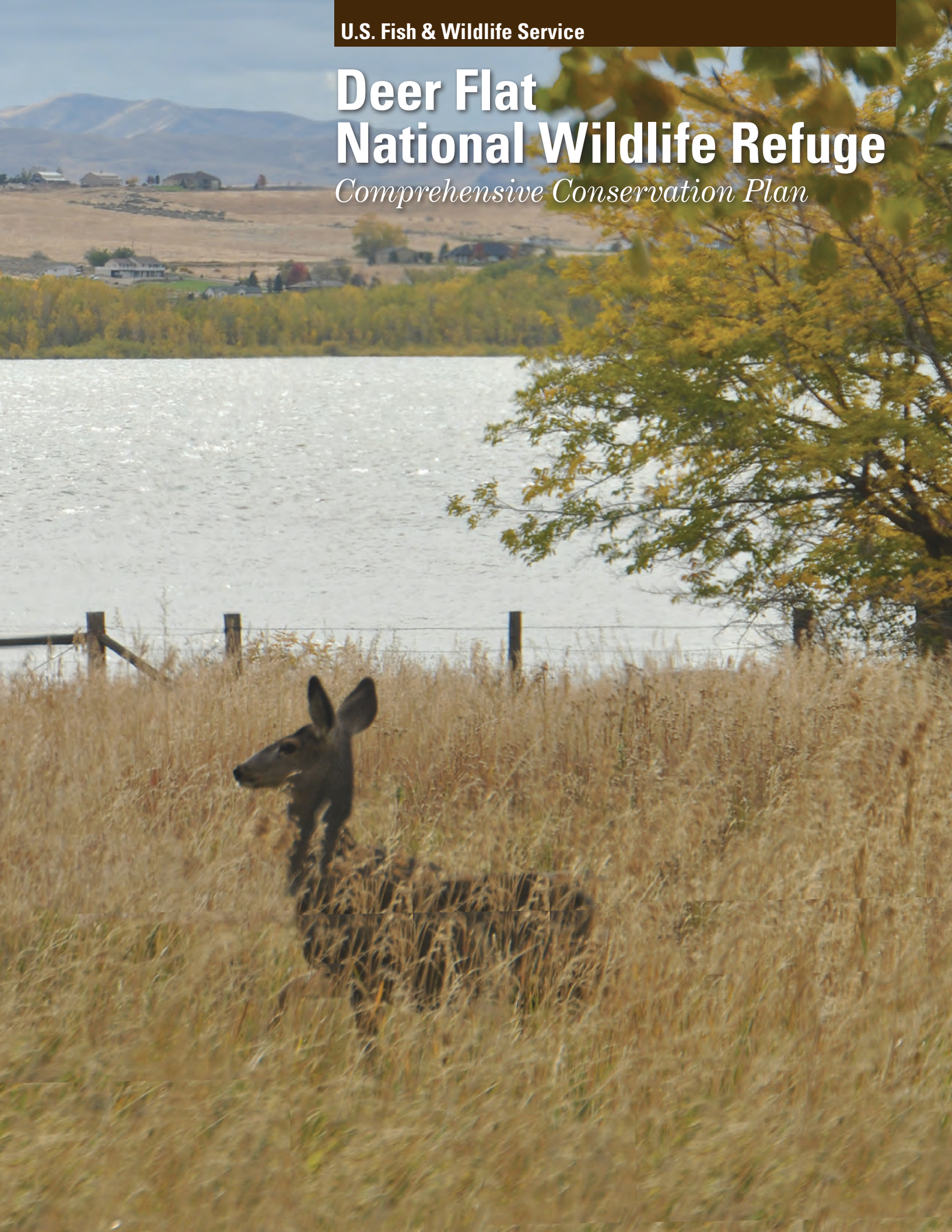
U.S. Fish & Wildlife Service

Deer Flat National Wildlife Refuge

Comprehensive Conservation Plan



A Vision of Conservation

Deer Flat National Wildlife Refuge is enjoyed, appreciated, protected, and treasured as a place where wildlife comes first. The public actively supports and advocates for the Refuge purpose and programs. Residents of the Treasure Valley value the oases of wildlife habitat in their backyard, both at Lake Lowell and the Snake River Islands. The clean, clear waters and lush riparian landscapes of Lake Lowell and the Snake River Islands provide nesting, resting, and feeding habitat for spectacular concentrations of migratory birds and other wildlife. Reductions in disturbance to important nesting, breeding, resting and feeding areas allow wildlife in all Refuge habitats to successfully produce and raise their young thereby sustaining wildlife populations for future generations of Americans to enjoy. The removal of invasive and/or undesirable plant and animal species on the islands of the Snake River and at Lake Lowell provides habitats where songbirds, nesting waterfowl and colonial waterbirds, and native mammals thrive. Habitat goals are met without impacts to the irrigation resources of Lake Lowell.

The Refuge is a place where all visitors are able to enjoy and connect with nature and realize the value of wildlife and habitats. Staff and volunteers share their love of the Refuge and its resources with visitors. In addition to being a destination for hunting, fishing, wildlife photography and observation, children and adults learn in the outdoor "living classroom" that the Refuge provides. The Refuge also provides for other recreational uses that allow people to enjoy the outdoors without impacting wildlife and habitats. All public use opportunities maintain the integrity of the wildlife resources, instill in visitors the importance of protected open spaces, and provide memorable outdoor experiences for present and future generations of Americans.

Comprehensive Conservation Plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

The refuge headquarters and visitor center rests on the shore of Lake Lowell.
Addison Mohler/USFWS

Deer Flat
National Wildlife Refuge
Comprehensive Conservation Plan

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November 2015

U.S. Fish and Wildlife Service

Approval Submission
for the
Deer Flat National Wildlife Refuge
Comprehensive Conservation Plan

In accordance with the National Wildlife Refuge System Administration Act as amended, the U.S. Fish and Wildlife Service has completed this Comprehensive Conservation Plan (CCP) for Deer Flat National Wildlife Refuge (Refuge). The purpose of this CCP is to specify management direction for the Refuge for the next 15 years. The goals, objectives, and strategies for improving Refuge conditions—including the types of habitat and recreation we will provide, partnership opportunities, and management actions to be implemented to achieve desired future conditions, are described in the CCP.

This CCP is submitted for the Regional Director's approval.

Submitted by: _____ 4/1/15
Project Leader, Southeast Idaho National Wildlife Refuge Complex — Date

Concur: Acting _____ 4/1/15
Refuge Supervisor, Pacific Region — Date

Concur: Kevin S Foerster _____ 4/1/15
Regional Chief, Pacific Region National Wildlife Refuge System — Date

Approved: Robyn Thorson _____ 4/3/15
Regional Director, Pacific Region Portland, Oregon — Date

U.S. Department of the Interior, Fish and Wildlife Service

Record of Decision for the Deer Flat National Wildlife Refuge Final Comprehensive Conservation Plan and Environmental Impact Statement

(Canyon, Payette, Owyhee, and Washington Counties, Idaho, and Malheur County, Oregon)

Introduction

Through this Record of Decision (ROD), the U.S. Fish and Wildlife Service (Service) selects the management direction for the Deer Flat National Wildlife Refuge (Refuge) Comprehensive Conservation Plan (CCP). This ROD includes brief summaries of our public involvement process, the alternatives we analyzed in our Final CCP and environmental impact statement (EIS), and our rationale for selecting Alternative 2 for management of the Refuge. The CCP will provide guidance for managing and conserving the Refuge's natural resources and public uses during the next 15 years.

Planning and Public Involvement Process

We initiated our planning and public involvement process in July 2010 by announcing our intention to complete a CCP/EIS in the Federal Register, issuing a press release, and distributing Planning Update 1. We invited the public to participate in our planning process and open house meetings, and we requested public comments. Our open house meetings and work sessions engaged elected officials, representatives from agencies and groups, and other stakeholders in identifying issues and developing solutions. Refuge staff members attended meetings held by stakeholders and engaged in numerous activities throughout the process to reach out to our diverse stakeholders, listen to their comments, and answer their questions.

In Planning Update 2 (December 2010), we summarized the significant planning issues we identified in public comments. In Planning Update 3 (May 2011), we described our four preliminary management alternatives that addressed public comments, resource needs, and refuge management regulations and policy. Several issues were identified; however, potential changes to boating on the Refuge’s Lake Lowell Unit and protecting the lake’s wildlife and habitats were recognized as primary concerns. We requested comments on the alternatives, including our preferred alternative. Additional meetings were held with key stakeholders including Idaho Fish and Game.

In Planning Update 4 (October 2011), we summarized the comments we received on the preliminary alternatives and the subsequent revisions to the alternatives. We presented our refined alternatives in the Draft CCP/EIS, distributed to the public in March 2013. We requested public comments in a news release, Federal Register notice, and in Planning Update 5. The comments we received on the Draft CCP/EIS were addressed in the Final CCP/EIS, which was available to the public on February 20, 2015, as announced in our press release, Federal Register notice, and Planning Update 6.

Range of Alternatives Considered

We analyzed four alternatives for managing the Refuge in the Final CCP/EIS, including a no-action alternative (Alternative 1) as required under the Council on Environmental Quality’s regulations (40 Code of Federal Regulations [CFR] 1500-1508). Summaries of the alternatives follow:

Under Alternative 1, we would continue current wildlife, habitat, and public use management. Invasive species control and limited restoration would be our habitat management focus. The Lake Lowell no-wake zone and seasonal closure October 1—April 14 for migratory birds would continue. Compatible priority and other public uses would continue. No additional trail or lake access would occur. Limited invasive species control and restoration would occur on the Snake River Islands Unit, which would open June 1—January 31 for free-roam activities and shoreline fishing.

Alternative 2, our preferred alternative, would protect Lake Lowell's shoreline feeding and nesting sites for wintering and migratory birds by continuing the seasonal closure of the lake October 1—April 14; establishing a new 200-yard no-wake zone on the south side and in the Narrows; and expanding the southeast no-wake zone to Gotts Point. Wildlife observation, fishing, and wildlife interpretation would be emphasized, and Gotts Point would open to vehicles, with increased law enforcement. We would increase wildlife inventory and monitoring, invasive species control, and restoration on the Snake River Islands Unit, and we would adjust closures to protect nesting and wading birds. Hunting for deer, upland game birds, and waterfowl would continue to be allowed. Most islands would be open for shoreline fishing and free-roam activities June 15—January 31; heron- and gull-nesting islands would be open July 1—January 31.

Alternative 3 would protect wildlife resources in Lake Lowell by closing emergent plant beds located in Murphy's Neck and near Parking Lots 3-8; closing the lake seasonally for wintering/migrating birds; closing areas within 500 yards of grebe-nesting sites; implementing a seasonal, 100-yard shoreline closure from Murphy's Neck to the Narrows; a 200-yard closure and no-wake zone in the southwest area; and a no-wake zone in the East Pool. Boating season would end on September 20. Upland game bird and controlled waterfowl hunting would be allowed, horseback riding and dog walking would not be allowed, and bicycling would be limited. Wildlife inventory and monitoring, invasive species control, and restoration would increase on the Snake River Islands Unit; closure dates would change to protect birds. Wildlife observation and hunting would occur on the islands. The islands would be open June 15—January 31 for fishing and free-roam activities. Heron-and gull-nesting islands would be open July 1—January 31.

Alternative 4 is described below as the Environmentally Preferable Alternative.

Environmentally Preferable Alternative

The definition of "environmentally preferable alternative" (40 CFR 1505.2(b)) is different from that of the preferred alternative. The environmentally preferred alternative generally causes the least damage to the environment and best protects natural and cultural resources. For this CCP/EIS, Alternative 4 is the environmentally preferable alternative; it would protect wildlife and their habitats through restrictions not found in Alternatives 1—3 and other actions.

Alternative 4 would reduce disturbance to feeding and resting wildlife by allowing boating at no-wake speeds only on all areas of Lake Lowell open to the public from April 15 to September 30. All emergent beds and the southeast end of the lake would be closed to public use to protect nesting and feeding waterbirds, waterfowl, and shorebirds. The entire lake would continue to be closed for wintering and migrating birds from October 1 to April 14 each year. The shoreline from Murphy's Neck to the Narrows would be protected by a 100-yard year-round closure in order to provide undisturbed loafing and feeding habitat for shorebirds and waterfowl. Trees would be removed in this area to enhance mudflats for migrating shorebirds. An increase in habitat enhancement through invasive species removal and vegetation manipulation would occur. Increases in wildlife and habitat

research and assessments would be focused on providing a strong scientific base for future management decisions.

The Refuge would not be open to nonwildlife-dependent activities, including horseback riding, pet walking, bicycling, and ice skating. To minimize conflicts with and improve the quality of the waterfowl hunt program, upland game hunting under Alternative 4 would no longer be allowed at the Lake Lowell Unit. Waterfowl hunting would be allowed on the south side of the Lake Lowell Unit from Parking Lots 1 to 8 with a daily limit of 25 shotgun shells per hunter.

Refuge staff would emphasize management of the Snake River Islands Unit under Alternative 4 by increasing wildlife inventory and monitoring efforts, invasive species control (following the Integrated Pest Management Plan), and restoration efforts. The most biologically intact islands would receive higher management priority. Island closure dates would be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used including prescribed fire and aerial application of herbicide and/or seed.

Existing public uses would continue on the Snake River Islands Unit, including wildlife observation, and hunting for deer, upland game species, and waterfowl on 1,219 acres. The Snake River Islands Unit would be open for off-trail, free-roam activities and shoreline fishing would also be available, from June 15 to January 31 each year on all islands under Alternative 4.

Selected Alternative

Based on our comprehensive review and analysis of Deer Flat Refuge's resources and issues, the Service has selected Alternative 2, our preferred alternative, for implementation. We will implement Alternative 2, as it is described in the Final CCP/EIS, with two modifications identified on the following page. In reaching our decision to implement Alternative 2, we identified and analyzed its impacts to the Refuge environment in Chapter 6 of the Draft and Final CCPs/EISs. Issues, concerns, and opportunities presented throughout the planning process by organizations, agencies, individuals, and all other stakeholders, were also considered.

Factors Considered in Making the Decision

The range of alternatives we analyzed in the Final CCP/EIS identified four scenarios for managing Deer Flat Refuge as a unit of the National Wildlife Refuge System. Measures for protecting wildlife and habitat varied from area closures to more expansive wildlife protection. Alternative 2 was selected because it is the most effective alternative for addressing the key issues identified during the planning process, and it will guide management of the Refuge in a manner that:

- Achieves the mission of the National Wildlife Refuge System, and the purposes, vision, and goals of the Refuge.
- Emphasizes interpretive programs and connecting families to nature through increased interpretive programs and by providing access to new facilities, as well as a wide range of wildlife-dependent and nonwildlife-dependent recreational activities
- Maintains and restores the ecological integrity of the Refuge's habitats and populations.
- Emphasizes management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control and restoration efforts.
- Addresses the legal mandates of the Service and the Refuge.
- Applies the scientific principles of sound wildlife management.

- Facilitates priority public uses appropriate and compatible with the Refuge's purposes and the National Wildlife Refuge System mission.

Alternative 1, the status quo, is the least protective of wildlife. Alternative 1 was not selected, because it would not provide sufficient protection for the Refuge's wildlife and habitat. Impacts to wildlife habitats and species would be significant if daytime disturbances by high-speed boating and other water sports continue. Significant negative effects to nesting and feeding habitats for waterbirds, waterfowl, and shorebirds would occur if visitation increases over time, public use remains unrestricted, and only minimal habitat management is conducted.

As a wildlife refuge near a major urban center, Deer Flat Refuge has an opportunity to engage new and diverse audiences to build an urban conservation constituency which ultimately benefits the entire National Wildlife Refuge System and the broader conservation community by nurturing increased education and support among these audiences. Alternative 3 was not selected because the public use restrictions would unnecessarily limit the Refuge's ability to connect with a diverse group of refuge visitors and build an urban conservation constituency because the additional public uses that were found to be compatible under Alternative 2 would be restricted under Alternative 3.

Similarly, Alternative 4, although it is environmentally preferred, was not selected because the public use restrictions would unnecessarily limit the Refuge's ability to connect with a diverse group of refuge visitors and build an urban conservation constituency because the additional public uses that were found to be compatible under Alternative 2 would be restricted under Alternative 4.

Changes Made to the Selected Alternative

Two changes were made to wildlife-dependent public uses between the Final CCP/EIS and this ROD for the final CCP, they follow.

- We clarified that noncompetitive jogging, bicycling, and horseback riding groups of 10 or fewer people without a special use permit (SUP) are allowed, *even if they are training*, but competitive events are still not allowed and an SUP is still required for groups larger than 10.

- We re-evaluated the restriction on boats using wake-generating devices (wake-boats) and have found that the use is compatible, with stipulations identified in the Compatibility Determination for Recreational Boating in Appendix B.

The original prohibition on wake-boats stems from concerns that their ballast could introduce invasive species into Lake Lowell and that wake-boats create wakes greater than other allowed boats. However, the invasive species issue can be addressed by adding filtering systems, and some boats without wake-generating devices are capable of causing similar wakes.

While we remain concerned about wake impacts to grebes, the greatest threats to the grebe colony at Lake Lowell are the withdrawal of water during incubation and nest disturbance which results in predation. We believe that the new no-wake zones will provide some additional protection and that public education and compliance with the new no-wake zones can provide the appropriate balance of boating opportunities and wildlife protection. We will continue to evaluate the effects of boating on wildlife to ensure that the permitted uses remain compatible and revise the Compatibility Determination, as necessary, to ensure that uses do not materially interfere or detract from the fulfillment of the Refuge System or the purposes of the refuge.

Stipulations for all compatible uses are identified in Appendix B of the final CCP.

Measures to Minimize Environmental Harm

All practicable measures to avoid or minimize environmental harm that could result from implementing Alternative 2 were identified and incorporated into the Final CCP/EIS in Chapter 2 (Alternatives, Goals, Objectives, and Strategies), Chapter 6 (Environmental Consequences), and Appendix B (Compatibility Determinations). The stipulations identified in Appendix B ensure that public uses and other uses are compatible with the National Wildlife Refuge System mission and the Refuge's purposes. The stipulations and other mitigation measures identified in Alternative 2 and Appendix B are adopted by the Service in this ROD, and will be implemented by Refuge staff members, collaborators, volunteers, and other stakeholders.

Findings Required by Other Laws and Executive Orders

The proposed action complies with all federal laws and executive orders related to the National Wildlife Refuge System CCP planning process. A compliance statement has been completed, which explains how the selected alternative complies with the requirements of the National Wildlife Refuge System Administration Act, as amended, (16 U.S. Code [U.S.C.] 688dd-688ee); the National Environmental Policy Act (42 U.S.C. 4321 et seq.); the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884); the National Historic Preservation Act (16 U.S.C. 470-470b, 470c-470n); the Wilderness Act (16 U.S.C. 1131-1136); Executive Order 11990, Protection of Wetlands; Executive Order 12372, Intergovernmental Review; Executive Order 13186, Protection of Migratory Birds; Executive Order 12898, Environmental Justice; Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; and 517 DM 1 and 569 FW1, Integrated Pest Management.

For Further Information

Questions about this CCP/EIS may be directed to Annette de Knijf, Refuge Manager, Deer Flat National Wildlife Refuge, 13751 Upper Embankment Road, Nampa, Idaho, 83686-8046, phone number (208) 467-9278, and e-mail annette_deknijf@fws.gov. View this ROD and related documents on our Website http://www.fws.gov/refuge/deer_flat/.

Final Decision

To further protect the wildlife and habitats of the Deer Flat National Wildlife Refuge, and to enhance the public uses and visitor experiences provided by the Refuge, the Service selects Alternative 2 for implementation over the next 15 years.

Robyn Thorson

Regional Director, Pacific Region
Portland, Oregon

4/3/15
Date

Supporting References

U.S. Fish and Wildlife Service. 2013. Deer Flat National Wildlife Refuge Draft Comprehensive Conservation Plan and Environmental Impact Statement. Deer Flat National Wildlife Refuge, Nampa, ID.

U.S. Fish and Wildlife Service. 2015. Deer Flat National Wildlife Refuge Comprehensive Conservation Plan and Environmental Impact Statement. Deer Flat National Wildlife Refuge, Nampa, ID.

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Executive Summary

Refuge Information and Background

The Deer Flat National Wildlife Refuge (Refuge) is located in Idaho's Canyon, Payette, Owyhee, and Washington Counties; and Malheur County, Oregon. This summary provides a brief overview of the Refuge's Comprehensive Conservation Plan (CCP). The U.S. Fish and Wildlife Service (Service) is required by the National Wildlife Refuge System Administration Act of 1966 as amended, to develop a CCP for all units of the National Wildlife Refuge System (Refuge System).

The Refuge was established by Theodore Roosevelt in 1909 to provide a refuge and breeding ground for migratory birds and other wildlife. The Refuge encompasses two units totaling approximately 11,617 acres. The Lake Lowell Unit is approximately 10,582 acres; it is an overlay refuge on the Bureau of Reclamation's Lake Lowell Reservoir irrigation facility, and includes adjacent uplands. The Snake River Islands Unit encompasses approximately 1,035 acres on 104 islands in the Snake River. The Refuge provides opportunities for a variety of activities, and is a popular recreation destination.

The Refuge's staff manages habitat for more than 215 bird species including waterfowl, waterbirds, shorebirds, raptors, and passerines. The Refuge is also an important resting and wintering area for birds migrating along the Pacific Flyway, and more than 25 species of mammals and invertebrates have been documented on the Refuge. Lake Lowell is the largest physical feature on the Refuge, providing open water, emergent vegetation, and mudflats. Other habitat types found on the Refuge include sagebrush-steppe uplands and riparian habitats.

The management direction in Chapter 2 was analyzed in our draft and final CCPs/EISs as Alternative 2, our preferred alternative. We selected Alternative 2 in our Record of Decision, for implementation on the Refuge. We will conserve the Refuge's fish, wildlife, and plants, by monitoring their populations, reducing human-caused disturbance, managing and restoring habitats, and controlling invasive and feral species. The Refuge's priority wildlife-dependent public uses include wildlife observation and photography, hunting, fishing, environmental education, and interpretation. Actions for managing these and a variety of nonwildlife-dependent uses, in a manner that is compatible with the Refuge's purposes are also in Chapter 2. This CCP will guide Refuge management for 15 years.

Refuge Purposes

The Refuge's conservation purposes were fundamental in formulating the management direction in this CCP. The purposes for establishing the Refuge follow.

- "as a refuge and breeding grounds for migratory birds and other wildlife" (Executive Order 7655, dated July 12, 1937).
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d, Migratory Bird Conservation Act).
- "suitable for—(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1, Refuge Recreation Act).

- "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2, Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended).

Our Vision

The Service's vision for the future of Deer Flat Refuge follows.

> Deer Flat National Wildlife Refuge is enjoyed, appreciated, protected, and treasured as a place where wildlife comes first. The public actively supports and advocates for the Refuge purpose and programs. Residents of the Treasure Valley value the oases of wildlife habitat in their backyard, both at Lake Lowell and the Snake River Islands. The clean, clear waters and lush riparian landscapes of Lake Lowell and the Snake River Islands provide nesting, resting, and feeding habitat for spectacular concentrations of migratory birds and other wildlife. Reductions in disturbance to important nesting, breeding, resting and feeding areas allow wildlife in all Refuge habitats to successfully reproduce and raise their young thereby sustaining wildlife populations for future generations of Americans to enjoy. The removal of invasive and/or undesirable plant and animal species on the islands of the Snake River and at Lake Lowell provides habitats where songbirds, nesting waterfowl and colonial waterbirds, and native mammals thrive. Habitat goals are met without impacts to the irrigation resources of Lake Lowell.
>
> The Refuge is a place where all visitors are able to enjoy and connect with nature and realize the value of wildlife and habitats. Staff and volunteers share their love of the Refuge and its resources with visitors. In addition to being a destination for hunting, fishing, wildlife photography, and observation, children and adults learn in the outdoor "living classroom" that the Refuge provides. The Refuge also provides for other recreational uses that allow people to enjoy the outdoors without impacting wildlife and habitats. All public use opportunities maintain the integrity of the wildlife resources, instill in visitors the importance of protected open spaces, and provide memorable outdoor experiences for present and future generations of Americans.

Our Refuge Management Goals

The vision will be fulfilled, by managing Refuge resources to achieve the following goals.

Wildlife and Habitat Goals

Goal 1: Protect, maintain, and enhance viable mudflat, emergent-bed, and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife.

Goal 2: Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Goal 3: Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Goal 4: Protect, maintain, and enhance shrub-steppe habitats characteristic of the historical Columbia Basin.

Goal 5: Protect, maintain and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife.

Goal 6: Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources.

Public Use and Cultural Resources Goals

Goal 1: Visitors of all ages will enjoy abundant native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat.

Goal 2: Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 3: Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 4: Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats.

Goal 5: Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors.

Goal 6: The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 7: The Refuge will protect and manage cultural resources and look for ways to gain new understanding of the history and cultural resources of the Lake Lowell and Snake River Islands Units.

Public Involvement

The Refuge staff conducted extensive outreach to engage a wide variety of stakeholders in our planning process throughout development of the CCP. We began the planning and public involvement process in July 2010 by publishing a notice in the Federal Register; holding Open Houses at the Refuge's Visitor Center; and requesting public input to identify management issues. Public comments were also requested on our preliminary draft alternatives in June 2011, and again when we released our Draft CCP/EIS in March 2013. We addressed public comments in our final CCP/EIS. For additional information see the Summary of Public Involvement in Appendix H.

Management Direction

We selected Alternative 2, as the basis for the management direction in the CCP. Our primary emphasis will be to reduce disturbance to important wildlife breeding, nesting and feeding areas, reduce undesirable plant and animal species, and improve compatible recreation opportunities. We will emphasize connecting families to nature by providing access to new facilities and a wide range of wildlife-dependent and nonwildlife-dependent recreational activities. Activities will be managed to protect wildlife, reduce conflicts between users, and increase safety.

Lake Lowell Unit

On Lake Lowell, we will protect shoreline feeding and nesting sites in no-wake zones and seasonal closed areas, and feature the Refuge's conservation purpose and goals in interpretive programs.

Management of Wildlife and Habitat. To provide needed protections for lake-dependent wildlife, a 200-yard no-wake zone will be established along the south side of the lake between Parking Lots 1 and 8. The entire lake will continue to be closed to motorized boating from October 1 to April 14 each year for the benefit of wintering and migrating birds. No-wake zones will be required in the Narrows, and the no-wake zone on the southeast end of the lake will be expanded to start at a line between Gotts Point and Parking Lot 1. Motorized boats will be allowed in the no-wake zones at speeds that do not create a wake (generally less than 5 mph).

Seasonally closed areas will protect heron rookeries, eagle nests, and grebe nesting colonies, which will allow us to adapt management actions to changes in the nesting and feeding requirements of wildlife, while ensuring that the areas actively used by wildlife are protected from potentially-disturbing activities. This will provide more flexible protections for wildlife, as well as more opportunities for compatible public uses. We will also increase habitat enhancement through invasive species removal and vegetation manipulation. Increases in wildlife and habitat research and assessments will be focused on providing a strong scientific base for future management decisions.

Management of Public Uses. We will provide access for a wide range of outdoor recreational activities. Management efforts will focus on increasing participation in all six priority wildlife-dependent recreational activities. Fishing and interpretation will be emphasized to serve a growing diverse, urban population. We will seek to connect people with nature and build support for wildlife conservation. Seasonal, on-trail regulations will protect wildlife while allowing visitors to experience wildlife in Refuge habitats. We will open Gotts Point to vehicles when a cooperative agreement is in place for increased law enforcement.

Snake River Islands Unit

Management of Wildlife and Habitat. Refuge staff will emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control and restoration efforts. Islands management needs will be prioritized using several factors. The most biologically intact islands will be a higher management priority. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed. Island closure dates will be adjusted to better protect nesting geese, wading birds, gulls, and terns.

Management of Public Uses. Existing public uses will continue and include wildlife observation and hunting for deer, upland birds, and waterfowl on over 1,200 acres. Most of the Snake River Islands Unit will be open for off-trail, free-roam activities including shoreline fishing, from June 15 to January 31 annually. Heron- and gull-nesting islands (four to six islands) will be open for off-trail, free-roam activities from July 1 to January 31.

Chapter 1 Introduction and Background

Western screech owl
©Dick McKee

Chapter 1 Introduction and Background

1.1 Introduction

Deer Flat National Wildlife Refuge (Refuge or NWR), located near the city of Nampa in southwest Idaho, is managed by the U.S. Fish and Wildlife Service (Service or FWS) as part of the National Wildlife Refuge System (NWRS or Refuge System). The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans. This Comprehensive Conservation Plan (CCP) contains our management direction for the Refuge for the next 15 years.

President Theodore Roosevelt established the Refuge in 1909 as the Deer Flat Reservation (Executive Order [E.O.] 1032), on Deer Flat Reservoir (Lake Lowell), the first irrigation reservoir completed for the Bureau of Reclamation's (Reclamation) Boise Project. Most of the Refuge is an overlay refuge on Reclamation's Lake Lowell. The Refuge was established to provide refuge and breeding grounds for migratory birds and other wildlife, subject to use by the Department of the Interior for reclamation work (E.O. 7655). This means that the Service has an obligation to manage Refuge uses consistent with the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd-668ee, et seq.), and other laws, regulations, and policies governing the Refuge System. Our management of the Refuge may not interfere with Reclamation operations and incidental purposes.

In 1994, we completed compatibility determinations for upland uses occurring at the Refuge, but none were completed for on-water uses at that time. The Service and Reclamation agree that the Refuge has jurisdiction over surface water and public uses on Lake Lowell, as long as Refuge management actions do not interfere with Reclamation operations and incidental purposes. Because the Service has responsibility for the management of all public uses within the Refuge, including on-water recreational uses, all public uses must be examined as part of the CCP process to determine if they are compatible with the purposes of the Refuge, as required by law.

The Refuge encompasses approximately 11,617 acres within two units: the Lake Lowell Unit and Snake River Islands Unit (see Maps 1 and 2). According to geographic information system (GIS) estimates, the Lake Lowell Unit covers 10,582 acres within Idaho's Canyon County, including the 9,951-acre overlay area on Lake Lowell. The Snake River Islands Unit includes approximately 1,200 acres on more than 104 islands scattered along 113 miles of the Snake River, between two states (Idaho and Oregon) and five counties (Canyon, Payette, Owyhee, and Washington counties in Idaho; and Malheur County in Oregon).

1.2 History of the Landscape

The presettlement landscape of southwest Idaho was much different than it is today. Native Americans hunted and gathered on the lands in and around the Refuge, finding rich sources of food. The hills were filled with sagebrush, rabbitbrush, and native bunchgrasses that provided homes for wildlife ranging from burrowing owls to spadefoot toads, beetles to badgers, and butterflies to sparrows.

Euro-Americans, who traveled through this part of Idaho in the late 1800s and early 1900s and eventually settled here, recognized the harsh reality that little rain—less than 10 inches a year—fell upon this high desert environment. Even though occasional springs supplied much-needed water that fed grasses and attracted deer and elk, settlers realized that it was not enough to carve out a life.

By 1904, Idaho's first water reclamation project was initiated at Minidoka, which became the site of the first hydroelectric dam in the West. Impressed by the Minidoka Project, State Engineer D.W. Ross, and J.H. Lowell, President of the Boise-Payette Water Users Association, successfully lobbied Congress to fund an irrigation project for Boise, Idaho. The Boise Project was authorized by the Secretary of the Interior on March 27, 1905, under the Reclamation Act of 1902. When Federal funding fell short of what was needed, J.H. Lowell organized local farmers and raised matching funds to support the project. In 1906 work on Deer Flat Reservoir began as part of the Boise-Payette Project. Materials from local quarries and the work of local citizens helped build the reservoir.

When Deer Flat Reservoir was completed, it was the largest human-made reservoir on earth, held in by three dams and one dike. The longest dam, called the Lower Embankment (Lower Dam), stretches 1.5 miles. The tallest dam at 74 feet, the Upper Embankment (Upper Dam) is 0.75 mile long. The Deer Flat Reservoir was critical to the development of the Boise Basin.

President Theodore Roosevelt created a national bird refuge at Deer Flat Reservoir, with Executive Order 1032. The Refuge was one of 21 Federal Reclamation Projects referenced in the order, each of which used man-made reservoirs to provide safe havens for migratory birds and other wildlife.

Reclamation operated and maintained Deer Flat Reservoir until 1926, when operation and maintenance was transferred to the Boise Project Board of Control (Board of Control), via repayment contracts with the five irrigation districts that comprise the Board of Control—Big Bend, Boise-Kuna, Nampa & Meridian, New York, and Wilder.

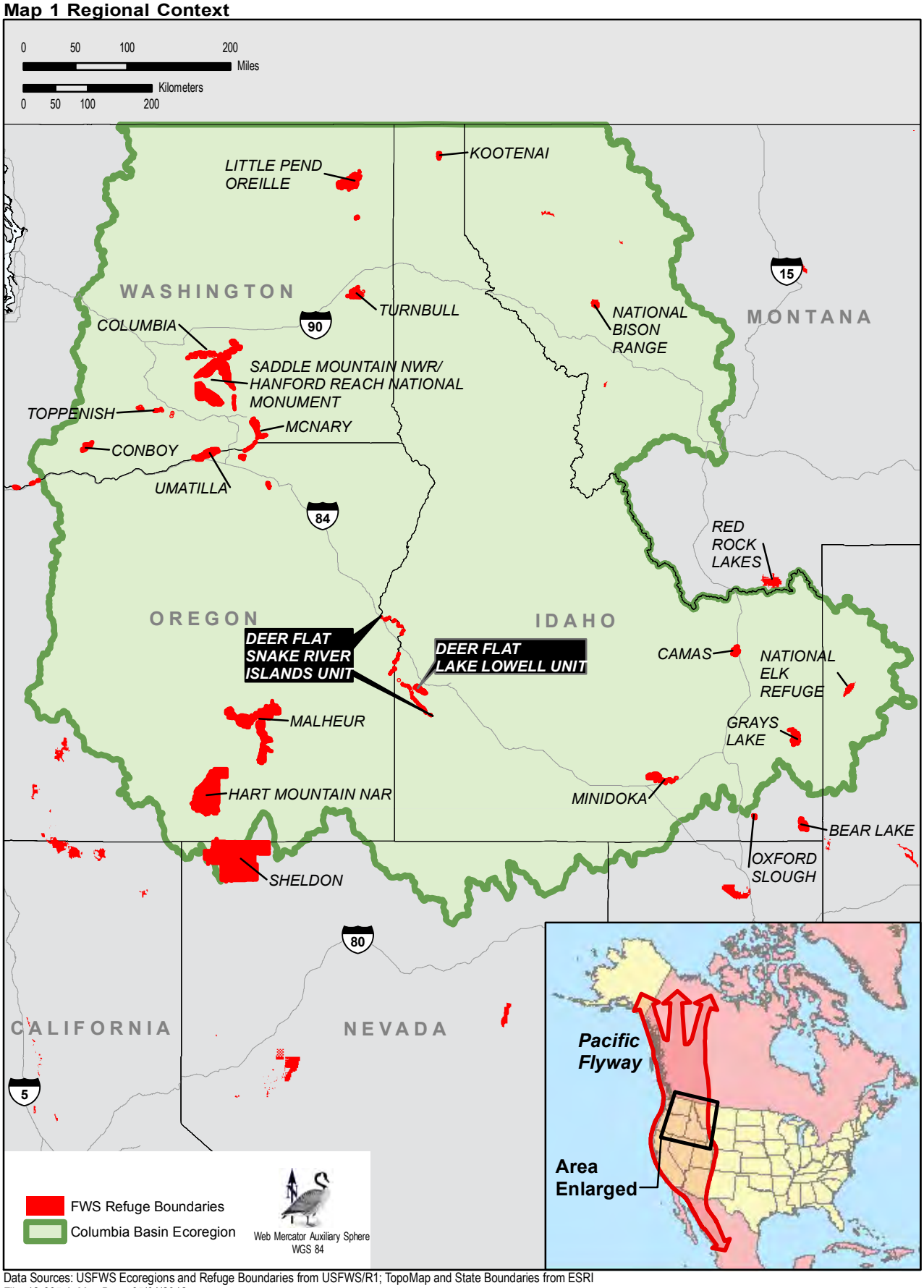
The Deer Flat Bird Reservation remained the only national wildlife refuge in southwest Idaho until 1937, when, through the efforts of President Franklin D. Roosevelt and J. Clark Salyer, 36 islands in the Snake River were designated as the Snake River Islands National Wildlife Refuge. Both Refuges were managed by the Deer Flat Bird Reservation, which was re-established and renamed Deer Flat Migratory Waterfowl Refuge (E.O. 7655) on July 12, 1937.

In 1940, the Refuges were renamed the Deer Flat National Wildlife Refuge and the Snake River National Wildlife Refuge, and in 1963 the Refuges were consolidated as two units of Deer Flat National Wildlife Refuge. Deer Flat Reservoir was renamed Lake Lowell in 1948 in recognition of J.H. Lowell's work to develop the reservoir, and in 1976, the Lower and Upper Dams were included on the National Register of Historic Places because of their role in Idaho's history.

1.3 Biological Significance of the Refuge

Nestled in the rolling sagebrush hills of southwest Idaho, the Refuge provides a variety of wildlife habitats, including the open waters and wetland edges of the Lake Lowell Unit, sagebrush uplands and riparian forest around the lake, and grassland and riparian forests on the Snake River Islands Unit. Lake Lowell provides a resting and wintering area for migratory birds along the Pacific Flyway in the fall and winter, and important areas for nesting species in spring and summer. The Refuge is recognized by the National Audubon Society as a State Important Bird Area (Audubon 2012).

Map 1 Regional Context



Data Sources: USFWS Ecoregions and Refuge Boundaries from USFWS/R1; TopoMap and State Boundaries from ESRI
File: 12-005-1 Map Date: 05/04/2012

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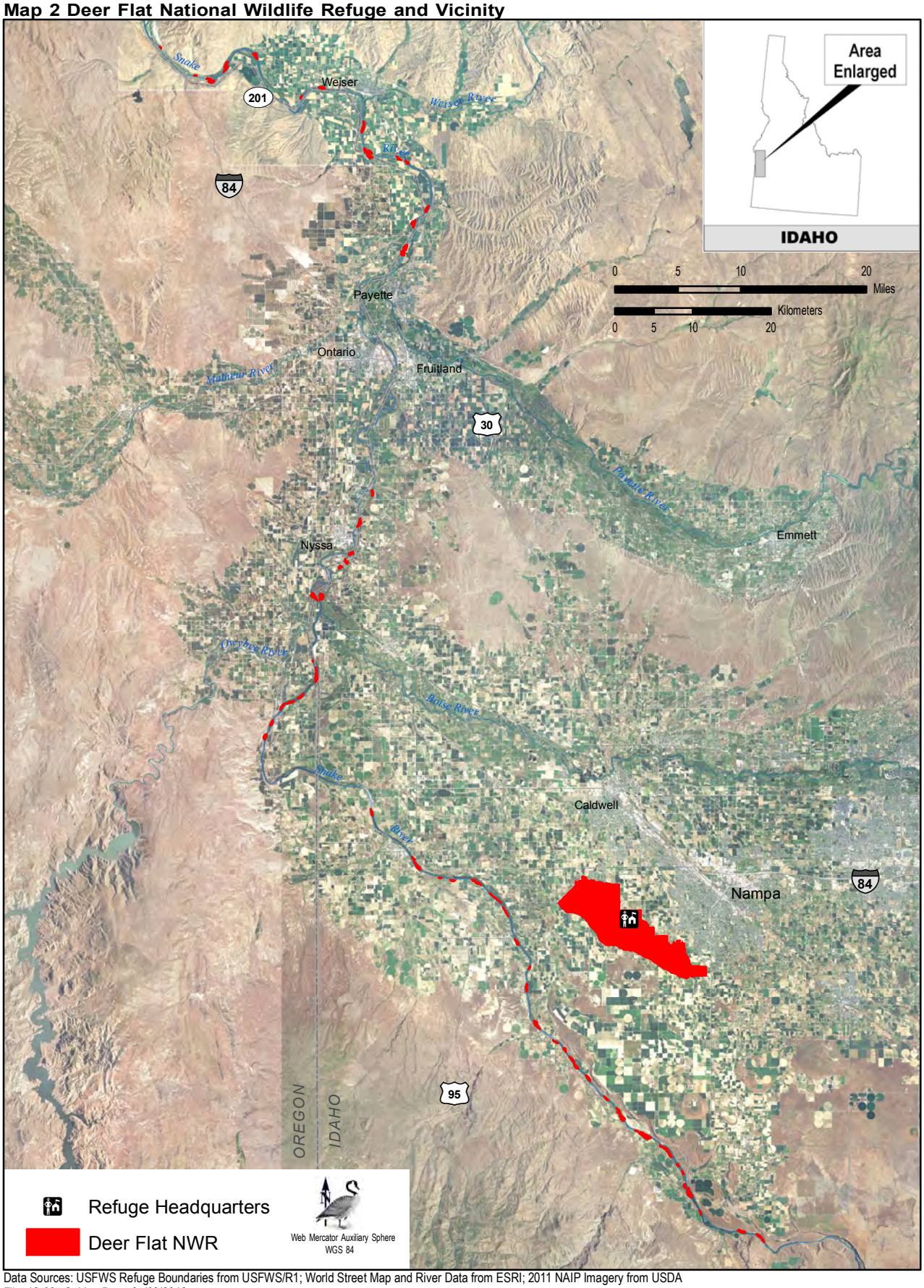
Map 2 Deer Flat National Wildlife Refuge and Vicinity



Data Sources: USFWS Refuge Boundaries from USFWS/R1; World Street Map and River Data from ESRI; 2011 NAIP Imagery from USDA
File: 12-005-2 Map Date: 05/03/2012

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In spring, bald eagles, ospreys, and great horned owls nest on both Refuge units, with most feeding nestlings by the end of April. In April and May, great blue herons, black-crowned night herons, and double-crested cormorants nest in large rookeries on some of the islands in the Snake River Islands Unit, and up to 10,000 pairs of California gulls nest on Smith Island.

In early summer, western grebes dance on Lake Lowell while resident bald eagles look for food for their young. Visitors can see large numbers of white pelicans on the lake and large broods of Canada geese in pastures and fields adjacent to the Snake River. By late July and early August, mallards and wood ducks begin to congregate on the lake, looking for food in flooded vegetation.

As irrigation waters recede in late summer and early fall, the large exposed mudflats provide important feeding areas for shorebirds such as dowitchers, sandpipers, godwits, yellowlegs, and plovers, migrating south to wintering areas. The Intermountain West Shorebird Regional Plan (Oring et al. 2000) names Lake Lowell as one of only two sites in Idaho where more than 5,000 shorebirds were observed in more than half of the years surveyed.

As fall sets in, the number of birds using the Refuge increases. Resident flocks of ducks and up to 6,000 Canada geese are usually on Lake Lowell by the second week of October. As colder weather drives migrating ducks and geese south, migratory birds join the resident birds at the lake. Some birds pass through, while others spend the winter. By mid-November, the goose population peaks at up to 15,000 birds. Duck populations peak in mid-December, with up to 70,000 ducks using Lake Lowell annually. Mallards predominate, but small numbers of northern pintail, American wigeon, green-winged teal, wood duck, common merganser, and northern shoveler are also present. The Snake River also provides a winter home for a variety of ducks and geese.

Emergent vegetation along the edges of the lake, such as smartweed, provides a food source for waterfowl, nesting material for on-water nesting birds such as western and Clark's grebes, and cover for fish. Lake Lowell provides habitat for one of the three largest nesting colonies of western grebes in Idaho (pers. comm., C. Moulton 2010). Western and Clark's grebes are considered species of greatest conservation need by the Idaho Department of Fish and Game (IDFG), because appropriate nesting sites are lacking (IDFG 2005).

Bald eagles, osprey, great blue herons, and other colonial nesting birds are attracted to the riparian areas of the Lake Lowell and Snake River Islands Units. The upland habitats of the units provide habitat for nesting California gulls and Canada geese and a variety of other native wildlife. The Snake River Islands' grassland, shrub, and riparian forest habitats and surrounding waters provide habitat throughout the year for herons, cormorants, songbirds, and predators, such as foxes, coyotes, red-tailed hawks, and American kestrels.

1.4 Action

This document is the Refuge's final CCP. This CCP sets forth management guidance for the Refuge for the next 15 years, as required by the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee, et seq.), as amended by the National Wildlife Refuge System Improvement Act (Improvement Act) of 1997 (Public Law 105-57). The Refuge System Administration Act requires CCPs to identify and describe the following:

- The purposes of a refuge;

- The fish, wildlife and plant populations, their habitats, and the archaeological and cultural values found on a refuge;
- Significant problems that may adversely affect wildlife populations and habitats and solutions for correcting or mitigating the effects of those problems;
- Areas suitable for administrative sites or visitor facilities; and
- Opportunities for fish- and wildlife-dependent recreation.

NWRS planning policy (602 FW 3, June 2000) states that the purpose of CCPs is to "describe the desired future conditions of a refuge and provide long-range guidance and management direction to achieve refuge purposes; help fulfill the National Wildlife Refuge System mission; maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System; … and meet other mandates."

Through this CCP, we will implement management actions described in the final CCP/EIS in Alternative 2, with the addition of wakesurfing as a compatible use (see Appendix B). We examined three other alternatives for managing the Refuge in the final CCP/EIS, pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321-4347).

The goals, objectives, and strategies in Chapter 2 best achieve the purpose and need for this CCP, while maintaining balance among the varied management needs and programs. Operation and maintenance of the Deer Flat Dams, reservoir storage, appurtenant structures and Reclamation zones, and delivery of stored irrigation water are the responsibility of Reclamation and the Board of Control. This CCP represents the most balanced approach for achieving the Refuge's purposes, vision, and goals; contributing to the Refuge System's mission, addressing relevant issues and mandates, and managing the Refuge consistent with the sound principles of fish and wildlife management. For the details of specific components and actions, see Chapter 2.

1.5 Purpose and Need for Action

The need for the CCP is to provide reasonable, scientifically grounded guidance for ensuring that over a period of 15 years, as directed by the National Wildlife Refuge System Administration Act of 1966, as amended, Deer Flat NWR will achieve the following purposes.

- Enhance, maintain, and protect Refuge habitats (including mudflats, emergent beds, and open water habitats of Lake Lowell, riparian forests, nonlake wetlands, and shrub-steppe) for the benefit of migratory birds and other wildlife.
- Gather sufficient scientific information to guide responsible adaptive management decisions.
- Provide visitors with compatible wildlife-dependent and nonwildlife-dependent recreational opportunities that foster an appreciation and understanding of the Refuge's fish, wildlife, and plants, and their habitats, and have limited impacts to wildlife.
- Initiate and nurture relationships and develop cooperative opportunities to promote the importance of the Refuge's wildlife habitat, and support Refuge stewardship.
- Protect and manage the Refuge's cultural resources, and identify new ways to gain an understanding of the Lake Lowell and Snake River Islands Units' history and cultural resources.

1.6 Legal and Policy Guidance

The Refuge is part of the NWRS, managed within a framework provided by legal and policy guidelines. The Refuge System is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems.

1.6.1 The U.S. Fish and Wildlife Service

The Refuge System is managed by the Service, an agency within the Department of the Interior. The Service is the principal Federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife populations and their habitats. The mission of the Service is: "working with others, to conserve, protect and enhance fish and wildlife and their habitats for the continuing benefit of the American people." Although we share this responsibility with other Federal, State, Tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, endangered and threatened species, and certain anadromous fish and marine mammals. The Service has similar trust responsibilities for the lands and waters we administer to support the conservation and enhancement of fish, wildlife, and plants, and their habitats.

The Service also enforces Federal wildlife laws and international treaties for importing and exporting wildlife, assists with State fish and wildlife programs, and helps other countries develop wildlife conservation programs.

1.6.2 National Wildlife Refuge System

The needs of wildlife and their habitats come first on national wildlife refuges, in contrast to other public lands that are managed for multiple uses. Refuges are guided by various Federal laws and Executive Orders, Service policies, and international treaties. Fundamental are the mission and goals of the NWRS and the designated purposes of the refuge unit, as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge.

Key concepts and guidance of the Refuge System derive from the National Wildlife Refuge System Administration Act of 1966 as amended (16 U.S.C. 668dd-668ee, et seq.); the Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4), as amended; Title 50 of the Code of Federal Regulations (C.F.R.); and the Fish and Wildlife Service Manual. The National Wildlife Refuge System Administration Act is implemented through regulations covering the NWRS, published in Title 50, subchapter C of the C.F.R. These regulations govern general administration of units of the Refuge System.

1.6.2.1 National Wildlife Refuge System Mission and Goals

The mission of the Refuge System is to "administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended).

The goals of the NWRS, as articulated in the Mission, Goals, and Purposes Policy (601 FW 1), are to:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that are strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

1.6.2.2 National Wildlife Refuge System Administration Act

Of all the laws governing activities on national wildlife refuges, the Refuge Administration Act undoubtedly exerts the greatest influence. The Improvement Act amended the Refuge System Administration Act in 1997 by including a unifying mission for all national wildlife refuges as a system, a new process for determining compatible uses on refuges, and a requirement that each refuge be managed under a comprehensive conservation plan, developed in an open public process.

The Refuge Administration Act states that the Secretary shall provide for the conservation of fish, wildlife and plants, and their habitats within the Refuge System, as well as ensure that the biological integrity, diversity, and environmental health of the System are maintained. House Report 105-106 accompanying the Improvement Act states “the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first.” Biological integrity, diversity, and environmental health are critical components of wildlife conservation. As later made clear in the Biological Integrity, Diversity and Environmental Health Policy (601 FW 3), “the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions.”

Under the Refuge Administration Act, each refuge must be managed to fulfill the Refuge System mission as well as the specific purposes for which it was established. The Refuge Administration Act requires the Service to monitor the status and trends of fish, wildlife, and plants in each refuge.

Additionally, the Refuge Administration Act identifies six priority wildlife-dependent recreational uses for the Refuge System (the “Big Six”). These uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Under the Refuge Administration Act, the Service is to grant these six wildlife-dependent public uses special consideration in the planning for, management of, and establishment and expansion of units of the NWRS. The overarching goal for wildlife-dependent public use programs is to enhance opportunities and access to quality wildlife-dependent visitor experiences on refuges, while managing refuges to conserve fish, wildlife, plants, and their habitats. When determined compatible on a refuge-specific basis, these six uses assume priority status among all uses of the refuge in question. The Service is to make extra efforts to facilitate priority wildlife-dependent public use opportunities.

When preparing a CCP, refuge managers must re-evaluate all general public, recreational, and economic uses (even those occurring to further refuge habitat management goals) proposed or occurring on a refuge for appropriateness and compatibility. No refuge use may be allowed or continued unless it is determined to be appropriate and compatible. Generally, an appropriate use is one that contributes to fulfilling a refuge's purposes, the Refuge System mission, or goals or objectives described in a refuge management plan. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge. Appropriate use and updated compatibility determinations for public uses of the Deer Flat Refuge are in Appendices A and B respectively, of this CCP.

The Refuge Administration Act also requires that in addition to formally established guidance, the CCP must be developed with the participation of the public. Issues and concerns articulated by the public play a role in guiding alternatives considered during the development of the CCP, and with the formal guidance, can play a role in selecting a preferred alternative. It is Service policy to develop CCPs in an open public process, and to obtain public input throughout the process. Appendix H details the public involvement that occurred during the CCP process.

1.6.3 Other Laws and Mandates

Many Federal laws, executive orders, Service policies, and international treaties govern the Service and Refuge System lands. Examples include the Migratory Bird Treaty Act of 1918, Refuge Recreation Act of 1962, National Historic Preservation Act of 1966, and the Endangered Species Act of 1973. For additional information on laws and other mandates, a list and brief description of Federal laws of interest to the Service can be found in the Laws Digest at http://www.fws.gov/laws/Lawsdigest.html.

The Service has developed or revised numerous policies and Director's Orders to reflect the mandates and intent of the Improvement Act. Some of these key policies include the Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3); the Compatibility Policy (603 FW 2); the Comprehensive Conservation Planning Policy (602 FW 3); Mission, Goals, and Purposes (601 FW 1); Appropriate Refuge Uses (603 FW 1); Wildlife-Dependent Public Uses (605 FW 1); wilderness-related policies (610 FW 1-5); and the Director's Order for Coordination and Cooperative Work with State Fish and Wildlife Agency Representatives on Management of the National Wildlife Refuge System. These policies and others in draft or under development can be found at http://fws.gov/refuges/policymakers/nwrpolicies.html. During CCP development, refuges must consider these broader laws and policies as well as Refuge System and ecosystem goals and visions. The CCP must be consistent with these and also with the Refuge's purpose.

1.7 Refuge Establishment and Purposes

1.7.1 Legal Significance of the Refuge Purpose

The purpose for which a refuge was established or acquired is of key importance in refuge planning. Refuge purposes must form the foundation for management decisions. They are the driving force in the development of the refuge vision statements, goals, objectives, and strategies in a CCP and are critical to determining the compatibility of existing and proposed refuge uses. The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public

land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

Unless the establishing law, order, or other document indicates otherwise, purposes dealing with the conservation, management, and restoration of fish, wildlife, and plants, and the habitats on which they depend, take precedence over other purposes in the management and administration of any unit. Where a refuge has multiple purposes related to fish, wildlife, and plant conservation, the more specific purpose will take precedence in instances of conflict. When an additional unit is acquired under an authority different from the authority used to establish the original unit, the addition takes on the purpose(s) of the original unit, but the original unit does not take on the purpose(s) of the newer addition. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the mission.

1.7.2 History of Refuge Establishment and Purposes

President Theodore Roosevelt originally established Deer Flat Bird Reservation in 1909 as a "preserve and breeding grounds for native birds" (E.O. 1032). As an overlay refuge, the purpose of the Refuge can in no way impede the irrigation purpose of the Reclamation reservoir. In 1937, President Franklin D. Roosevelt revoked E.O. 1032 and re-established the Refuge as the Deer Flat Migratory Waterfowl Refuge to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691) to serve "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge, respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Per national policy, any lands (including those in the Snake River Islands Refuge) that were added to Deer Flat Refuge assume the purposes for which Deer Flat Refuge was established, as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

The Refuge purposes are:

- "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655, dated July 12, 1937).
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (16 U.S.C. 715d, Migratory Bird Conservation Act)
- "suitable for—(1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1, Refuge Recreation Act)
- "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2, Refuge Recreation Act).

For more information on Refuge establishment, see Appendix I.

1.7.3 Land Status and Ownership

Tables 1-1 and 1-2 and Maps 2 and 3 show the lands associated with the Refuge. The acreage figures were generated from our geographic information systems (GIS).

Table 1-1. Land Ownership Status

Refuge/Unit	Refuge Lands Owned in Fee (acres[1])	Refuge Lands Overlaid on Reclamation Lands (acres[1])	Total Acres[1]
Lake Lowell Unit	631	9,951	10,582
Snake River Islands Unit	1,035	0	1,035
Deer Flat NWR	**1,666**	**9,951**	**11,617**

[1] Acres generated from GIS are rounded to the nearest acre.

Table 1-2. Acquisition Authorities

Land Tracts	Acquisition Authority	Total Acres[a]
Lake Lowell Tract 4 (Refuge Maintenance Area)	Migratory Bird Conservation Commission	73
Lake Lowell Tract 5 (Gotts Point)	Migratory Bird Conservation Commission	61
Lake Lowell Tract 8	Migratory Bird Conservation Commission	13
Lake Lowell Tract 51 (Leavitt Tract)	Migratory Bird Conservation Commission	80
All other Refuge lands	Executive Orders, Presidential Proclamation, Public Land Orders and Mitigation	11,390

[a] Rounded to the nearest acre.

1.7.4 Special Designation Lands

1.7.4.1 Important Bird Area

The Important Bird Areas (IBA) program is a global effort to identify the most important areas for maintaining bird populations and focusing conservation efforts on protecting these sites. Within the United States, the program has been promoted and maintained by the American Bird Conservancy (ABC) and the National Audubon Society (Audubon). The ABC coordinates the identification of nationally significant IBAs, while Audubon identifies sites in individual states that provide critical habitat for birds. This effort recognizes that habitat loss and fragmentation are the most serious threats to birds across North America and around the world. By working through partnerships, principally the North American Bird Conservation Initiative, to identify those places that are critical to birds during some part of their life cycle (breeding, wintering, feeding, migrating), the IBA program hopes to minimize the effects that habitat loss and degradation have on bird populations.

Idaho's IBA program was launched in 1996 as a partnership between Idaho Partners in Flight and the Idaho Audubon Council. Since 1997, the IBA Technical Committee has encouraged and reviewed nominations for potential IBAs. To date, 55 sites have been officially recognized as IBAs in Idaho, representing 3.8 million acres of public and private wetland and upland habitat throughout the state. The IBA Program in Idaho is currently housed in the Nongame and Endangered Wildlife Program of the Idaho Department of Fish and Game (IDFG 2005).

In order to be identified as an IBA, sites must meet criteria in at least one of the following categories: species of conservation concern (e.g., threatened and endangered species); range-restricted species (species vulnerable because they are not widely distributed); species that are vulnerable because their populations are concentrated in one general habitat type or biome; and species, or groups of similar

species (such as waterfowl or shorebirds), that are vulnerable because they occur at high densities due to their congregative behavior (Audubon 2012).

Deer Flat NWR was identified as a State IBA based on three criteria: importance for waterfowl (State Criteria D4ii), for other colonial waterbirds (State Criteria D4iv), and for shorebirds (State Criteria D4v). Waterfowl, especially Canada geese and mallards, use the Refuge for breeding, wintering area, and a migratory stopover. Colonial waterbirds nest on both Lake Lowell and the Snake River Islands Units of the Refuge, including California gulls, great blue herons, black-crowned night herons, double-crested cormorants, and western and Clark's grebes. The mudflats at Lake Lowell are such a highly used stopover for shorebirds during summer and fall migration that Lake Lowell is one of only two sites in Idaho with greater than 5,000 shorebirds observed in more than half the years it was surveyed (Oring et al. 2000). Some of the shorebirds present in late summer and fall include pectoral, least, Baird's, solitary, spotted, and stilt sandpipers; marbled godwits; and long-billed dowitchers.

1.8 Relationship to Ecosystem Management Efforts

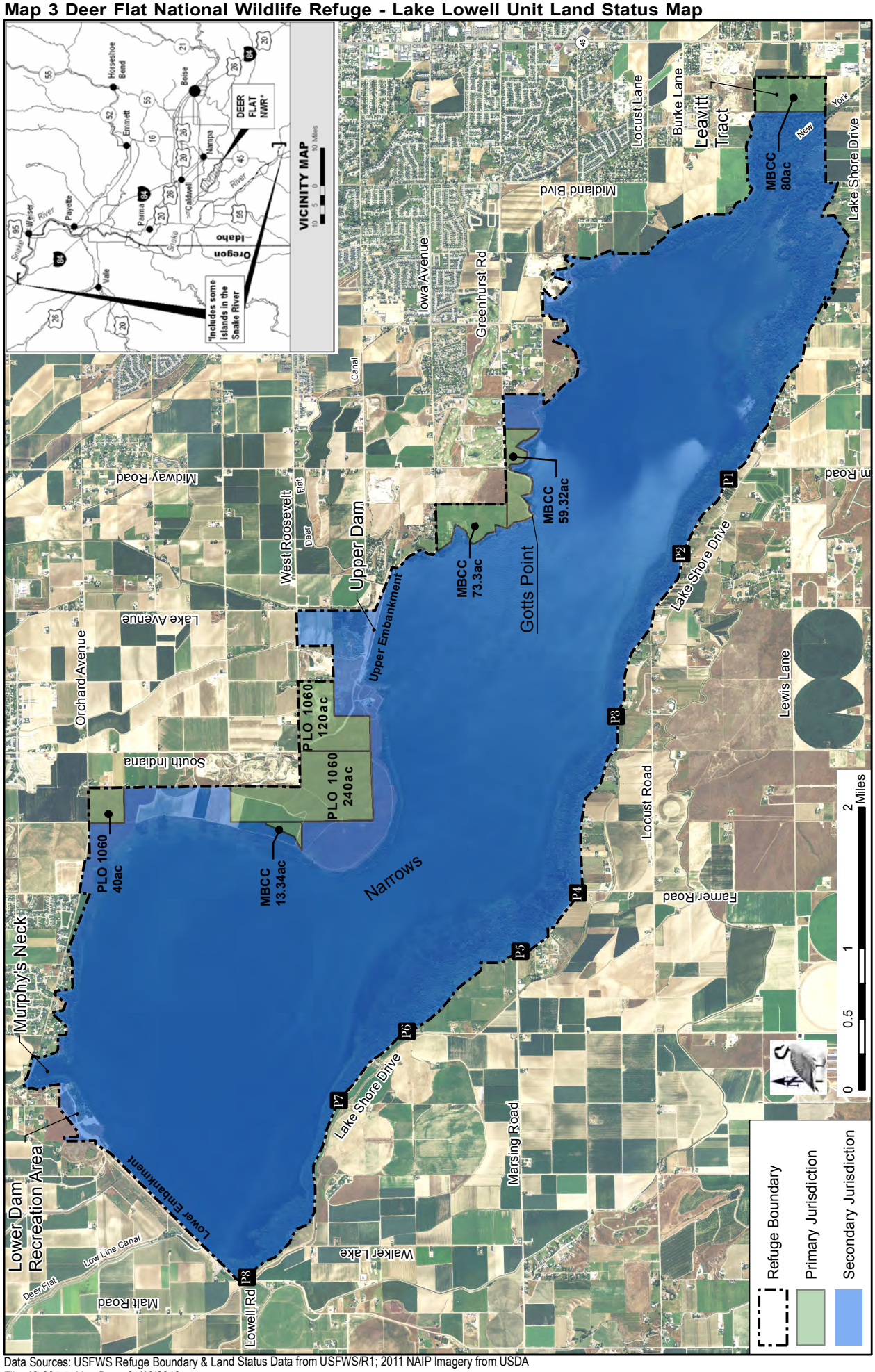
When developing a CCP, the Service considers the goals and objectives of existing national, regional, state, and ecoregion/ecosystem efforts, plans, and assessments. The CCP is to be consistent with existing plans and assist in meeting their conservation goals and objectives (602 FW 3). This section summarizes some of the key plans reviewed by the CCP planning team during development of the Final CCP/EIS.

1.8.1 Relationship to Previous Refuge Plans

Because this is the first CCP written for the Refuge, it will be the first management plan to fully implement the National Wildlife Refuge System Improvement Act of 1997. Although earlier plans made attempts to address conflicts between public use and wildlife, these plans made little mention of the scientific information used to determine the appropriate actions to take. Plans created after the passage of the National Wildlife Refuge Administration Act of 1966 are summarized here, because in that period, guidance for Refuge activities more closely aligns with the guidance provided for CCPs in the Improvement Act.

- A Master Plan was developed in 1968 with a Recreation Management Plan completed shortly thereafter. These plans express a need to put wildlife first: "Foremost among refuge objectives is the preservation and management of the waterfowl and other wildlife resources. Public use of the refuge is and will continue to be a subordinate refuge objective" (USFWS 1970). The public use regulations at that time did not allow any motorized boats in the southeast end of the Refuge (USFWS 1968). The Recreation Management Plan also states, "Those uses associated with wildlife and wildlife environments are regarded as highest in objective even though they may be lower in number of participation visits than other uses," making it clear wildlife-dependent activities were to receive higher priority status than nonwildlife-dependent uses.
- A Master Plan written in approximately 1980, boasts a wide variety of crops being grown around the Refuge including cereal grains and corn. The planners go on to express concerns about the conversion of agricultural land to urban areas, and of wildlands to agricultural lands (USFWS 1980). The planners also imply that Refuge visitation would increase because high gasoline prices would spur users to stay close to home.

Map 3 Deer Flat National Wildlife Refuge - Lake Lowell Unit Land Status Map



Data Sources: USFWS Refuge Boundary & Land Status Data from USFWS/R1; 2011 NAIP Imagery from USDA
File: 12-005-5 Map Date: 05/16/2012

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- A Refuge Management Plan was also signed in 1990 and had a draft update in 1996 (USFWS 1996). The plan emphasized the Refuge's importance to wildlife, and wildlife-dependent recreation, and stated the need for clearly defined jurisdiction over recreational activities.

1.8.2 Relationship of Refuge CCP to Other Ecosystem Planning and Assessment Efforts

A brief summary of the major regional conservation plans and efforts we considered in the development of this CCP and the priority resources of concern (see Appendix E) follows.

Landscape Conservation Cooperatives. Interior Secretary Ken Salazar directed Department of the Interior bureaus to initiate the development of the Landscape Conservation Cooperative (LCC) network as a response to landscape-scale stressors, including climate change (Secretarial Order Number 3289, September 2009). The LCC network is composed of 22 individual LCCs, and Deer Flat Refuge lies within both the Great Basin LCC and the Great Northern LCC. These LCCs are public-private partnerships composed of States, Tribes, Federal agencies, nongovernmental organizations, universities, and others.

The LCCs develop science-based conservation plans across a large geographic area to address environmental challenges and ensure the sustainability of America's land, water, wildlife, and cultural resources (www.fws.gov/science/shc/lcc.html). Through this CCP, we identify opportunities to obtain and share, survey and research data on wildlife, habitat, and biological processes.

Idaho Comprehensive Wildlife Conservation Strategy (IDFG 2005). In 2001, the U.S. Congress began to appropriate Federal funds through the State Wildlife Grants program to assist states with fish and wildlife conservation efforts. Along with the funding came the responsibility of each state to develop a comprehensive wildlife conservation strategy (CWCS). IDFG prepared its CWCS in 2005 to coordinate the efforts of partners working toward the conservation of wildlife and wildlife habitats across the state. The aim of Idaho's CWCS is to provide a common framework that will enable conservation partners to jointly implement a long-term approach for the benefit of species of greatest conservation need (SGCN).

The CWCS identifies 229 SGCN (103 invertebrates, and 126 vertebrates) and associated habitats; provides an ecological, habitat-based framework to aid in the conservation and management of SGCN; recommends actions to improve the population status and habitat conditions of SGCN; and describes an approach for long-term monitoring to assess the success of conservation efforts and to integrate new information as it becomes available. The CWCS "promotes proactive conservation to ensure cost-effective solutions instead of reactive measures enacted in the face of imminent losses" (IDFG 2005).

Pacific Flyway Management Plan for the Pacific Population of Western Canada Goose (Subcommittee on Pacific Population of Canada Geese [SPPCG] 2000). The plan provides guidelines to wildlife agencies responsible for the management of the Pacific population of Western Canada geese. The plan aims to maintain the distribution of this population while optimizing recreational opportunities and controlling depredation and nuisance problems. The plan provides several management recommendations, including population monitoring, harvest management, and research.

North American Waterfowl Management Plan* and *Coordinated Implementation Plan for Bird Conservation in Idaho, Version 2005 (North American Waterfowl Management Plan Committee [NAWMPC] 2004 and Intermountain West Joint Venture [IWJV] 2005, respectively). *The North American Waterfowl Management Plan* is an international action plan, signed by the United States, Canada, and Mexico, to conserve migratory birds throughout the continent. The goal of the plan is to return waterfowl populations to their 1970s levels by conserving wetland and upland habitats. Transforming the goals into on-the-ground actions is accomplished through partnerships called joint ventures. Joint ventures are made up of individuals, corporations, conservation organizations, and local, State, Provincial, and Federal agencies. Habitat joint ventures restore and enhance wetlands and associated upland habitats.

Partners in Flight, North American Landbird Conservation Plan (Rich et al. 2004). *The North American Landbird Conservation Plan* gives Partners in Flight Watch List status to birds that it deems are threatened by loss or degradation in habitat, and small or declining populations or species distribution. It also identifies "stewardship species" that should be considered in conservation planning due to their representation of large avifaunal biomes. The plan identifies research and monitoring needs and attempts to create estimates of landbird species populations.

Idaho Bird Conservation Plan, Version 1 (Idaho Partners in Flight 2000). *The Idaho Bird Conservation Plan* focuses on restoring and maintaining high-priority habitats with the goal of maintaining healthy communities of priority bird species. Three of the four priority habitats identified by the plan (i.e., riparian, nonriverine wetlands, and sagebrush shrublands) can be found on Deer Flat NWR. The plan provides strategies for meeting habitat and population objectives for these priority species and habitats.

Intermountain West Regional Shorebird Plan, Version 1 (Oring et al. 2000). *The United States Shorebird Conservation Plan* (Brown et al. 2001) includes 11 regional plans reflecting major shorebird flyways and habitats within the United States. The Intermountain West Regional Working Group was formed under the auspices of the national plan to formulate shorebird management goals for the Intermountain West. The purpose of this shorebird plan is to address shorebird management needs on a regional basis while considering both Pacific Flyway and national levels of need.

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) notes that perhaps a million shorebirds breed in the Intermountain West and millions more migrate through the area each year. The plan recognizes that finding ample high-quality fresh water will be the greatest challenge faced by shorebirds in the Intermountain West in the future. The regional plan articulates seven goals, plus associated objectives and strategies related to habitat management, monitoring and assessment, research, outreach and planning. The planning goal includes objectives to coordinate shorebird planning and projects with other migratory bird initiatives and specifically with the Intermountain West Joint Venture. The Intermountain West Regional Shorebird Plan identifies 11 shorebird species that regularly breed in the region, as well as 23 additional species that are annual migrants.

North American Waterbird Conservation Plan* and *Intermountain West Waterbird Conservation Plan (Kushlan et al. 2002 and Ivey and Herziger 2006, respectively). *The North American Waterbird Conservation Plan* attempts to "sustain the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and nonbreeding waterbirds . . . throughout the lands and waters of North America" (Kushlan et al. 2002). It includes goals for species and populations, habitats, education and information, and coordination and integration. One strategy under the coordination and integration goal seeks to develop regional step-down plans.

The Intermountain West Waterbird Conservation Plan (Ivey and Herziger 2006). *The Intermountain West Waterbird Conservation Plan* is one of several regional step-down plans designed to implement the *North American Waterbird Conservation Plan*. Waterbirds are wetland-dependent species including both colonial breeders (e.g., gulls, terns, most grebes, cormorants, herons, egrets, ibis, and pelicans), and solitary nesting marshbirds (e.g., cranes, rails, coots, bitterns, and loons). Shorebirds and waterfowl are covered by other bird conservation initiatives, therefore, they were excluded from the Intermountain West plan. The goal of the plan is to maintain healthy populations, distributions, and habitats of waterbirds throughout the Intermountain West region.

Columbia Plateau Ecoregional Assessment (Andelman et al. 1999). *The Columbia Plateau Ecoregional Assessment* attempts to identify an approach to maintaining long-term viability of imperiled species and natural systems on an ecosystem level. The assessment recognizes that management actions are often needed that would cross agency, governmental, and geographical boundaries. The assessment ties together site-specific conservation actions to a regional scale to help effect change on a larger scale. The conservation goal for the Columbia Plateau Ecoregion as set forth by the assessment is "the long-term survival of all viable native species and community types in the ecoregion" (Andelman et al. 1999).

1.9 Planning and Issue Identification

1.9.1 Planning Process Overview

A core planning team identified priority Refuge species, a work plan, a communication and outreach plan, and preliminary issues to be addressed in the CCP. See Appendix J for a list of core planning team members.

To ensure that the CCP/EIS was developed collaboratively with the larger community of scientists, land managers, and partners, valuable input was sought from an extended team whose members participated in wildlife habitats and public use reviews during preplanning; this extended team also provided technical expertise, assisted with data collection, and reviewed and provided feedback during development of the Draft and Final CCPs/EISs. The extended team consisted of various professionals from other agencies and divisions within the Service. See Appendix J for a list of extended team members.

Early in the planning process, the core planning team identified several priority resources of concern for the Refuge (see Chapter 4 and Appendix E) based on a thorough review of regional plans and input from extended team members during a wildlife and habitat review in 2008. Wildlife and habitat goals and objectives were designed around the habitat requirements of species designated as priority resources of concern. The analytical framework for identifying the resources of concern and for devising appropriate conservation objectives and strategies was based on the Service's draft *Identifying Resources of Concern and Management Priorities for a Refuge: A Handbook* (USFWS 2009b).

Public use planning centered on developing goals, objectives and strategies for the Refuge System's six priority wildlife-dependent public uses—hunting, fishing, wildlife observation and photography, and environmental education and interpretation; and existing, compatible nonwildlife-dependent public uses, as well as the transportation and infrastructure associated with both types of uses.

Our planning process benefitted from public input, which began in July 2010 with public scoping of issues and opportunities to include in the CCP. During July, August, and September 2010, public comments were solicited through the distribution of planning updates, in our public scoping meetings, and through outreach to stakeholder groups. Public scoping continued in September 2010, when we held public work sessions to generate strategies to use in the creation of CCP/EIS alternatives. In December 2010, a planning update was issued summarizing the public comments we received during public scoping.

In May 2011, a planning update was issued to share our preliminary draft alternatives with the public and to obtain public comments on them. Public comments were gathered at public open houses and at stakeholders' meetings. In addition, extended team meetings were held in June 2011, which included representatives from IDFG, the Boise Project Board of Control, ODFW, and others. We discussed the merits and issues of the preliminary draft alternatives and strategies. In October 2011, we summarized public comments and revisions to the preliminary alternatives based on those comments, in another planning update. See Appendix H for public involvement details.

The CCP process facilitates incremental development of the CCP/EIS with public involvement at key steps. We considered all comments from the public and extended team during the development and evolution of our alternatives for the final CCP/EIS. We held a public comment period of 45 days on the Draft CCP/EIS, and we modified Alternative 2, our Preferred Alternative, in the final CCP/EIS, based on the input we receive from the public and from other agencies and organizations. Thirty days after the final CCP/EIS was released to the public, the Regional Director for the Service's Pacific Region selected an alternative for implementation as documented in the Record of Decision, and announced in the Federal Register.

1.9.2 Major Issues Addressed in the CCP

The planning team evaluated the issues and concerns raised during public scoping. Issues are defined as matters of controversy, dispute, or general concern over resource management activities, the environment, land uses, or public use activities. Identifying issues to address in the CCP is an important part of the planning process. Issues influenced the types of information we gathered and helped us define alternatives for the CCP. It is the Service's policy to focus planning and analysis on major issues that are within the Refuge's jurisdiction and that have a positive or negative effect on the Refuge's resources. The following issues, concerns, and opportunities were considered in the development of the Final CCP/EIS.

1.9.2.1 Wildlife and Habitat Management

- **How should Refuge habitats be managed for resident and migratory wildlife species?** Other than invasive species removal and post-wildfire restoration activities, there has been minimal habitat manipulation at the Lake Lowell Unit in recent years. We identify opportunities to improve nesting and resting habitats for migratory birds, through habitat adjustments and more efficient and effective methods of invasive species removal across the Refuge. There may be opportunities in the future to partner with Reclamation and the Board of Control to accomplish these activities.

- **Which habitats should the Refuge consider priorities for active management?** Recent habitat management projects have been focused on the Lake Lowell Unit, with very little

occurring on the Snake River Islands Unit. Given the importance of healthy riparian habitats along the river corridor, the possibility of shifting habitat management priorities to the Snake River Islands Unit, was analyzed in the Final CCP/EIS, as were strategies that would increase the efficiency and effectiveness of our island habitat management.

- **What are our biological research and monitoring priorities?** In order to better manage Refuge habitats for the good of wildlife, we needed to gain a better understanding of how wildlife use the Refuge, how wildlife/human interactions affect wildlife use of the Refuge; how wildlife use patterns change over time; and how environmental factors (e.g., contaminants) impact wildlife.

- **What is the Refuge's role in improving water quality?** Although water quality issues are not within the management authority of the Refuge, contaminants in the lake may have an impact on wildlife resources and recreational opportunities at the Refuge. Before looking at ways to reduce contaminants, we must first identify and quantify their presence, and assess their impacts on the public and wildlife. Once there is a better understanding of the contaminants issue, the Refuge will be able to work with partners to address the problem and look for solutions.

- **How does the Refuge address the issue of invasive and undesirable nonnative plant and animal species?** Controlling invasive plant species on the Refuge is challenging. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species. Propagules from invasive plants spread to new areas easily from clothing or equipment. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife.

  Some of the first refuge managers documented issues with feral cats and dogs on the Refuge. This problem has expanded as the human population near the Refuge continues to increase. These invasive animals can negatively impact wildlife in many ways (e.g., destroying nests and killing or chasing wildlife). Carp are another species that affect wildlife by reducing water quality, destroying habitat, and feeding on smaller fish and fish eggs. What strategies would efficiently and effectively control invasive and undesirable nonnative species?

1.9.2.2 Public Use Management

- **How can the Refuge provide more quality opportunities for wildlife-dependent recreation to visitors of differing abilities without creating an undesirable level of disturbance to wildlife and habitats?** Refuges are tasked with providing hunting, fishing, wildlife observation and photography, and environmental education and interpretation opportunities for the public, without negatively impacting the purpose of the Refuge (i.e., refuge and breeding grounds for migratory birds and other wildlife). Regional populations and Refuge visitation have increased substantially in recent years. Increased visitation is likely to increase wildlife disturbance, possibly to levels that may alter wildlife movements, impact productivity, and reduce available food resources. In the CCP we identify ways to increase the quality of and opportunities for these wildlife-dependent activities without increasing disturbance to an unacceptable level. We also identify ways to increase Refuge accessibility to wildlife-dependent activities for people of all levels of physical ability.

- **Can the Refuge provide opportunities for nonwildlife-dependent recreation in a way that does not negatively impact wildlife, habitats, and visitors engaging in wildlife-dependent recreation and education?** The population surrounding the Refuge and visitation to the Refuge has increased over time. This has resulted in greater demand for nonwildlife-dependent recreation such as high-speed boating, jogging, bicycling, and other activities, which increases the potential for impacts to wildlife, habitats, and wildlife-dependent visitors. If nonwildlife-dependent uses are to continue on the Refuge, we must balance these uses with protecting wildlife and habitat and providing quality wildlife-dependent uses.

- **How can the Refuge increase the quality of its waterfowl and upland hunts?** Some hunters voiced concerns in the past about the crowded conditions surrounding the waterfowl hunt at Lake Lowell Unit. There is also question as to whether or not the Refuge can provide a quality upland hunt opportunity. Strategies meant to reduce hunter conflict, increase safety, and assess the quality of Refuge hunting opportunities are identified in this CCP.

- **How should limited Refuge resources be allocated between environmental education programs as compared to outreach and interpretation to the general visitor?** Many visitors do not know that they are on a national wildlife refuge or what the purpose of the Refuge is. Would it be better to increase interpretive programs for the general visitor, so they have a better understanding of what a national wildlife refuge is and have an opportunity to experience the Refuge in a new way? Or is it better to continue to focus on structured environmental education programs for children from local schools.

- **How can the Refuge improve safety for its visitors and reduce the amount of illegal activity?** In the past, there were at least two dual-function Refuge Law Enforcement (LE) officers. Currently, the Refuge has one LE officer assigned to it. The Refuge also receives assistance as part of the territory a Service Zone LE officer covers, which includes Service law enforcement in eastern Oregon, eastern Washington, all of southern Idaho, and northern Nevada. The Canyon County Sheriff's Office, the Canyon County Marine Deputies, and IDFG Conservation Officers also provide assistance, but these agencies have their own priorities and obligations. In order to decrease illegal activity without increasing the burden on local law enforcement, the Refuge may need to implement technological solutions such as automatic gates, cameras, and better lighting. Developing agreements with other law enforcement agencies to enforce Refuge regulations could improve visitor experiences.

1.9.3 Issues outside the Scope of the CCP

Although CCPs are very comprehensive plans, no single plan can cover all issues. The planning team has compiled a list of issues that are currently considered to be outside the scope of this CCP.

- **Deer hunting.** A new Lake Lowell Unit deer hunt was addressed in a recent environmental assessment (USFWS 2011a) and hunt package. The hunt was approved in September 2012 and began in October 2012. Because impacts of the Lake Lowell deer hunt were so recently assessed, the Lake Lowell deer hunt is outside of the scope of this CCP.

- **Development.** Development that reduces habitat, impacts wildlife, or increases pollution outside of the Refuge borders could impact the wildlife and habitats of the Refuge. We may discuss partnering with local entities to identify areas of concern for future development in

the CCP, but the Refuge does not have the authority to restrict or direct future county or city development on lands outside the Refuge. Managing development outside the Refuge's boundary is within the management control of city and county governments, not the Service.

- **Fisheries management.** Service policy requires us to develop a fisheries management plan. The plan will be developed in close coordination with IDFG.

- **Lake Lowell water levels.** The Refuge received comments expressing concern that using the water in Lake Lowell to meet biological goals and objectives would reduce the amount of water available to local irrigators. The Refuge is an overlay refuge on a Reclamation reservoir, and Reclamation has primary jurisdiction over the manipulation of water levels of Lake Lowell. Through its contracts with Reclamation, the Board of Control has the day-to-day operation and maintenance of project features which directly affects Lake Lowell water levels. Consistent with the executive order that established Deer Flat NWR the Refuge does not have authority to manipulate water levels.

- **Reclamation Zone activities.** The Reclamation Zones are located to the west of the Lower Dam and to the north of the Upper Dam. These areas are within the boundary of the Refuge but are legally managed by Reclamation. Management of all activities in these areas is outside the scope of this CCP.

- **Refuge boundary.** No modifications to the Refuge boundary were considered or proposed in the Final CCP/EIS. Individual boundary issues are researched as issues arise.

- **Restructuring of priority and nonpriority recreational activities.** Because the concepts of priority/nonpriority and wildlife-dependent/nonwildlife-dependent are found in the National Wildlife Refuge System Administration Act of 1966, as amended, and are a matter of law, making changes to these categories is not within the scope of the CCP.

- **Snake River boating.** The Snake River is considered navigable waters and is not managed by the Service. This issue is not within the jurisdiction of Deer Flat NWR, therefore, it is outside of the scope of the CCP.

- **Snake River water flows.** Water levels on both the Snake River and Lake Lowell are outside of the management control of the Service.

- **Water quality control.** Although water quality is extremely important to the health of the wildlife and habitats of Deer Flat NWR, many of the forces influencing water quality are not within the management control of the Service. Refuge staff may partner with other agencies to create solutions to the water quality problem and assist in implementation of the total maximum daily load plan proposed by the Department of Environmental Quality.

1.10 Refuge Goals

Refuge management goals are descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose, but they do not define measurable units. Goals must support the Refuge vision and describe the desired end result.

1.10.1 Wildlife and Habitat Goals

Goal 1: Protect, maintain, and enhance viable mudflat, emergent–bed, and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife.

Goal 2: Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Goal 3: Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Goal 4: Protect, maintain, and enhance shrub-steppe habitats characteristic of the historical Columbia Basin.

Goal 5: Protect, maintain and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife.

Goal 6: Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources.

1.10.2 Public Use and Cultural Resources Goals

Goal 1: Visitors of all ages will enjoy native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat.

Goal 2: Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 3: Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 4: Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats.

Goal 5: Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors.

Goal 6: The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat.

Goal 7: The Refuge will protect and manage its cultural resources and look for ways to gain new understanding of the history and cultural resources of both the Lake Lowell Unit and the Snake River Islands Unit.

Chapter 2 Management Direction

Canada goose and gosling
Jennifer Brown-Scott/USFWS

Chapter 2 Management Direction

2.1 Considerations in CCP Development

The Deer Flat Refuge's purposes (see Chapter 1) serve as the foundation for this long-term conservation plan as mandated by the Refuge Administration Act. The Refuge's natural resource considerations were also fundamental in formulating the management direction for this CCP. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act states that "the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." The Service also reviewed and considered a variety of resource, social, economic, and organizational data important to managing the Refuge. These background conditions are described more fully in Chapters 1, 3, 4, and 5.

This CCP was developed using an iterative process that began with our planning team drafting a Refuge vision statement, and preliminary goals and objectives. After reviewing available scientific reports and studies to better understand ecosystem trends and recommendations for species and habitats, the team collaborated with cooperating agencies and local stakeholders to create a list of important Refuge management issues.

The public also identified issues and provided comments during the public scoping comment period July-September 2010 and again in response to preliminary draft alternatives May-July 2011. The management direction in this CCP was identified as Alternative 2, our preferred alternative, in the draft CCP/EIS, which was also distributed for public comments. All substantive comments were considered during development of this CCP, and addressed in Appendix H.

2.1.1 Definitions

To help make this chapter more user friendly, we are providing the following definitions.

Wildlife-dependent Recreation: Sometimes referred to as the "Big Six," these activities consist of hunting, fishing, wildlife observation, wildlife photography, interpretation, and environmental education. These six wildlife-dependent uses are priority activities for the Refuge as well as for all national wildlife refuges.

Nonwildlife-dependent Recreation: At the Refuge, these uses include swimming, picnicking, biking, jogging, horseback riding, boating, and water sports.

Protect: To keep from being damaged or injured. Protected acreage consists of the total Refuge acreage of each defined habitat.

Maintain: To keep in the current state; preserve; retain. Maintenance includes the continuation of current routine management or maintenance, such as the continuation of recurring weed control or management of current public use regulations.

Enhance: To improve features or quality. Enhancement includes implementing new additions to current management and ongoing future maintenance of these areas, or initiating new management, such as treating new areas and acreages for weeds and maintaining these areas during the life of the plan or implementing new public use regulations.

2.2 Summary of Management Direction

Our management direction emphasizes connecting families to nature by providing access to new facilities and a wide range of wildlife-dependent and nonwildlife-dependent recreational activities. Actions will be implemented over the next 15 years. Some actions will require additional funding, and will be implemented as funding becomes available. Project priorities and projected staffing/funding needs are included in Appendix C.

Activities will be managed to protect wildlife, reduce conflicts between users, and increase safety. Under this CCP, fishing access will be promoted, and wildlife interpretation will be emphasized and integrated into all visitor activities to increase awareness and appreciation of Refuge resources.

The Service will protect and enhance habitat throughout the Refuge. In Lake Lowell specifically, the Refuge will protect wildlife species' shoreline feeding and nesting sites from disturbance through no-wake zones and seasonal closures. Our management direction provides protections and enhancements for Refuge wildlife, and upland and on-water recreational opportunities.

2.2.1 Management Actions Specific to Each Refuge Unit

2.2.1.1 Lake Lowell Unit

Management of Wildlife and Habitat

Our management direction provides needed protections for lake-dependent wildlife by establishing a 200-yard no-wake zone along the south side of the lake between Parking Lots 1 and 8. The entire lake will continue to be closed for the benefit of wintering and migrating birds from October 1 through April 14 each year. No-wake zones will also be required in the Narrows, and the existing no-wake zone on the southeast end of the lake will be expanded to start at a line between Gotts Point and Parking Lot 1. In the no-wake zones, boaters will be allowed to travel at speeds that do not create a wake (generally less than 5 mph). We will also create seasonally closed areas, such as heron rookeries, eagle nests, and grebe nesting colonies, to protect bird species.

Specific wildlife and habitat management objectives in this CCP include the following.

- Maintain 100 acres and enhance 250 acres of emergent wetland plant beds along the lake shoreline.
- Maintain 350 acres and enhance 560 acres of mudflats to benefit migrating shorebirds.
- Maintain and enhance 6,430 acres of open-water habitat to benefit migrating, nesting, and wintering waterfowl and waterbirds.
- Maintain 520 acres and enhance 1,200 acres of riparian forest habitat at Lake Lowell Unit.
- Maintain 70 acres and enhance 85 acres of nonlake wetland basins in three units to diversify wetland habitats and improve water quality.
- Maintain 520 acres and enhance 300 acres of sagebrush-steppe habitat at Lake Lowell Unit to benefit key migrating birds including sage thrashers, loggerhead shrikes, burrowing owls, and other species.
- Maintain and enhance all Refuge islands through seasonal closures and habitat management.
- Maintain grain and forage crops on 250 acres to benefit migratory ducks and geese and other resident wildlife.

- Inventory and map noxious weeds and prioritize treatment with a variety of tools including mechanical removal, herbicide use, and prescribed fire, consistent with the Integrated Pest Management Plan (Appendix G).

Management of Public Uses

The Refuge provides access for a wide range of outdoor recreational activities while putting in place measures (e.g., no-wake zones and seasonal closures) to protect wildlife. Management efforts will focus on increasing participation in all six, priority wildlife-dependent recreational activities. Fishing and interpretation will be emphasized to serve a growing diverse, urban population. Management of public uses will connect people with nature and build support for wildlife conservation.

Deer Flat Refuge will be one of the few, if not only, refuges in the NWRS that allows use of personal watercraft, waterskiing, wakeboarding, kiteboarding, and windsurfing in waters under Service jurisdiction. It is anticipated that participants in these activities will be exposed to interpretive messages that encourage appropriate, conservation-oriented visitor behavior to benefit wildlife.

Our management direction includes several elements to protect wildlife and enhance recreational experiences at the Refuge. These include:

- **Lower Dam Recreation Area facilities.** A visitor contact station and a fishing and observation dock/platform will be provided at the Lower Dam Recreation Area. Suitability will be assessed for providing a 0.65-mile interpretive loop trail in riparian habitat between the Lower Dam Recreation Area and Murphy's Neck, which will be accessible for visitors with mobility impairments in compliance with the Architectural Barriers Act (ABA).
- **Gotts Point** will be opened to vehicular traffic upon completion of a cooperative agreement with Canyon County for increased law enforcement presence. Other potential improvements such as electronic gates and improved lighting might also be implemented. Access to the water's edge will be improved for visitors with mobility impairments.
- **Environmental education and interpretive programs** will continue. Emphasis will be placed on developing interpretive programs, with the goal of increasing visitor awareness of the Refuge's purposes and goals and to encourage appropriate, conservation-oriented visitor behavior. On-site interpretation will involve updating visitor center displays, installing additional interpretive signage, and providing more interpretive tours. Public contact with Refuge staff and volunteers will significantly increase. EE will continue and the program will emphasize on-site and teacher-led programs.
- **Upland, waterfowl, and deer hunt areas** will be maintained. Each waterfowl hunter will have a limit of 25 shotgun shells.
- **Wildlife-dependent activities** such as fishing, wildlife observation, and photography will be allowed on-trail year-round and off-trail all year in the East Side Recreation Area, and off-trail seasonally in the South Side and North Side Recreation Areas. Shoreline access will be developed at Parking Lots 2, 3, 4, and 7. Ice fishing will be allowed within 200 yards of the dams, subject to areas posted by Reclamation.
- **Horseback riding, bicycling, and other nonwildlife-dependent activities** will be allowed on designated trails only (Maps 4-6). Narrower trails and those used by EE groups will be designated for pedestrian use only. As described in Section 2.2.1.1, ice skating and land-based competitive group activities will not be allowed.
- **On-leash dog walking** will be allowed on designated trails (see Maps 4-6), and in the Refuge's Lower Dam Recreation Area.

- **Wake-causing activities** will be allowed in the East and West Pools, outside of the no-wake zones and seasonal closures, from April 15 through September 30. Generally, wakes occur when boats travel at speeds greater than 5 mph.
- **Boardwalk.** A feasibility assessment will be completed to determine whether trail access between Parking Lots 1 and 3 could be provided at a reasonable cost. Other fishing docks will be provided as shown on Map 4.
- **Swimming.** To increase swimming safety and reduce impacts to anglers, swimmers will be encouraged to swim in the designated swimming areas at the Upper and Lower Dams.

Limiting Ice Activity

Safety is a major concern for recreational users that rely on the structural integrity of ice on Lake Lowell to enjoy ice activities. Systematic ice evaluations by qualified personnel are not conducted on Lake Lowell, and average monthly high temperatures in Treasure Valley do not reach freezing according to the National Weather Service (www.rssweather.com/climate/Idaho/Boise/). This, combined with high winds and long fetch, makes the freezing of Lake Lowell unpredictable, and any frozen areas potentially unsafe.

Lake Lowell is closed to boating from October 1 through April 14 to provide habitat for wintering waterfowl and reduce disturbance from human-caused flushing events. Under the management direction in this CCP, the lake will be open to ice fishing but closed to all other human access during those months, including ice skating and cross-country skiing. We addressed ice skating in a Finding of Appropriateness in Appendix A, and in our response to comments in Appendix H.

Limiting Organized Group Activities

Wildlife-dependent group activities (e.g., fishing tournaments) may be allowed by an SUP that limits the number of participants, times of use, and areas of use to reduce impacts to other wildlife-dependent recreationists.

Land-based nonwildlife-dependent competitive events and group training for competitive events (e.g., cross-country training and meets) will not be allowed because they exclude the general public, increase wildlife disturbance, affect the quality of wildlife-dependent activities, require additional management resources, and increase safety concerns. See also the Competitive Jogging, Competitive Cycling, and Competitive Rowing Appropriate Use Determinations in Appendix A.

Sailing regattas will be allowed according to the stipulations set forth in the Compatibility Determination for Sailing Regattas in Appendix B.

Nonwildlife-dependent group events (e.g., weddings, reunions, birthday parties, and other gatherings) will be allowed only at the Lower Dam Recreation Area because of the availability of parking, restrooms, picnic areas, and trash services. Such group events will be required to comply with stipulations laid out in the Compatibility Determination for Swimming, Beach Use, and Picnicking (Appendix B), to reduce impacts to visitor safety or the ability of other visitors to enjoy the Refuge. These stipulations will be provided to visitors on the Refuge website and through handouts. If staffing and funding levels allow at a later time, organized group events may be required to obtain an SUP and a fee may be assessed for the SUP.

Improving Safety and Traffic Flow

A transportation study for the Lower Dam Recreation Area and the east Upper Dam boat launch will identify site planning, signs, and other mechanisms to reduce congestion and provide parking availability information to allow people to detour to other launches when a parking lot is full. To increase pedestrian safety near the east Upper Dam boat launch, the Refuge will work with the County Highway District to identify and install safety features such as crosswalks between the Refuge and the County Park. The on-Refuge parking areas along Iowa Avenue will be removed or blocked, because there is no designated access to the lake at those locations, and pedestrian safety has been a concern. Parking at Lot 7 will be restricted to the parking area, and will not be allowed between the parking area and the lakeshore in order to provide access for visitors launching boats.

Working with Board of Control and Bureau of Reclamation on Reservoir Water Level Prescriptions and Shared Efficiencies

Deer Flat Reservoir (renamed Lake Lowell in 1948) was built as part of Reclamation's Boise-Payette Project between 1906 and 1908. Providing irrigation to the surrounding lands was the project's sole purpose at its inception. Although the Refuge's primary purpose is to "provide a refuge and breeding ground for migratory birds and other wildlife," the Refuge may not impede the purpose of the reservoir for irrigation. The irrigation purpose puts the administrative responsibility for water level management with Reclamation and the Board of Control.

Reservoir water level declines throughout the irrigation season (April to September) when irrigation outflow exceeds water inflow from the New York Canal. This results in fairly low water levels in the lake in July and August. Using data acquired from the Lake Lowell Hydromet Station (www.usbr.gov/pn/hydromet/dfcgi.html), the average water level elevation was estimated to range from 2,520 to 2,516 feet during this time period. Many species, both plant and animal, can adapt and/or use habitat where water levels fluctuate, and sometimes even benefit from the changes. For example, low water levels in Lake Lowell in mid- to late-July expose mudflats that provide foraging habitat for migrating shorebirds. However, when water levels drop too low in June and early July, emergent plant beds can dry out, and grebe and other on-water nests can be left on dry land. If that happens, the adults will often abandon the colony, or the nests will be destroyed by predators.

Because the Board of Control, in cooperation with Reclamation, manages the water level, Refuge staff will continue to explore with the Board of Control the possibility of maintaining a water level appropriate to provide nesting and foraging habitat for grebes, fish, and other wildlife from April through July, while still meeting the Board of Control's mission of providing water to irrigators. Based on 2010-2011 nesting surveys, the appropriate water level will be at or above an elevation of approximately 2,520 feet. However, Refuge staff will continue to monitor waterbird nesting to determine appropriate target water levels. In addition, the Refuge will explore with the Board of Control the possibility of dropping the water level to at or below approximately 2,515 feet by September 1 to provide mudflats for foraging shorebirds while still meeting their irrigation mission.

Refuge staff will also work with the Board of Control's staff to coordinate water conservation educational projects that will assist with meeting both agencies' purposes and missions.

Working with Partners to Improve Lake Lowell's Water Quality

Lake Lowell has significant water quality problems that affect both wildlife and recreationists. The Federal Clean Water Act (CWA; 33 U.S.C. 1251 et seq.) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water-quality standards necessary to protect fish, shellfish, and wildlife, while providing recreation in and on the nation's waters whenever possible.

Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water-quality standards). Lake Lowell is on this list. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for the pollutants that is set at a level expected to achieve water quality standards. The Idaho Department of Environmental Quality (IDEQ) published the final TMDL for pollutants in Lake Lowell in 2010 (IDEQ 2010).

Lake Lowell's water quality problems have been developing for approximately 100 years and will take considerable time and money to improve. The Refuge is very concerned about water quality impacts on both wildlife and Refuge visitors and plans to be an active partner in working toward improving the lake's water quality. Several strategies are included in this CCP, they follow.

- Work toward reducing the carp population (Objective 2.3.1.1).
- Conduct water-quality monitoring to aid in evaluating the current TMDL (Objective 2.3.6.3).
- Promote the use of CARB star-rated motors at two-star ratings and above (Objective 2.4.1.4).
- Develop a water quality education program (Objective 2.4.4.1).
- Form a working group to investigate water-quality improvement actions (Objective 2.4.6.2).
- Work closely with the Board of Control to implement best management practices to reduce sediment runoff as well as evaluate current canal maintenance practices and identify areas for improvement (e.g., planting, geowebbing, contouring; Objective 2.4.6.2).
- Attend applicable water quality meetings with IDEQ and the Lower Boise Watershed Advisory Group to develop partnerships, increase knowledge, and leverage resources (Objective 2.4.6.2).

Siltation of the lake may also be an issue in the future. Areas that are currently used for nesting and angling appear to be silting in, which will eventually make them unusable for these activities. There is currently no plan to reduce future siltation or correct the current siltation issues. The Refuge will work with the Board of Control and Reclamation to identify ways to reduce siltation and correct current siltation issues without damaging wildlife habitat or impeding the delivery of irrigation water.

2.2.1.2 Snake River Islands Unit

Management of Wildlife and Habitat

Refuge staff will emphasize management of the Snake River Islands Unit by increasing wildlife inventory and monitoring efforts and increasing invasive species control (following the IPM Plan in Appendix G) and restoration efforts. The islands' management will be prioritized using several factors and managed accordingly. The most biologically intact islands will receive higher management priority (Objective 2.3.2.2). Island closure dates will be adjusted to better protect nesting geese, wading birds, gulls, and terns. An array of management techniques may be used, including prescribed fire and aerial application of herbicide and/or seed.

Management of Public Uses

Existing public uses will continue and will include wildlife observation, and deer, upland, and waterfowl hunting on 1,219 acres. Most of the Snake River Islands Unit will be open for off-trail, free-roam activities, including shoreline fishing, from June 15 through January 31. Heron- and gull-nesting islands (four-six islands) will be open for off-trail, free-roam activities from July 1 through January 31.

2.2.2 Management Actions Applicable to Both Refuge Units

Adaptive Management

Adaptive management is an approach to resource management that emphasizes adjusting management practices in response to what has been learned. Based on 522 DM 1 (Adaptive Management Implementation Policy), the Service will use adaptive management for conserving, protecting and, where appropriate, restoring lands and resources. Within 43 C.F.R. 46.30, adaptive management is defined as a system of management practices based on clearly identified outcomes, where monitoring evaluates whether management actions are achieving desired results (objectives). Adaptive management decisions are based on the best available science, common sense, experience, experimentation, new scientific discoveries, and monitoring.

The recently published *Department of the Interior Adaptive Management Technical Guide* (http://www.doi.gov/initiatives/AdaptiveManagement/index.html) also defines adaptive management as a decision process that "promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood." Adaptive management accounts for the fact that complete knowledge about fish, wildlife, plants, habitats, and the ecological processes supporting them may be lacking. The role of natural variability contributing to ecological resilience also is recognized as an important principle for adaptive management. It is not a trial and error process; instead, adaptive management emphasizes learning while doing. It is based on available scientific information and the best professional judgment of Refuge staff while considering site-specific biotic and abiotic factors on the Refuge.

Assessing and Monitoring Effects of Climate Trends and Climate Change

As stated in the Department of the Interior's Secretarial Order 3226 and the Service's Climate Change Strategic Plan, the Service considers and analyzes climate change in its decisions, long-range plans, and other activities. Habitat conditions and wildlife populations are directly and indirectly sensitive to climatic conditions, namely precipitation, temperature, and changes to hydrologic conditions. As described in greater detail in Chapter 3, the subbasin's hydrology is particularly sensitive to changes in climate because snowmelt dominates seasonal runoff and the rain/snow balance is sensitive to temperature.

Combined changes to temperature, precipitation, and hydrology can affect the Refuge's habitats and species directly, such as the timing of migratory arrival of birds, many other phenologic responses, and changes in species' ranges and physiology. These combined changes can also affect species indirectly, such as added vulnerability to other stressors (including increasing invasive species and pathogens). These indirect effects highlight the importance of monitoring habitats and species to establish potential correlations and adaptation options.

Knowledge and monitoring of regional and local climate trends on Refuge resources will be used to assess potential changes or enhancements to the Refuge's management actions and techniques and/or their timing, using the adaptive management approach described below.

The Refuge will monitor wildlife corridor analyses, vulnerability assessments, and other efforts, including those underway at a landscape scale, such as the Great Northern Landscape Conservation Cooperative (LCC). LCCs are formal science-management partnerships between the Service, Federal agencies, States, Tribes, nongovernmental organizations, universities, and other entities to address climate change and other biological stressors in an integrated fashion. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs.

Biological Integrity

The Refuge Administration Act directs the Service to "ensure that the biological integrity, diversity, and environmental health of the [NWRS] are maintained for the benefit of present and future generations of Americans." The policy is an additional directive for the Service to follow while achieving the Refuge's purposes and the NWRS mission. It provides for consideration and protection of the broad spectrum of native fish, wildlife, and habitat resources found on the Deer Flat Refuge.

When evaluating the appropriate management direction for the Refuge (e.g., in compatibility determinations), we used sound professional judgment to determine the Refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. We incorporated field experience, our knowledge of Refuge resources, an understanding of the Refuge's role within the ecosystem, and applicable laws and the best available science, including consultation with others both inside and outside the Service.

Cultural Resource Protection and Section 106 Compliance

Actions that may affect cultural resources will be reviewed by the Regional Archaeologist. Those undertakings that are found to have the potential to affect cultural resources will undergo further examination and evaluation, under Section 106 of the National Historic Preservation Act (NHPA), dependent on the nature and extent of the effect.

Feral and/or Nuisance Animal Control

The close proximity of Deer Flat NWR to a city lends itself to the reality of feral animals running at large on Refuge property. The extent of feral animal use and presence within Refuge boundaries and the amount of impact on trust resources has not been formally studied and is currently unknown. However, sighting of feral animals on Deer Flat NWR is a common occurrence by visitors, staff, and volunteers. Incidents of dumping unwanted pets onto the Refuge are also common.

During the life of this CCP, we will address the feral animal issue including assessing impacts to resources and appropriate measures of control that could produce positive results including:

- Reducing damages to Refuge resources and facilities;
- Protecting humans, wildlife, and domestic animals from diseases carried by pest species;
- Preventing damages to adjacent private landowners property;
- Controlling exotic and/or feral species so that native wildlife species can thrive; and
- Protecting quality wildlife-oriented recreational experiences for the public.

Outside of assessments and studies on the impacts of feral animals, dogs and cats will be dealt with on the Refuge as authorized by 50 C.F.R. 28.43, Destruction of Dogs and Cats: "Dogs and cats running at large on a national wildlife refuge and observed by an authorized official in the act of killing, injuring, harassing or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife."

Fire Management

Fire management activities will conform to guidelines contained in Service policy and an approved fire management plan for the Refuge. The Refuge's current fire management plan is in Appendix K.

Invasive Species Control and Integrated Pest Management

In accordance with 517 DM 1 and 569 FW 1, an integrated pest management (IPM) approach will be used, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as *pests*) on Refuge lands. IPM will involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to nontarget species and the Refuge environment.

Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide is needed on Refuge lands, the most specific (selective) chemical available for the target species will be used unless considerations of persistence or other environmental and/or biotic hazards will preclude it. In accordance with 517 DM 1, pesticide usage will be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under Refuge jurisdiction.

Environmental harm by pest species refers to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites, or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. Environmental harm also can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and/or abundance of native wetland plants that provide forage during the winter.

Environmental harm may involve detrimental changes in ecological processes. For example, cheatgrass infestations in shrub-steppe habitat greatly can alter fire return intervals, displacing native species and communities of bunchgrasses, forbs, and shrubs. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by fire-promoting grasses, which alter entire plant and animal communities and eliminate or sharply reduce populations of many native plant and animal species, can also greatly increase firefighting costs.

See Appendix G for the Refuge's IPM program documentation to manage pests for this CCP. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of

pesticides for pest management on Refuge lands, where necessary. Throughout the life of the CCP, pesticide uses on Refuge lands will be evaluated for potential effects to Refuge biological resources and environmental quality prior to use. These potential effects will be documented in Chemical Profiles (see Appendix G).

Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance will be approved for use on Refuge lands where there likely will be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles. However, pesticides may be used on Refuge lands where substantial effects to species and the environment are possible (i.e., effects exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Maintaining and Updating Existing Facilities

Periodic maintenance and updating of Refuge buildings and facilities will be necessary. Periodic updating of facilities is necessary for safety and accessibility, to reduce the Refuge's carbon footprint, and to support staff and management needs. When existing facilities are modified or new facilities and programs developed, the Refuge will use principles of universal design to make facilities usable by all people to the greatest extent possible, without separate or segregated access for people with mobility impairments.

Monitoring Effects of Public Use Programs on Wildlife

Staff will monitor the effects of public use on wildlife and consider modifications to the location, timing, and/or type of public use if disturbance to wildlife or habitat degradation reaches unacceptable levels.

Monitoring Quality of Public Use Programs

Visitor use surveys will assess the quality of the fishing, hunting, environmental education, interpretation, wildlife observation, and photography programs. Quality for priority wildlife-dependent uses is defined in Refuge policy by several elements (605 FW 1):

- Promotes safety of participants, other visitors, and facilities;
- Promotes responsible behaviors and compliance with applicable laws and regulations;
- Minimizes or eliminates conflicts with fish and wildlife population or habitat goals or objectives;
- Minimizes or eliminates conflict with other users;
- Minimizes conflicts with neighboring landowners;
- Promotes accessibility and availability to a broad spectrum of the public;
- Promotes resources stewardship and conservation;
- Promotes public understanding and increases public appreciation of natural resources and the Refuge's and National Wildlife Refuge System's role in managing and protecting these resources;
- Provides reliable/reasonable opportunities to experience wildlife;
- Uses facilities that are accessible and blend into the natural setting; and
- Uses visitor satisfaction to help define and evaluate programs.

Mosquito Abatement

Mosquito control activities began on the Refuge in 2000 to prevent the spread of western equine encephalitis and West Nile virus. Mosquito monitoring (primarily *Culex* species) begins in mid-April with weekly sampling on the Refuge. Treatments typically begin in early May and continue until September with the first frost. The larvicide *Bacillus thuringiensis israelensis* (Bti) is used on the Refuge and applied by the Canyon County Mosquito Abatement District using several methods: backpack sprayer, hydraulic-powered spray equipment, and aerially in accordance with a Special Use Permit (SUP) issued annually by the Refuge (see the Compatibility Determination for Mosquito Management in Appendix B). Aerial application began in 2004 to reduce wildlife disturbance from ground applications.

Response to Mosquito-Borne Diseases

Mosquito populations on Refuge lands will be allowed to fluctuate and function unimpeded unless they pose a threat to wildlife and/or human health. We recognize mosquitoes are native invertebrates inhabiting aquatic habitats which provide forage for fish and wildlife including migratory birds.

To protect human and wildlife health and safety, the State or local vector control agency will be allowed to control mosquito populations on refuge lands. Pesticide treatments (larvicides, pupacides, or adulticides) will be allowed on Refuge lands only if local, current population monitoring and/or disease surveillance data indicate Refuge-based mosquitoes pose a health threat to humans and/or wildlife. As previously described, mosquito treatments will be allowed on Refuge lands in accordance with IPM principles applicable to all pests (see Appendix G). Pesticide uses for mosquito control will include appropriate and practical BMPs where possible, given potential effects documented in Chemical Profiles.

After approval of the CCP, a disease contingency plan will be prepared addressing response to mosquito-borne disease outbreaks on and/or adjacent to Refuge lands. The disease contingency plan will also include other information such as the history of mosquito-borne diseases on and/or adjacent to the Refuge as well as measures to protect Refuge visitors, Service-authorized agents, and Service employees when a health threat or emergency is identified by health officials.

Participation in Planning and Review of Regional Development Activities

The Service will actively participate in planning and studies pertaining to development, transportation, recreation, contamination, and other potential concerns that may affect Refuge resources. The Service will continue to cultivate working relationships with County, State, and Federal agencies to stay abreast of current and potential developments and will use outreach and education as needed to raise awareness of Refuge resources and their dependence on the local environment.

Reductions in the Refuge's Carbon Footprint

The Service developed the Strategic Plan for Responding to Accelerating Climate Change in the 21st Century (2009) and a 5-year action plan outlining specific actions needed to implement the strategic plan. The action plan calls for the Service to make its operations carbon-neutral by 2020. The Refuge will work toward this goal by replacing its current vehicles with more fuel-efficient vehicles and by building appropriately sized, energy-efficient facilities, as funding becomes available. The Refuge

will also reduce the carbon footprint of land management activities by using energy-efficient techniques where feasible and in line with management goals. The Refuge will also explore ways of offsetting any remaining carbon balance, such as carbon sequestration.

Research

Research projects will be allowed on the Refuge in accordance with Service policy and SUP provisions. Researchers focusing on high-priority Refuge research projects will be given enhanced consideration. See the Compatibility Determination for Research in Appendix B for further details.

State Coordination

The Service will continue to maintain regular discussions with the IDFG and ODFW. Key topics of discussion include management of Canada geese and other waterfowl, depredation, wildlife monitoring, hunting, and fishing seasons and regulations, and management of species listed at the Federal and State levels. The Refuge will continue to coordinate with IDFG on the stocking of the following fish species at the Lake Lowell Unit: largemouth bass, smallmouth bass, bluegill, channel catfish, black crappie, yellow perch, rainbow trout, and Lahontan cutthroat trout. Stocking of any other fish species will require additional planning. The Refuge is committed to developing a cooperative agreement with IDFG for resident fish and wildlife management.

Step-down Management Plans

The Refuge will complete step-down plans to provide additional detail for habitat management, visitor services management, fisheries management, and the inventory and monitoring program within five years of implementation of the CCP. Hunt plans will also be created for any newly proposed hunts or for expansion of any existing hunts.

Tribal Consultation and Coordination

All appropriate and necessary consultation with Tribes will be undertaken prior to implementing any action. Two Executive Orders (E.O. 13007, Sacred Sites; and E.O. 13175, Tribal Consultation and Coordination); as well as the NHPA, NEPA, and Archaeological Resources Protection Act (ARPA), have specific references for fulfilling coordination and consultation requirements.

Urban Refuge

With its close proximity to the cities of Nampa, Caldwell, and Boise, and as the surrounding area is developed, Deer Flat NWR has become an increasingly urban refuge. Between 1990 and 2010, the population of Canyon County doubled, from 90,000 to over 180,000 (U.S. Census 2012a). Because of its proximity to a large urban area, the potential for the Refuge to connect urban dwellers to nature—and thereby build support for the Refuge System mission—is high.

Volunteer Opportunities and Partnerships

Volunteer opportunities and partnerships are key components of the successful management of public lands and are vital to Refuge programs, plans, and projects, especially in times of static or declining budgets. Currently the Refuge makes use of volunteers in invasive species control, habitat restoration, maintenance, visitor surveys, and public use programs. In the future, successful

implementation of native habitat restoration, survey, and monitoring activities, and environmental education (EE) and interpretation programs will require the use of partnerships and volunteers.

Wilderness Review

Service CCP policy requires that a wilderness review be completed for all CCPs. If it is determined that the potential for wilderness designation is found, the process moves on to the wilderness study phase. As part of the process for this Final CCP/EIS, the planning team completed a wilderness review that can be found in Appendix D. This review concluded that Refuge lands are not suitable for wilderness designation.

Assess Feasibility of Fees

A feasibility assessment will be conducted to evaluate whether to charge an entrance and/or boat launch fee to provide funding to maintain visitor facilities and hire visitor services and law enforcement staff. Criteria to consider will include impacts to the community, the cost-benefit ratio of charging and collecting a fee, and other relevant factors.

Conduct Community Outreach

To increase community awareness, support, and appreciation for the Refuge and its purpose, the Refuge will conduct outreach with off-site audiences focusing particularly on adjacent landowners, local municipalities, and local community groups, because they have high potential to deliver Refuge messages to key audiences. Outreach programs will cover the same themes as those eventually identified for environmental education (EE) (see Objective 2.4.4.1) as well as basic information about Refuge programs (e.g., hunting regulations).

Enhance Law Enforcement

The law enforcement program will be enhanced to increase compliance with Refuge regulations and decrease trespass and vandalism. Methods may include hiring an officer and adding lighting, automatic gates, and security cameras.

Expand Hunting

Opportunities for hunting of additional species (e.g., turkey) will be addressed in future step-down planning efforts occurring in close coordination with IDFG. This process will require additional information provided in a hunt plan and an individual NEPA analysis. Changes to current hunting opportunities can be found in Section 2.4.2.

Improve Hunting Safety

Hunting and nonhunting areas will be clearly marked with signs on land and water, to notify nonhunters of hunt area boundaries and to notify waterfowl hunters when they reach the end of a hunt zone. Signs will be erected on the Refuge boundary to remind upland hunters not to shoot across or toward the boundary to reduce the potential for shot to travel onto private lands and public roads.

Promote Refuge-friendly Land Use with Neighbors and Local Municipalities

From aerial images of the Refuge, it is readily apparent that the Refuge is an island surrounded by human alterations of the landscape. It is bounded by agricultural fields, but even this landscape has been rapidly changing. The small cities and communities that dot the landscape around the Refuge have experienced one of the highest growth rates in the country. Because the Refuge represents only a small part of the overall landscape, to successfully manage wildlife the Service must work with other agencies, governments, businesses, and neighboring landowners to protect and preserve Refuge wildlife and wildlife habitat.

The Refuge also plans to conduct outreach to adjacent landowners to educate them about their potential impacts (fragmentation, feral animals, habitat degradation) to wildlife and habitat and to promote awareness of existing incentive programs that promote continued agricultural use and/or low-density development. Cooperation and education of Refuge neighbors could also enhance the law enforcement program by providing a well-educated corps of neighboring landowners and regular Refuge visitors who may observe and report inappropriate or illicit behavior on the Refuge. This could reduce the number of violators through increased surveillance, thus benefitting natural and cultural resources, taxpayers' investment in visitor facilities, and visitor experiences.

Table 2-1. Summary of Management Direction by Issue

Issue	Management Direction
	How will the Refuge protect its valuable resources on the Lake Lowell Unit?
Recreational boating	Expand the no-wake zone to the east of a line between Parking Lot 1 and Gotts Point and at the Narrows. Add no-wake zone 200 yards from the edge of the vegetation between Parking Lots 1 and 8.
Boating season	Open lake April 15 through September 30.
Protection of emergent beds	Keep all emergent beds open to public use, except up to a 500-yard closure around active and historical grebe nesting colonies during the boating season. Keep closure in place until July 15 of the following year.
Protection of mudflats	Seasonally close mudflats when water levels below 2,522 feet around shorebird areas in the East and West Pools.
Creation of mudflats	Remove 5 to 25 acres of shoreline vegetation adjacent to West Pool mudflats.
Noise	Enforce State/County decibel limits.
Swimming	Encourage swimmers to swim at designated swimming areas at the Lower Dam Recreation Area and Upper Dam, and allow swimming at other areas.
Upland access	Allow wildlife-dependent activities off-trail at—East Side Recreation Area year-round; Gotts Point February 1 through September 30; and in all other open areas August 1 through January 31. Allow nonwildlife-dependent activities on designated trails only.
Upland activities	Allow walking, jogging, bicycling, horseback riding, and on-leash dog walking.
	How will the Refuge protect its valuable resources on the Snake River Islands Unit?
Nesting protection	Most Refuge islands will be open to public use outside of goose nesting season from June 15 through January 31. Some Refuge islands (currently four to six) will be open to public use July 1 through January 31 to reduce disturbance to nesting herons, gulls, and terns.
	How will the Refuge provide safe, accessible, high quality compatible wildlife-dependent recreation opportunities in the future?
Wildlife observation and photography	Maintain existing and add additional trails and observation facilities (see Maps 4-6).
Environmental education (EE) and interpretation	Increase interpretive opportunities and programs. Reduce the size of current EE program by emphasizing on-site programs.
	Redesign Lower Dam Recreation Area (LDRA) to include new facilities and trails.

Issue	Management Direction
Upland game hunting	Allow upland game hunting at Snake River Islands Unit. Allow upland game bird hunting at Lake Lowell Unit between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.
Waterfowl hunting	Allow on Snake River Islands Unit. Allow on Lake Lowell Unit between Parking Lots 1 and 8, and from the east boundary of Gotts Point to the east boundary of the Leavitt Tract.
Shell limit	A limit of 25 shotgun shells in possession per hunter will be implemented.
Type of hunt	Offer general season hunt.
Youth hunt	Allow youth hunt in all designated waterfowl hunting zones.
Deer hunting	Allow on Snake River Islands Unit, and allow controlled hunt on Lake Lowell Unit from Parking Lot 8 to the New York Canal.
Fishing	Provide additional shoreline fishing access from designated trails and docks (see Maps 4-6). Allow access in all open areas of lake. Allow anglers off-trail in East Side Recreation Area year-round, at Gotts Point February 1 through September 30, at Murphy's Neck March 15 to September 30, and in all other open areas August 1 through January 31. From October 1 to April 14 fishing is allowed from nonmotorized boats in Fishing Areas A and B. Allow ice fishing within 200 yards of the dams, subject to areas posted by Reclamation.
Fees	Evaluate whether to charge an entrance and/or boat launch fee.
Bass Tournaments	Allow every other weekend from LDRA, April 15 through May 13 and July 10 through September 30.
Gotts Point Access	Allow vehicle access (contingent on signed agreement with County Sheriff to reduce illegal activities).

2.3 Wildlife and Habitat Goals, Objectives, and Strategies

Goals and objectives are the unifying elements of successful refuge management. They identify and focus management priorities, resolve issues, and link to refuge purposes, Service policy, and the NWRS mission.

A CCP describes management actions that help bring a refuge closer to its vision. A vision broadly reflects the Refuge's purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Goals then define general targets in support of the vision, followed by objectives that direct effort into incremental and measurable steps toward achieving those goals. Strategies identify specific tools and actions to accomplish objectives (USFWS 2002a).

The goals for Deer Flat NWR for the next 15 years are presented in the following tables. The order of the goals does **not** imply any priority in this CCP. Priority actions are identified in the staffing and funding analysis (see Appendix C). Each goal is followed by the objectives that pertain to it. Some objectives pertain to multiple goals and have simply been placed in the most reasonable spot. Below each objective statement are the strategies that could be employed to accomplish the objective. Some strategies pertain to multiple objectives. Symbols are used in the tables with the following meanings:

%	percent
>	greater than
<	less than
≥	greater than or equal to
≤	less than or equal to

2.3.1 Goal 1 (Lake): Protect, maintain, and enhance mudflat, emergent-bed and open-water habitats associated with Lake Lowell to benefit migratory birds and other wildlife

Objective 2.3.1.1. Protect, maintain, and enhance emergent beds – Lake Lowell shoreline
Protect 845, maintain 100, and enhance 250 acres of emergent plant beds on Lake Lowell, benefiting aquatic migratory birds (e.g., western and Clark's grebes, great egrets, and mallards) and other fish and wildlife. These emergent plant beds are characterized by the following attributes: • 50%-70% cover of desirable moist-soil plants (e.g., smartweeds, spikerushes, salt grass) interspersed with taller (<3 feet) emergent plants (e.g., bulrush, simplestem bur-reed, and cattail) • Presence of native/desirable submergent plants (e.g., pondweeds) • No hydrilla, Eurasian watermilfoil, or purple loosestrife present • Areas with high concentrations of breeding and foraging birds and other wildlife protected from human-caused disturbance • Minimum water elevation of 2,520 feet to benefit grebe nesting colonies from April through July (if suitable for Board of Control)
Strategies Applied to Achieve Objective
Implement boating closures to protect emergent beds for grebe nesting and other wildlife. See Objective 2.4.1.4. On a seasonal basis, close areas critical to nesting birds (e.g., grebe colonies, heron rookeries, and bald eagle nests) from public entry. Size these areas appropriately according to best available science. Keep the areas closed until no nesting is observed in the same area the following year.
Work with IDFG and other partners to develop and implement methods to reduce carp biomass in Lake Lowell. Potential methods include mechanical removal, chemical treatments, biological treatments, and carp exclusion devices.
Use soil disturbance (e.g., discing) techniques to create openings in emergent beds.
Seed/plant desirable moist-soil plants, as needed.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Rationale: Deer Flat NWR was established to provide a refuge and breeding grounds for migratory birds and other wildlife. The Refuge has been identified as a notable waterbird site (Ivey and Herziger 2006), an "important site for aquatic birds in Idaho" (Manning and Hartley 2006), and as a State Important Bird Area (see Chapter 1). Nineteen species of birds that use the Refuge's emergent beds, open waters, and mudflats are listed by the Idaho Comprehensive Wildlife Conservation Need Strategy (IDFG 2005) as species of greatest conservation need. These species include western and Clark's grebes, northern pintail, great egret, and hooded merganser. Emergent beds (i.e., plants that grow in the water but pierce the water surface) typically occur along the entire south and east shorelines of Lake Lowell as well as pockets along the northern shoreline. Lake Lowell's approximately 845 acres of emergent plant beds are composed predominantly of water smartweed (*Polygonum amphibium*), coyote and peachleaf willow (*Salix exigua* and *S. amygdaloides*), and bulrush (*Scirpus paludosus* and *S. tuberosus*). Plants from the *Polygonum* and *Scirpus* genera have been shown to be an important food source for ducks in the early spring (Stollberg 1950). Approximately 77 bird species in Idaho use marshes and lakes, and 55 species depend on lakes and emergent beds as their primary habitat (Idaho Partners in Flight 2000). Many of the bird species that are seen in the smartweed bed are near the edge of the open water. Nesting grebes have also selected sites near open water to facilitate easy feeding and back brooding. In order to create more edge area and open up areas for foraging and nesting waterbirds, we will explore appropriate measures to create openings (e.g., discing) and channels in the larger expanses of smartweed to facilitate grebe foraging and movement.

Smartweed was planted in the lake in 1938 by Refuge staff and typically emerges as the ambient and water temperatures increase in April and May. The plant continues to grow throughout the summer season, blooms in July, and dies back as water temperatures drop. The combination of willows, smartweed, and open water provides excellent feeding, cover, and nesting habitat for numerous species of migratory birds (including waterbirds), as well as spawning, nursery, and escape habitat for fish.

For example, marsh wrens and yellow-headed blackbirds nest in the willows, and Clark's, western, and pied-billed grebes; American coots; American bittern; and redheads, nest in the smartweed beds and also in the willows. In addition, many species use the emergent beds for foraging. Lake Lowell is known for large concentrations of wintering ducks and geese that rely on smartweed habitat. Canada geese primarily use the shallow water, smartweed beds, and other emergent cover of the lake for sanctuary and loafing during the spring. Ducks including redhead, mallard, northern shoveler, and cinnamon teal use the emergent beds as brood rearing and/or foraging habitat. Duck broods were much more common around the lake in the late 1960s than they are today.

These plants are also important to anchor soil and help reduce lakeshore erosion and sedimentation of the lake, thereby improving water quality by reducing sedimentation. Asplund (2000) concludes that naturally vegetated shoreline helps reduce the impacts of waves on shoreline erosion. The removal of some of the shoreline vegetation will be beneficial to marshland birds but may also increase or add to the erosion and sedimentation in the immediate area. The overall effects of this strategy are anticipated to be minimal as the amount of emergent vegetation removal will be small in comparison to overall size of the lake and adherence to BMPs.

According to Bouffard (1982), boat propellers can remove aquatic vegetation and change the species composition of the vegetation. Also, in Bouffard's study, vegetation loss caused as a result of bank erosion and siltation was most common in areas where waterskiing was practiced. During summer months at Lake Lowell, migratory birds such as pelicans, cormorants, and grebes loaf and forage in and adjacent to shallow water with smartweed and emergent vegetation. The presence and noise from boats and personal watercraft in and adjacent to smartweed beds and emergent vegetation (used for nesting and foraging) causes disturbance (e.g., flushing) to aquatic birds (Rodgers and Schwikert 2002).

Clark's and western grebes are migratory waterbirds that have historically used Lake Lowell for nesting, foraging and staging for migration. The breeding populations of Clark's and western grebes are listed as imperiled by the State of Idaho (IDFG 2005). Species are designated imperiled in Idaho if few populations exist, there is a rapid decline in numbers, or there are other factors that make the species vulnerable to rangewide extinction or extirpation (IDFG 2005).

Grebes at Lake Lowell nest in emergent beds, and large nesting colonies have been noted along the south shore of Lake Lowell. Although regular grebe nesting surveys have not been conducted, references to nesting grebes are made regularly in Refuge files and historical pamphlets. The shoreline and its emergent vegetation are an important habitat for a variety of wildlife, but these areas are especially important for nesting and breeding grebes in Idaho. In order to protect this habitat, the Refuge will implement various measures, including no-wake zones and seasonal boating closures to protect emergent beds that provide grebes and other waterbirds opportunities to nest, forage, and rest with minimal disturbance.

The emergent beds also provide an important buffer. Allen et al. (2008) found that such buffers are important for protecting grebe nests from wind- and/or boat-caused wakes. Boats with frequent starts, stops, and "nearplane" speeds increased the potential for habitat impacts. Increased sedimentation and/or resuspension of lake sediments, by either boating activity or natural wind events, increases turbidity and resuspends phosphorus and other pollutants that adhere to soil particles (IDEQ 2010).

Carp represent a high threat to the submerged vegetation's ecological functions. Carp uproot and eliminate submerged vegetation, increase turbidity, and decrease the abundance and diversity of the invertebrate community (Miller and Crowl 2006). The lake's carp population is estimated at 1.2 million. IDFG recommended three options for significant carp reduction: physical control such as seining, a yet-to-be-studied biological control using a koi-herpes virus, or chemical control using a rotenone treatment applied to the lake in an extreme low-water year (Kozfkay et al. 2011).

Carp removal has occurred intermittently for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell. Through an SUP, a commercial fisherman uses a beach seine to harvest carp and suckers. Seining is usually conducted during the fall and winter because the fish slow down and congregate in the cooler water, making them easier to catch. Current seining operations, which remove an estimated 50 to 125 tons of biomass annually (Cunningham 2012), likely do not remove enough of the carp population (estimated at 4,800 tons of biomass) to result in significant water quality improvements or promote submergent plant growth. However, there have been no studies that have determined the appropriate threshold of biomass removal to achieve habitat improvements.

Objective 2.3.1.2. Protect, maintain, and enhance mudflats – Lake Lowell shoreline

Protect between 100 and 800 (560 based on a water level elevation of 2,515 feet), maintain 350, and enhance 560 acres of mudflats on Lake Lowell, benefitting aquatic migratory birds (e.g., shorebirds, waterfowl) and other wildlife. These mudflats are characterized by the following attributes:

- Saturated soils during mid-July to end of September
- Sparse (1%-10%) to no vegetation (e.g., moist-soil plants)
- Macroinvertebrates (e.g., chironomids) that provide forage for migratory shorebirds present
- Areas with high concentrations of foraging shorebirds, waterfowl, and other wildlife protected from human-caused disturbance, especially during the late summer and fall

Strategies Applied to Achieve Objective

Work with the Board of Control to explore lowering the water elevation to 2,515 feet by September 1.

Implement seasonal or permanent closures to prevent disturbance to migrating shorebirds. See Objective 2.4.1.4.

Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).

Rationale: Late in the summer, as Lake Lowell is drawn down for irrigation, many species of shorebirds use the exposed mudflats for feeding. Shorebirds depend upon wetland stopover sites to replenish their depleted fat reserves used during migratory flight (Farmer and Parent 1997). Many wetland areas in Idaho and throughout the United States have been drained, developed, or otherwise altered, forcing shorebirds to use other remaining wetlands. Construction of reservoirs for power and irrigation throughout the United States has created about two million acres of such habitat since the mid-1950s (Howe 1987). Taylor and Trost (1992) showed that reservoirs in the western interior can be important migratory stopover sites for shorebirds. The Lake Lowell Reservoir has been shown to be important for shorebirds.

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) identified Lake Lowell as one of two sites in Idaho with greater than 5,000 shorebirds in more than half the years surveyed. The tens of thousands of shorebirds recorded at the lake document its importance as a stopover site (Taylor et al. 1992). Shorebirds present in late summer and fall include lesser and greater yellowlegs, sandpipers (western, pectoral, least, Baird's, solitary, spotted, and stilt), marbled godwits, long-billed dowitchers, plovers (black-bellied, semi-palmated, killdeer, and American golden), as well as the black-necked stilt and American avocet. If mudflats are exposed, peak shorebird abundances occur at Lake Lowell between late-July, mid-August, and mid-late September (Taylor and Trost 1992).

The Intermountain West Regional Shorebird Plan (Oring et al. 2000) lists Lake Lowell as critically important for the Wilson's phalarope, long-billed curlew, long-billed dowitcher, and black-necked stilt. Lake Lowell is also listed as very important for the western sandpiper, willet, red-necked phalarope, least sandpiper, and marbled godwit and important for the semi-palmated plover, spotted sandpiper, and greater yellowlegs. The long-billed curlew is a Federal species of special concern.

The Idaho Comprehensive Wildlife Conservation Strategy (CWCS; IDFG 2005) lists species of greatest conservation need by different levels. Three species of shorebirds that occur at Lake Lowell are included on the list; two are listed as vulnerable (black-necked stilt and American avocet), and one is listed as imperiled (marbled godwit). *Vulnerable* means the species is at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to rangewide extinction or extirpation. *Imperiled* means the species is at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to rangewide extinction or extirpation.

Studies have shown that both the date and amount of shoreline exposed affect shorebird abundance, with increasing numbers of shorebirds correlating to increasing mudflat (Taylor and Trost 1992; Turley and Holthuijzen 1999). When exposed, mudflats are the most extensive on the southeast end of the lake and near Parking Lots 1 through 3. Additional areas include areas along the north and east sides of the West Pool. At Lake Lowell, approximately 100 acres of mudflats are exposed at a surface water elevation of 2,522 feet and increase in extent to 560 acres as the water drops to typical annual lows reaching elevations of 2,515 feet. Even more mudflats are exposed if surface water elevations fall below the annual averages. If consistent mudflats are made available to shorebirds, the Refuge may experience increased numbers and prolonged stopover times, which will benefit shorebird populations and provide increasing viewing opportunity for Refuge visitors.

Deer Flat NWR does not have any jurisdiction to manage the water levels of Lake Lowell; water levels fluctuate with irrigation demands (Chapter 3). The Refuge will work with the Board of Control to explore the possibility of maintaining a minimum water level from July 15 through September 30 at or near forebay elevations ranging from 2,515 to 2,512 feet to provide mudflats for foraging shorebirds while still meeting the Board of Control's primary mission of providing water to irrigators.

The mudflats used most by shorebirds are near the New York Canal at the east end of the lake. The New York Canal is the southern boundary of the east end of the East Side Recreation Area. This area is currently open to the public for recreational activities including hunting, fishing, and wildlife observation (see Chapter 5). Recreational activities in this area could disturb migrating shorebirds.

The consequences of human disturbance, in terms of physical condition or survival, are currently unknown (Fernández et al. 2010). Some studies have shown that shorebirds avoid areas of higher disturbance. For example, when comparing bird response on paired lower and higher use days at trail sites, a study in California found the number of shorebirds decreased with increasing trail use, with higher trail-use days averaging 25 percent fewer birds than on lower use days (Trulio and Sokale 2008).

To minimize disturbances to migrating shorebirds, access to the shorebird area along the shoreline from Murphy's Neck to the Narrows and at the northern shoreline of the East Pool east of Tio Lane will be closed seasonally to boating when water level elevation falls below 2,522 feet (Objective 2.4.1.4; and Map 4). A shorebird observation blind will be installed to provide shorebird viewing opportunities while minimizing disturbance (Objective 2.4.1.3). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

Objective 2.3.1.3 Create mudflats – Lake Lowell shoreline
Within five years, restore approximately 5-25 acres of mudflats at Lake Lowell adjacent to Farm Field 5 at or above approximately 2,518 feet elevation. These mudflats will provide habitat for migrating shorebirds and other wildlife when lake water levels are above 2,518 feet. These mudflats are characterized by the following attributes: • Saturated soils during mid-July to end of September. • Sparse (1%-10%) to no vegetation (e.g., moist-soil plants). • Saturated soils to dry soils during mid-July to mid-September. • Macroinvertebrates (e.g., chironomids) that provide forage for migratory shorebirds present. • Adjacent or connected to existing mudflats with a history of high shorebird use.
Strategies Applied to Achieve Objective
Remove 5-25 acres of shoreline vegetation adjacent to current mudflats by mechanical control (including possible issuance of firewood collection permits) or controlled burn to create larger contiguous mudflats.
Create shallow scours to hold water.
Disc vegetation in late fall to incorporate organic matter into the soil and encourage invertebrate growth.
Rationale: During high-water years, Lake Lowell does not have suitable exposed mudflats to provide reliable shorebird habitat. Historically, the Refuge maintained open shorelines by removing willows and cottonwoods. According to the 1975 Refuge Annual Narrative, short willows and forbs were clipped with a tractor and rotary beater to retard succession on shoreline adjacent to Farm Field 5. In addition, firewood permits were regularly issued in the 1960s through late 1970s, which likely provided additional mudflats above and/or at elevations that are now covered by riparian habitat. These activities ceased over time, and the riparian habitat developed, as management began to shift to provide habitat for raptors. Small openings in the riparian habitat have been maintained near Farm Field 5 and are primarily used as duck trapping sites. These areas are used by shorebirds when lake water levels are higher. The Refuge proposes to reimplement some of the historical management practices, such as willow and cottonwood removal, to provide mudflat habitat for shorebirds in high-water years. In addition, discing some of the smartweed at low water levels will incorporate organic matter into the soil and encourage invertebrate growth, therefore increasing the forage base for shorebirds even when water levels are maintained at levels conducive to providing suitable mudflats in July through September. Initially, small acreages (<5 acres) of willow and cottonwood will be removed and monitored to see if shorebirds use the area. If these first plots are used by shorebirds, then additional acreages will be treated.

Objective 2.3.1.4. Protect, maintain and enhance open-water habitat – Lake Lowell
Protect, maintain, and enhance 6,430 acres of open-water habitat (depths from 2 to 45 feet) at Lake Lowell to benefit waterfowl (e.g., mallards, geese), waterbirds (e.g., grebes, pelicans), and fish. These open-water habitats are characterized by the following attributes: • No emergent vegetation • Submergent plant beds in shallow areas with light penetration • Carp no more than 20% of total fish biomass • Areas with high concentrations of foraging and loafing birds and other wildlife protected from human-caused disturbance year-round
Strategies Applied to Achieve Objective
Implement carp reduction in 6,430 acres of open water. See Wildlife and Habitat Objective 2.3.1.1.
Continue winter waterfowl boating closure and current no-wake zones on 6,430 acres of open water. See Objective 2.4.1.4.
Implement new no-wake zones and/or closures to minimize disturbance to wildlife species that are dependent on open-water habitat. See Public Use Objective 2.4.1.4.
Work with partners to improve water quality in Lake Lowell.

Rationale: The importance of the Lake Lowell Unit to migratory birds is discussed in Objective 2.3.1.1. The lake's open-water habitat is important to many species of birds for feeding and roosting at different times of the year. Open-water sites such as Lake Lowell support large waterfowl concentrations during spring and fall staging, as well as migration and wintering (Idaho Partners in Flight 2000).

The lake carp population is estimated at 1.2 million carp (Kozfkay et al. 2011). Carp are thought to represent a high threat to the submerged vegetation's ecological functions. Carp impacts and potential treatments are discussed in Objective 2.3.1.1.

Grebes nest in the emergent beds of Lake Lowell (see Objective 2.3.1.1) and rear their young in the open water, typically from June through October. The water level drops at this time (see Objective 2.3.1.2), leaving the emergent beds dry. Lowered water levels are problematic for grebes for several reasons. Grebes eat fish and pursue them underwater (Lawrence 1950; Storer and Nuechterlein 1992) and grebe chicks are altricial (dependent on adults for protection), riding between the wings on their parent's back in open water until they are 2 to 4 weeks old. Back-brooding is essential for survival of young chicks because their plumage is not yet developed to withstand long periods of swimming and they are not adapted to loaf on shore (Storer and Nuechterlein 1992).

The fluctuating water levels on Lake Lowell have a direct effect on the amount of open water acreage available for grebes. As water levels decrease in the summer months, usable open water habitat decreases accordingly. During the 2010 and 2011 nesting season, as water levels dropped grebes moved into deeper water. Grebes nesting in the southeast portion of the lake needed to move especially far as water levels dropped, because the gradual slope of the lake bottom meant that feeding habitat was unavailable. In open water, grebes are more prone to disturbance from open-water recreational activities. High-speed boating leads to disruption of nesting and can separate chicks from adults, which may lead to a loss of production and displacement of grebes from preferred habitats (Burger 1997). Adults and chicks are often killed by boats (Ivey 2004; Shaw 1998), and small chicks can become separated from their parents and die of exposure if adults dive to avoid motorboats (Ivey 2004; Storer and Nuechterlein 1992). Creating no-wake zones will provide a sanctuary for grebes to forage and raise their young with fewer disturbances.

The open water of Lake Lowell is important for waterfowl primarily as wintering habitat, but some nesting also occurs on the Refuge. Closed areas and no-wake zones will provide undisturbed forage and brood-rearing habitat for waterfowl. Eleven species of waterfowl, including mallard, cinnamon teal, wood duck and gadwall, nest around the lake's edges and rear their young in the open water, typically in early summer. Annual Refuge narratives throughout the 1960s and early 1970s document nesting waterfowl and a fairly significant number of spring migrants using the lake. It appears that nesting and spring migration have declined over time. Reasons for the decline likely include habitat alteration (see Objective 2.3.2.1), fluctuating water levels (see Chapter 3), and disturbance. Disturbance can reduce courtship behavior and decrease egg and duckling survival. Disturbed adults may leave their eggs, nestlings, or ducklings, reducing survival rates (Korschgen and Dahlgren 1992). Impacts on waterfowl depend on the noise, speed, and proximity of watercraft (Cywinski 2004). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

It is essential that grebes, waterfowl, and other wildlife can feed, roost, and raise young undisturbed on the lake. To provide places to feed, raise their young, and roost with little or no disturbance to waterfowl and waterbirds (e.g., grebes and pelicans), our strategies include seasonally closing portions of the lake to public use and implementing no-wake zones. The lake is closed to public use from October 1 through April 14 to provide resting habitat for migrating and wintering Canada geese and other waterfowl. Energy reserves are extremely important for wintering waterfowl to maintain body temperature in cold weather and provide energy for migration. Therefore, disturbance and flushing events during this critical time are more disruptive than during warmer months outside of the migration period.

2.3.2 Goal 2 (Riparian): Protect, maintain, and enhance riparian forest, benefiting migratory birds and other riparian-dependent species.

Objective 2.3.2.1. Protect, maintain, and enhance riparian forests – Lake Lowell
Protect 1,900 acres, maintain 520 acres, and enhance 1,200 acres of riparian forest communities surrounding Lake Lowell to benefit migratory birds (e.g., yellow warbler, song sparrow, herons) and a diverse assemblage of other riparian-dependent species. These riparian habitats are characterized by the following attributes: • Structurally diverse forest community • 20%-70% canopy cover of over-story woody species (e.g., cottonwood, peachleaf willow) • 30%-80% cover of native shrub in understory (e.g., willows, golden currant, wild rose, elderberry) • 25% cover of desirable/native grasses and forbs (e.g., *Deschampsia* sp., mannagrass) • 20%-40% ground cover from dead and downed wood • >2 standing dead trees/acre • 5%-25% coverage of invasive woody trees and shrubs (e.g., Russian olive) • No salt cedar • <5% cover of invasive plants (e.g., Canada thistle, perennial pepperweed, poison hemlock, reed canarygrass) • Areas with noted concentrations of nesting, wintering, and migrating birds and other wildlife protected from human-caused disturbance
Strategies Applied to Achieve Objective
Annually, remove undesirable trees, shrubs, and grass; plant desirable trees, shrubs, and grass species on 10-15 acres, as necessary.
Maintain appropriate level of downed and standing dead trees, including invasive tree and shrub species that are treated and left in place, except for the designated mudflat area adjacent to Farm Field 5.
Use mechanical and prescribed fire to reduce hazardous fuels loading, create openings, and reduce invasive species.
Maintain nesting habitat by reducing ladder fuels and/or fuel loading, or girdling trees in rookery areas and around eagle nests.
Maintain appropriate fire breaks while maintaining a continuous canopy cover.
Where feasible, relocate fire breaks to coincide with Board of Control drainage canals.
Require visitors to stay on trail seasonally to prevent disturbance to neotropical migrants, nesting wading birds, and other wildlife. See Public Use Objective 2.4.1.3.
Implement land-based seasonal closures to protect nesting and wintering areas. See Objective 2.4.1.3.
Issue SUPs for firewood collection as appropriate, to maintain level of dead and downed material.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Apply mechanical, chemical, and biological methods to treat invasive species.
Rationale: Before the construction of the reservoir, Deer Flat NWR consisted of typical sagebrush-steppe habitat that included springs and small riparian oases associated with these springs. The flooding of the reservoir eliminated the existing habitats but over the years provided an important riparian habitat. Currently, the majority of shoreline around Lake Lowell is a riparian zone dominated by cottonwood, Russian olive, coyote and peachleaf willows, and false indigo bush. The Lake Lowell Unit contains approximately 2,116 acres of riparian and/or floodplain forest habitat in various seral stages. Most of this habitat on the Refuge is in a degraded condition due to invasive plants, past grazing practices, alteration of hydrologic regimes, and potentially poor native plant recruitment/recovery.

Historically, the Refuge maintained open shorelines by removing willows and cottonwoods with a tractor and rotary beater to retard succession on shoreline in the area adjacent to Farm Field 5 (Refuge Annual Narrative 1975). In addition, firewood permits were regularly issued in the 1960s through late 1970s. Over time, these activities ceased, and a riparian habitat developed along the lakeshore. The Refuge can provide habitat for species dependent on riparian and floodplain forests by enhancing a mix of early, mid-, and late-successional riparian forests.

Human land uses (e.g., urban sprawl, agriculture) can have substantial effects on plant and animal communities, including riparian forests (Patterson and Best 1996; Wilson and Ryan 1988). One study has shown that some riparian areas harbor up to 10 times the neotropical migrants that are harbored by neighboring nonriparian habitats (Stevens et al. 1977). Of the 243 bird species breeding in Idaho, 113 (46%) use riparian habitat as nesting habitat. Many of the other 130 species also use riparian habitat as a source of water, as migratory corridors, or for other purposes. Of the 119 neotropical migratory landbirds, 68 species (57%) use riparian habitat. Many of Idaho's mammals, amphibians, reptiles, fish, and mollusks also depend on riparian habitat for survival (Idaho Partners in Flight 2000).

Wading birds, like great blue herons, typically build large stick nests in both live and dead trees in close proximity to water. Herons occasionally nest singly, but more typically they nest in large colonies that average 49 nests found in wet or dry forest, sparsely treed islands, beaver ponds, and marshes (Peck and James 1983). In order to provide this type of structure in the riparian habitat surrounding Lake Lowell, the Refuge will identify potential suitable habitats and protect and monitor them to encourage future wading bird use. Currently all recreation in the riparian habitat is required to be conducted on designated trails during the breeding season. Seasonal closures will be placed around any colonies to mitigate potential impacts from human disturbance that could result in increased mortality of chicks due to exposure or predation, nest desertion, or complete abandonment of a colony (Vos et al. 1985). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

The Refuge has an opportunity to enhance riparian areas on the Lake Lowell Unit. Planting desirable species will accelerate riparian regeneration, enhance habitat quality, and provide habitat for neotropical species. Highest-priority areas for enhancement will be based on their size and location on the Refuge. Though riparian acreages are relatively small, enhancement efforts may provide valuable habitat or habitat connectivity for some species that are dependent on riparian forests. New plantings will focus on connecting or expanding existing riparian stands in areas that are likely to be used by focal species.

In areas open to public use, social trails fragment viable wildlife habitat and increase user impact on the natural system. Wildlife responds to recreationists using trails by flushing away from the perceived danger, which effectively reduces the amount of suitable habitat available to them (Taylor and Knight 2003). Frequent flushing of an animal increases the amount of expended energy, which reduces their overall growth and reproductive potential, and causes animals to avoid otherwise suitable habitat (Geist 1978). There will be seasonal restrictions on off-trail travel in some areas.

Most riparian habitat on the Refuge is in a degraded condition due to invasive plants, alteration of hydrologic regimes and poor native plant recruitment/recovery. We will focus on improving habitat conditions in the existing riparian habitat. Strategies to enhance this habitat could involve thinning and planting of young native woody species to create multi-aged stands, controlling invasive species, and establishing native understory in existing riparian forests. Selected snags, logs, and piles of woody debris will be left in place to provide important habitat for a variety of bird species and other wildlife. Passerine birds like dark-eyed juncos and white-crowned sparrows as well as upland game species like California quail use dense vegetation and brush piles for cover. Snags are used by many raptors for perching, by woodpeckers for foraging, and by wood ducks and owls for nesting. Bunnell et al. (2002) estimate that 57 percent of the listed vertebrate species in their study were reliant or associated with dead and dying

woody debris. Firewood collecting is an effective way of reducing the amount of woody debris to reduce fuel loads. In one study, an unmanaged stand consisted of 30 to 40 percent woody debris cover, which declined rapidly with successive fiber harvesting (Angelstam 1997). Care should be taken to ensure excessive harvest does not happen. A balanced approach that supports a mosaic of woody debris and open riparian forest floor will provide suitable habitat for a wide variety of wildlife.

Mechanical and prescribed fire treatments can be used to reduce the amount of fuel loading and invasive species and to restore selected sites. Removal of selected dead and downed logs can reduce the amount of fuel loading in existing riparian forests, which can reduce the likelihood of an out-of-control fire destroying riparian sanctuaries important for local and migrating wildlife. Refuge neighbors and users have expressed interest in collecting firewood from the Refuge due to its close proximity to residences and an abundance of trees and downed debris. Firewood collection could be allowed by SUP and will provide interested parties with a usable resource while benefitting the Refuge's wildlife. With the Refuge Fire Management Officer, we will identify areas vulnerable to wildfire, and place fire breaks to reduce the probability of an out-of-control wildfire destroying large swaths of riparian habitat.

Objective 2.3.2.2. Protect, maintain, and enhance riparian forests – Snake River Islands

Protect 104, maintain 104, and enhance 104 islands' riparian forest communities to benefit migratory birds (e.g., yellow warbler, song sparrow, great blue heron) and a diverse assemblage of other riparian-dependent species. Riparian habitat will be managed to meet the following attributes as appropriate:

- Structurally diverse forest community
- >20% canopy cover of over-story woody species (e.g., cottonwood, peachleaf willow)
- 30%-80% cover of native shrub in understory (e.g., golden currant, wild rose, coyote willow, elderberry)
- 25% cover of native grasses and forbs (e.g., Sandberg bluegrass, bluebunch wheatgrass)
- 20%-40% ground cover from downed trees
- >2 standing dead trees per acre
- Minimal invasive woody trees and shrubs (e.g., Russian olive, salt cedar)
- <25% cover of invasive plants (e.g., Scotch thistle)
- Areas with high concentrations of nesting and migrating birds and other wildlife protected from human-caused disturbance

Strategies Applied to Achieve Objective

Plant desirable tree and shrub species after invasive species treatment and/or removal on 2-10 islands.

Maintain downed and standing dead trees (including treated invasive tree and shrub species that are left in place) as appropriate.

Use mechanical and prescribed fire to reduce hazardous fuel loading.

Implement seasonal closures to prevent disturbance to waterfowl and colonial-nesting birds. See Public Use Objectives 2.4.1.3 and 2.4.3.1.

All Refuge islands closed from February 1 to June 14 during goose nesting season.

Some Refuge islands (currently four to six islands) closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns).

Partner with adjacent landowners to address cattle trespass problems in targeted locations (i.e., fencing on landowner property, fencing on islands, and other exclusion methods).

Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).

Rationale: The importance of riparian habitat in the arid west is discussed in the rationale for Objective 2.3.2.1. Meador and Goldstein (2003) also suggest the universal importance of riparian zones to the maintenance and restoration of diverse fish communities in streams.

Vegetative structure varies from island to island, but most include both upland and riparian habitat. The Refuge can provide habitat for species dependent on riparian forests by enhancing or restoring a mix of early, mid-, and late-successional forests on the Snake River Islands Unit. Highest-priority areas for restoration will be based on GIS modeling that includes a ranking system identifying the most biologically intact islands that are likely to provide good habitat. Factors to be modeled include size, current condition (e.g., existing habitat, noxious weeds), neighboring land use, and isolation (measure of flow and channel depth, Zoellick et al. 2004b) (See Objective 2.3.6.4). By starting with small projects, the Refuge can monitor effectiveness, predict future funding needs, and develop a long-term strategy for enhancing riparian habitat on all of the Refuge islands.

To effectively protect riparian zones on the islands, functional partnerships with adjacent landowners will be important. Unauthorized grazing occurs on the islands periodically, especially when low water flow allows easy access. Maintaining collaborative efforts with landowners will help the Refuge identify problem areas, seek assistance for prevention of trespass, and provide a shared outlook on the importance of riparian areas on the Snake River Islands. In addition, the Refuge periodically receives requests from Snake River Islands Unit neighbors to better control invasive species to prevent spread from the islands to private property. Invasive species are an enormous problem in the Treasure Valley, especially on the Snake River Islands, and effectively reducing invasive populations can be accomplished only with a combined effort.

Fire has been used to control undesirable plant communities in the past with mixed results. The vegetative structure on some of the islands is such that mechanically thinning and then burning the entire island may be the most cost-effective method of restoration. In cooperation with Service fire personnel, Refuge staff will evaluate past, current, and future practices to effectively use fire as a valuable tool in vegetative removal and restoration of riparian zones on the Snake River Islands.

Current protection practices include the closure of Refuge islands during sensitive times, most notably nesting periods for waterfowl and wading birds. The current island closure dates are February 1 to May 31, but additional protection is warranted. Canada geese in this area generally start hatching at the end of April or beginning of May, but hatching has been noted well into June (Steele et al. 1957). Molting of flight feathers happens around the same time, and geese are more vulnerable to disturbance when they are land-bound with young. To provide protections through this vulnerable time, the island closures will be extended to June 15. The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

2.3.3 Goal 3 (Wetlands): Protect, maintain, and enhance nonlake wetland habitats for the benefit of migratory birds and other wildlife.

Objective 2.3.3.1. Protect, maintain, and enhance emergent wetlands

Protect 85 acres, maintain 70 acres, and enhance 85 acres of wetland on three tracts (Upper Dam Marsh, Rambo Pond, and Leavitt Tract) to benefit wetland-dependent species (e.g., wetland birds, amphibians, hydrophytic plants, aquatic invertebrates). Wetlands should be characterized by the following attributes:

- Variably flooded, from seasonal inundation (October through April) to semipermanent (October through August) to permanent
- Variable-bottom topography resulting in water depths 0 to >36 inches
- Mosaic of tall (4-6 feet) emergent vegetation and open water
- 30%-70% cover of native emergent vegetation (cattail, bulrushes, sedges, rushes, smartweeds, wild millet)
- Submergent plants (e.g., pondweeds) in open water

• <5% cover of invasive plants (e.g., purple loosestrife) • Wetland areas of importance to nesting and migrating birds and other wildlife protected from human-caused disturbance
Strategies Applied to Achieve Objective
Use prescribed fire, discing, mowing, and herbicides to remove extensive emergent stands (e.g., cattails).
Implement water-level management (flood-up and drawdown) using water control structures.
Develop/secure reliable water sources (including water rights) and lift-pump systems, as needed.
Use scraping and contouring to produce a variable-bottom topography.
Modify the time and purpose of use (from irrigation to wildlife use) for existing water rights on the Leavitt Tract.
Reseed and/or revegatate with a mix of emergent vegetation.
Exclude cattle from Leavitt Tract wetland.
Finalize transfer of Upper Dam Marsh (and adjacent uplands) from Reclamation to FWS.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Rationale: The Refuge was established to provide refuge and breeding grounds for migratory birds and other wildlife. Providing a diversity of wetlands is vital to the Refuge's purposes. Wetlands provide habitat for fish and wildlife; improve water quality by filtering sediments and chemicals; reduce flooding; recharge groundwater; protect biological diversity; and provide opportunities for educational, scientific, and limited recreational activities. Outside of wetlands' use by waterfowl and other migratory birds, little is known about the vegetative composition of or aquatic species inhabiting Lake Lowell Unit's wetlands. Wetland basins should be at least 1 acre if the primary concern is waterfowl production (Hudson 1983). However, Williams (1985) reported that bird species diversity increases with a wetland area up to 10 acres, and species richness is more stabilized in larger wetlands. Water depths should vary throughout a wetland basin to attract a wide variety of flora and fauna but should not exceed 8 feet for optimum wetland plant development. Shorelines should consist primarily of gently sloping gradients (1:10) if the primary objective is to maximize wetland vegetation production and waterfowl use (Cole et al. 1996). Refuge wetlands at the Lake Lowell Unit (three wetlands totaling approximately 85 acres, including the Upper Dam Marsh, Rambo Pond, and the Leavitt Tract) should be managed to mimic natural disturbance mechanisms, thus providing and maintaining the cyclical aging and renewal processes of wetlands over time. By maintaining a number of acres of open shallow marsh through active management such as mechanical soil disturbance and water-control infrastructure, the Refuge can provide a diversity of early successional vegetation stages that increase overall biodiversity. Invasive plants (e.g., cattails and purple loosestrife) are widespread in Refuge wetlands. Invasive plants limit native plant production and cause impacts to food, nesting habitat, and cover for wildlife. Invasive plants in wetlands reduce waterfowl food availability during the migration and wintering periods. Cattails generally occur as scattered sterile plants in high-quality natural areas. Disruptions of hydrology, wildfire suppression, or system enrichment may favor cattail growth. System disruption is often followed by the growth of dense monocultures of cattails that may reduce habitat heterogeneity and eliminate other plants. Mechanical and chemical methods, prescribed burning, and several other methods of cattail control are available. Reliable control is achieved when any method reduces and maintains the stature of live and dead cattail stems below water levels for a period of one to three years (Apfelbaum 1985). A step-down plan for invasive species abatement will be developed following completion of the CCP. The Refuge has minimal water-management capabilities on these wetlands. Refuge staff will work toward ensuring the dependability of water to these wetland areas. With the exception of Rambo Pond,

the wetlands retain water throughout the summer, though significant reduction in surface area and depth may occur. Water levels in the Rambo Pond appear to vary due to seepage from groundwater and timing of when the water is pumped in. These wetlands support primarily submergent plant species.

The Leavitt Tract simulates a wet meadow and is used as foraging habitat by Canada geese, ducks, Sandhill cranes, and shorebirds and as nesting habitat for northern harriers and ducks. Wet-meadow vegetation may have included native species historically, but this site has been largely taken over by cattails. Currently, the Leavitt Tract attracts ducks and geese during the fall and winter.

Scraping and contouring of these wetlands may be beneficial in a few ways. The Leavitt Tract and the Upper Dam Marsh consist of a monoculture of cattails that could be removed most easily by heavy equipment initially, after which a regime of mowing and discing could maintain the wetlands. Modifying the wetlands to provide more edge, shoreline, and island structure for waterfowl and shorebirds could also be beneficial. Removing sediment buildup in the shallow ponds will deepen them, making the wetland more of a permanent structure.

The degradation of sensitive riparian habitats by livestock has been well studied, and some of the negative impacts from livestock include compaction of soil, which increases runoff and decreases water availability to plants; significant removal of vegetation, which allows soil temperatures to rise, increases evaporation on the soil surface and reduces resources available to native wildlife; and physical damage to vegetation from rubbing, trampling, and browsing (Severson and Boldt 1978). If the Refuge is to maintain wetland habitat as a priority resource for waterfowl and other wildlife, cattle need to be excluded from wetland areas and managed in the nearby uplands at appropriate stocking rates and times of the year (see Objective 2.3.5.2).

2.3.4 Goal 4 (Shrub-steppe): Protect, maintain, and enhance shrub-steppe habitats characteristic of the historic Columbia Basin

Objective 2.3.4.1. Protect, maintain, and enhance shrub-steppe habitat– Lake Lowell
Protect 830, maintain 520, and enhance 300 acres of shrub-steppe communities surrounding Lake Lowell, benefiting migratory birds (e.g., sage thrasher, loggerhead shrike, burrowing owls) and a diverse assemblage of other shrub-steppe-dependent species. These habitats should be characterized by the following attributes: • Unfragmented stands of 20 to >50 acres • 25% canopy cover of native shrubs, including sagebrush, bitterbrush, saltbush, and rabbitbrush • 25% cover of native perennial forbs/bunchgrasses (bluebunch wheatgrass, Great Basin wildrye, Idaho fescue) • <25% cover of invasive plants (e.g., cheatgrass, puncturevine, tumbleweed) • No rush skeletonweed present • 15% cover of bare ground • Refuge areas for wildlife protected from human-caused disturbance
Strategies Applied to Achieve Objective
Seed and plant native shrubs, forbs, and bunchgrasses with emphasis on areas adjacent to previously restored areas (i.e., CC Lightning Fire and Sage Fire areas) and areas beneficial for research and/or EE.
Rehabilitate shrub-steppe that has been damaged in unplanned fire events with native shrubs, forbs, and bunchgrasses.
Use 163 acres of restored steppe habitat to research cheatgrass control methods. Priority will be given to the North Side Recreation Area and adjacent areas, and the CC Lightning Fire area and adjacent areas.
Remove and rehabilitate unnecessary internal fire breaks through green-stripping.

Use prescribed fire and mechanical treatments for hazardous fuels reduction.
Implement land-based seasonal closures to protect nesting and wintering areas. See Objective 2.4.1.3.
Seasonally restrict travel to designated roads and trails to reduce and/or prevent habitat impacts and disturbance to wildlife. See Public Use Objective 2.4.1.3.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Rationale: Uplands on the Refuge typically consist of patches of big sagebrush with a cheatgrass understory between Lake Lowell, agricultural fields, fences, roads, and irrigation dikes. Even though most of the vegetation is nonnative, these areas provide nesting and foraging habitat for ground-nesting birds, resting and feeding areas for flocks of geese, foraging space for raptors, and habitat for small mammals and other wildlife. Currently the Lake Lowell Unit has approximately 830 acres of this upland or shrub-steppe habitat. The area near the Visitor Center has the largest contiguous piece of sagebrush habitat on the Refuge at approximately 550 acres. Sagebrush ecosystems and the wildlife that depend on them are thought to be among the most imperiled in North America (Dobkin and Sauder 2004; Knick and Rotenberry 2002; Knick et al. 2003; Mac et al. 1998). Populations of shrubland and grassland birds, which represent an important component of the biodiversity in the western United States, are declining more rapidly than other groups of bird species in North America (Dobkin 1994; Knopf 1994; Saab and Rich 1997; Vickery and Herkert 1999). Declines in sagebrush-dependent species can be attributed to the once greater than 60 million hectares of the Intermountain West shrub-steppe habitat being degraded, fragmented, converted to agriculture, or changed to vegetative states dominated by exotic annual grasses (Miller and Eddleman 2001; West 1996). These disturbance regimes have accelerated soil erosion and the loss of sagebrush ecosystems (Bunting et al. 2003; West and Young 2000) to a point where the ecological integrity may be pushed beyond a threshold from which they can recover (Allen 1988; Belnap and Eldridge 2001). Conservation and restoration of sagebrush lands are becoming high priorities for natural resource agencies because of changing attitudes about the intrinsic value of sagebrush ecosystems and the threat of petitions to list species under the Endangered Species Act (Bureau of Land Management [BLM] 2002). Deer Flat NWR is particularly vulnerable to invasive plant infestations due to a combination of surrounding land management practices and high levels of human use. Seeds and propagules can transfer across boundaries along trails (human and wildlife), rivers, utility corridors, and roads. Recreational use by bird watchers, hikers, hunters, cyclists, joggers, photographers, equestrians, and dog walkers can create a high probability for propagules to enter and be distributed into even remote areas. Currently there is minimal management of natural vegetation due to large areas, low budgets, and staff shortages. The constant flood of new propagules into desert regions, especially near urbanized areas, increases the probability that new populations (of invasive species) will become established. One of the biggest challenges for land managers is to identify these problematic species and control them before they establish and spread in wildland areas (Brooks and Pyke 2001). Mowing, grazing, burning, tilling, and reseeding of existing shrub-steppe habitat will be used to attempt to restore small tracts of Refuge uplands to provide presettlement conditions for obligate bird species and other terrestrial vertebrates as well as provide a working example and educational opportunity for future studies. In one study, repeated mowing (every three weeks) during the spring and summer was found to be as effective at controlling cheatgrass seed production as an application of glyphosate, when initiated in the year following a prescribed fire treatment (Ponzetti 1997). This method was very labor-intensive, and a cost/benefit analysis should be conducted before any choice is made. Refuge staff will attempt to continue, augment, and improve past restoration efforts. The strategic placement of fire breaks will be re-evaluated, and those identified as superfluous will be exploited for green-stripping and restoration efforts.

There is substantial evidence that human presence can cause significant impacts to bird behavior and fecundity. For birds, human disturbance can impact foraging habits (Skagen et al. 1991), reduce song occurrence and consistency (Gutzwiller and Marcum 1993), and reduce reproductive success (Safina and Burger 1983). Knight and Cole (1995b) pointed to multiple studies that showed human disturbance can also alter nesting behavior. The effects of human intrusion increase when accompanied by dogs. One study showed that dog walking in woodland leads to a 35 percent reduction in bird diversity and 41 percent reduction in abundance, both in areas where dog walking is common and where dogs are prohibited (Banks and Bryant 2007). To minimize disturbance to wildlife, people engaged in recreational activities will be required to stay on trails from February 1 to July 31. In addition, dogs will be required to be on leash, and will be allowed only on designated trails and in the Lower Dam Recreation Area (see Objective 2.4.1.4). The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

Objective 2.3.4.2. Protect, maintain, and enhance shrub-steppe habitat – Snake River Islands

Protect, maintain, and enhance 104 Refuge islands with shrub-steppe habitat on the Snake River, benefiting nesting and migrating birds (e.g., geese and mallards) and a diverse assemblage of other shrub-steppe-dependent species. These habitats should be characterized by the following attributes:

- 0%-50% cover of <8 feet native shrub species (e.g., sagebrush species, fourwing saltbush, rabbitbrush, greasewood, golden currant, wild rose)
- >50% cover of native grasses and forbs (e.g., Great Basin wildrye, bluebunch wheatgrass, Indian ricegrass, western wheatgrass, Idaho fescue, smooth brome, salt grass)
- No invasive woody trees (e.g., Russian olive, salt cedar)
- <25% cover of invasive plants (e.g., Scotch thistle, cheatgrass, whitetop)
- No rush skeletonweed, leafy spurge, or yellow starthistle present

Strategies Applied to Achieve Objective

Seed and plant native shrubs, forbs, and bunchgrasses, particularly following invasive species treatments on 2-10 islands.

Use prescribed fire and mechanical treatment to reduce hazardous fuels on 2-10 islands.

Aerially apply the herbicide metsulfuron to control extensive infestations of whitetop on 2-10 islands.

Graze goats on select islands to prevent woody invasion and set back succession as appropriate for nesting Canada geese.

Implement seasonal closures to prevent disturbance to waterfowl and colonial-nesting birds. See Public Use Objectives 2.4.1.3 and 2.4.3.1.

- All Refuge islands closed February 1 to June 14 during goose nesting season.
- Some Refuge islands (currently four to six islands) closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns).

Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).

Rationale: The importance of shrub-steppe habitat and the responsibility of Federal land managers to enhance and protect this landscape are discussed in Objective 2.3.4.1. Monitoring of Canada geese nesting on the Snake River Islands Unit has been done by Refuge staff since the 1960s because the area is an important nesting area for resident flocks. Goose nesting platforms and wood duck boxes are in place and are maintained by Refuge staff, volunteers, and partners. The islands also provide nesting habitat for other species of birds, including raptors, owls, cormorants, herons, gulls, and a wide variety of songbirds.

Vegetative structure varies from island to island, but most include both upland and riparian habitat. Highest priority areas for restoration will be based on GIS modeling that includes a ranking system that will identify the most biologically intact islands which are likely to provide good habitat. Factors that will be modeled include size, current condition (existing habitat, noxious weeds, nesting activity), neighboring

land use, and isolation (measure of flow and channel depth) (see Objective 2.3.6.4). By starting with small projects, the Refuge could monitor effectiveness, predict future funding needs, and develop a long-term strategy for enhancing riparian habitat on the Refuge islands.

Protection and management of shrub-steppe habitat on the Snake River Islands Unit presents a different set of challenges than at the Lake Lowell Unit. Fluctuating water levels causes some islands to be more accessible to livestock from neighboring shores during lower flow regimes. Refuge staff may use fencing, law enforcement, and partnering with adjacent landowners to control livestock trespass on the islands.

The control of invasive species on the Snake River Islands Unit presents some unique challenges due to the logistics of getting people and equipment onto the islands for effective control measures. Some of the islands are so choked with invasive woody species (e.g., tamarisk), large monocultures of noxious weeds (e.g., whitetop), and cheatgrass that conventional land-based mechanical control is restricted. Using aerial spraying may be more cost effective than attempting to get personnel and materials over the water and onto the islands to implement physical control measures. Successful control usually requires repeated applications with foliar herbicides as well as reseeding and planting of desirable species within treatment areas. Islands will be prioritized and treated accordingly.

Alternative methods for invasive species control on the islands will also be researched and implemented as needed. Methods like using goats to graze on select islands to prevent woody invasion and set back succession as appropriate for nesting Canada geese may be a viable alternative. The use of mechanical treatments and prescribed fire to remove large areas of invasive species may be the most cost-effective way of encouraging a more desirable shrub-steppe landscape.

The current closure dates for the Snake River Islands Unit do not correspond with the dates of needed protection. Canada geese in this area generally start hatching at the end of April or beginning of May, but hatching has been noted well into June (Steele et al. 1957). Molting of flight feathers happens around the same time, and geese are more vulnerable to disturbance when they are land-bound with young. To provide protections through this vulnerable time, island closures should be extended to June 14. There are a few (four to six) Refuge islands that have historically held nesting colonies of herons, egrets, cormorants, and gulls. The existing closures do not adequately cover the sensitive nesting time for these birds and need to be lengthened to provide needed protection. Islands that have nesting colonies or rookeries (present and future) will be closed from February 1 through June 30. The general and Refuge-specific effects of human-caused disturbance to wildlife are presented in Appendix B.

2.3.5 Goal 5 (Agriculture): Protect, maintain, and enhance managed grasslands and agricultural crops to support migrating waterfowl as well as resident wildlife

Objective 2.3.5.1. Maintain grain and forage crops

Maintain a diversity of grain and green forage crops on 250 acres, benefitting migratory birds (e.g., Canada geese, dabbling ducks) and other resident wildlife. Croplands will be characterized by the following attributes:

- As of October 1, ≥25% of total crop acreage is left standing and is a wildlife forage crop
- As of October 1, alfalfa must be 6 inches tall and winter wheat must be 3 to 6 inches tall.
- No cutting between April 15 and June 15 to avoid destroying ground-nesting birds.
- Minimize winter till on Refuge farmlands
- <10% presence of invasive plants (e.g., *Kochia*, field bindweed, Russian thistle)

The area enhanced (i.e., for shoreline plantings) will vary depending on water levels and the ability to agree on appropriate in-water acreages with the Board of Control.
Strategies Applied to Achieve Objective
Use crop rotation as a mechanism to improve soil tilth and as a strategy to control invasive/undesirable plant species in agricultural lands.
Use cooperative farmers.
Knock down corn after hunting season.
Use the following BMPs: leaving residues, filter strips, and buffers along field edges.
Install one new well near Farm Field 5 to better farm current acres.
No cutting allowed between April 15 and June 15.
Ensure wildlife crop share is at least 25%.
Implement shoreline plantings (millet, buckwheat, and/or winter wheat) in areas adjacent to Farm Field 5.
Develop cooperative land management plan.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Rationale: The Refuge farm fields are an important food source for waterfowl and other wildlife when natural foods are limited. The lake contains minimal submerged aquatic food for waterfowl because of poor water quality, unreliable water levels, and large numbers of carp. The smartweed beds provide natural food only when they are sufficiently flooded in the summer for the production of seed and flooded in the fall to allow for waterfowl access. Much of the surrounding landscape has been converted from agriculture to low-density development, resulting in food loss for wintering waterfowl. In addition, crops grown in many of the remaining fields include higher-value specialty crops such as seed alfalfa, onions, and mint that are not as valuable to wildlife. Also, more efficient harvesting equipment leaves little waste grain in the field for waterfowl. “Clean farming,” which involves plowing and tilling in the fall to reduce the spread of noxious weeds, also reduces the amount of waste grain left in the fields prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue into the future, cooperative farming will be essential for waterfowl management. Although wintering waterfowl numbers have declined over time, numerous waterfowl still winter at the Refuge (see Chapter 4). Refuge crops provide a consistent food source for the wintering waterfowl and therefore are important to continue. One significant change may be implemented as part of the cooperative farming program. The basic objective for cropland management has been to produce green browse and high-nutrition foods for waterfowl. Historically, one of the biggest changes in the farming program included the elimination of shoreline plantings, likely due to budget constraints at the time. At one time, approximately 400 acres were farmed on the Refuge, which included planting millet along some of the lake shorelines. Because lakeshore plantings can be less labor intensive and do not require irrigation, they can be a less costly option than expanding cooperative farming. As development continues around the lake, use of this strategy may be implemented to achieve Refuge goals and objectives. Studies have shown that BMPs like crop rotation can reduce the amount of weed species in agricultural fields (Liebman and Dyck 1993) and improve soil tilth and carbon sequestering capabilities (West and Post 2001), thereby reducing the amount of pesticides and fertilizers needed for profitable farming. Other Refuge practices like knocking down share-crop corn after the hunting season so that waterfowl have easier access to it will also continue on cooperatively farmed land. The strategies are either existing practices or improvements. In addition to BMPs, special conditions currently in place will continue, including restricting pesticide uses, limiting the types of crops grown, no grass-crop harvesting April 15 through June 15 (to reduce the risk of destroying nests of ground-nesting birds), and a requirement to have 6 inches of green browse by October 1. Conditions for cooperative farming will be identified in a cooperative land management plan.

Objective 2.3.5.2. Protect, maintain, and enhance managed grasslands to benefit migratory and wintering waterfowl
Protect and maintain 80 acres, and within two years enhance 80 acres (Leavitt Tract) of improved pasture for wintering waterfowl with the following attributes: • Mix of desirable, palatable grasses (e.g., perennial ryegrass, orchard grass, fescues) and forbs (e.g., clover) with a height of <4 inches by October 15 in fields and along field/wetland interfaces. • <20% cover of invasive species • No encroaching woody vegetation
Strategies Applied to Achieve Objective
Use herd rotation as a mechanism to reduce soil compaction and control invasive/undesirable plant species in grazing lands.
At Leavitt Tract, clean ditches and update irrigation infrastructure (i.e., redo corrugations and replace irrigation checks) to provide better water control.
Re-establish permanent goose pasture by interseeding cool-season perennial grasses at the Leavitt Tract.
In addition to grazing, manage short grasses by haying, mowing, burning, and other means.
Graze Leavitt Tract from April 1 through August 15. Determine if grazing during this time period is impacting ground-nesting birds.
Develop cooperative land management plan and grazing management plan.
Conduct grazing fee market analysis to evaluate current grazing fees.
Use enhanced IPM techniques including mechanical/physical (e.g., mowing), chemical, cultural, and biological methods to control or eradicate invasive species (see Appendix G).
Rationale: Grazing is allowed on refuges if it achieves a management goal that will benefit wildlife. The only area on the Refuge that currently has grazing is the Leavitt Tract, its purpose is to maintain short grasses to benefit wintering Canada geese. To provide high-quality forage for wintering and migrating geese, the Refuge has used grazing to ensure that young shoots less than 6 inches tall are available annually by early October to reduce the accumulation of thatch, which can reduce the number of shoots. Other tools for managing grasslands for geese include mowing and prescribed fire. Both of these tools, if used properly, can achieve similar benefits as grazing and may be implemented as necessary. Grazing can be used to set back succession, increase native annual forb species and cover, and decrease vegetation height and litter depth (Hayes and Holl 2003), all of which are beneficial to foraging Canada geese. However, studies have also shown negative impacts of grazing, including altering species composition, decreasing density and biomass of individual species, reducing species richness, and changing community organization (Fleischner 1994). Vavra (2005) also showed that grazing can alter species composition and that it can increase the productivity of selected species, increase nutritive quality of the forage, and increase diversity of the habitat by altering its structure. Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese (Greenwalt 1978). Therefore, grazing will continue to be allowed at the Leavitt Tract to benefit wintering Canada geese, but Refuge staff will monitor potential impacts to wildlife and habitat. The impacts of grazing depend on many factors including timing, habitat type, and stocking rate. An evaluation of the current Refuge grazing program, including infrastructure maintenance (irrigation ditches, fences), stocking rate, habitat impacts, wildlife use, and grazing fees has not been conducted in many years. Development of a cooperative land management plan and a grazing management plan will address these concerns. The cooperative land management plan will be written after the CCP is complete and will include a description of the agreement between the Refuge and the private farmer to manage the land for both parties. Typically the cooperator is responsible for pasture management, weed control, and installation and maintenance of fencing, whereas the Refuge maintains pumps, supplies fencing materials,

and constructs access roads. The grazing management plan will better define the objectives of grazing, as well as the amount of stock to be grazed and any time restrictions necessary to meet biological management goals. The management plan will also identify what habitat and/or wildlife will be monitored to determine the benefits and/or impacts of the grazing program.

2.3.6 Goal 6 (Research): Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources

Objective 2.3.6.1. Monitoring activities
A prioritized list of monitoring activities to support Refuge resource management decisions follows.
Strategies Applied to Achieve Objective
Develop an inventory and monitoring plan.
Monitor public-use activities on Lake Lowell to evaluate wildlife disturbance effects.
Implement shorebird surveys to determine importance of Lake Lowell unit to migrating shorebirds.
Implement point counts to characterize importance of riparian habitat to migrating and nesting passerines.
Early detection and rapid response monitoring to identify new or spreading invasive plant and animal species (e.g., zebra and quagga mussels [*Dreissena polymorpha* and *D. rostriformis bugensis*).
Monitor the effectiveness of IPM activities to control/eradicate invasive plants on the Refuge.
Monitor habitats (e.g., wetlands, shrub-steppe, riparian) to establish baseline and evaluate achievement of objectives for adaptive management.
Evaluate and analyze historical biological data (e.g., waterfowl counts and goose nesting data) to determine long-term population trends and reliability of the data.
Monitor nesting density and success of waterfowl on Snake River Islands Unit.
Monitor waterfowl populations during fall and winter on Lake Lowell Unit to develop long-term population trends.
Install and monitor water-level gauges in Refuge wetlands.
Conduct annual grebe nesting and brood count surveys.
Monitor dog walking leash compliance and associated wildlife impacts.
Monitor effectiveness and impacts of integrated pest management.
Rationale: Monitoring the wildlife and vegetation response to habitat management practices is necessary to implement adaptive management techniques on the Refuge. The NWRS Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants on each refuge. An inventory and monitoring plan needs to be developed that will include monitoring of vegetation and wildlife in order to measure responses to habitat management activities, and the response of vegetation and wildlife to habitat restoration projects. Existing staff and funds are prioritized to perform the most pressing habitat management projects on the Refuge, leaving few resources available to conduct studies of the effectiveness of habitat management or restoration treatments. This lack of data hinders the Refuge's ability to use adaptive management to evaluate the effectiveness of its management practices and make necessary course corrections. At Deer Flat NWR, there is a lack of data for both managed sites as well as appropriate reference sites that are necessary to account for variability. A substantial body of scientific literature has documented the disturbance effects of human activities, including recreational activities on wildlife (Bartelt 1987; Boyle and Sampson 1985; Cole and Knight 1990; Havera et al. 1992; Klein 1993; Knight and Cole 1995b; Madsen 1995; Pease et al. 2005). The Refuge is mandated by law to provide wildlife-dependent recreational opportunities that do not materially interfere with the Refuge's ability to manage according to its purposes. Nesting waterfowl and waterbirds, such as great blue herons, western grebes, and Clark's grebes, are a few species of particular concern at the Refuge because they are especially sensitive to disturbance. The Refuge must design and evaluate public use programs based on the best available science while considering disturbance effects. By

monitoring changes in wildlife-use patterns that follow changes to public-use programs and facilities, the Refuge manager will be able to make adjustments if disturbance reaches unacceptable levels.

Objective 2.3.6.2. Inventory Activities
The following is a prioritized list of inventory activities to support resource management decisions on the Refuge.
Strategies Applied to Achieve Objective
Develop an inventory and monitoring plan.
Inventory and map invasive exotic plants on both Refuge units.
Conduct breeding and migratory bird inventory of shrub-steppe and riparian habitats on both units.
Inventory bat use on both Refuge units.
Inventory riparian habitat structure and composition on both Refuge units.
Estimate fuel loading in riparian habitat on both Refuge units.
Inventory wildlife use of wetlands.
Inventory plant species composition of emergent beds associated with Lake Lowell.
Rationale: Maintaining an inventory of the Refuge's wildlife and vegetation is necessary to implement adaptive management techniques. The NWRS Improvement Act requires the Service to monitor the status and trends of fish, wildlife, and plants on each refuge. An inventory and monitoring plan needs to be developed that will include monitoring of vegetation and wildlife to measure responses to habitat management and public uses. Existing staff and funds are prioritized to perform the most pressing habitat management projects on the Refuge, leaving few resources available to conduct studies of the effectiveness of habitat management or restoration treatments. This lack of data hinders the Refuge's ability to use adaptive management to evaluate the effectiveness of its management practices and make necessary course corrections. At Deer Flat NWR, there is a lack of data for both managed sites as well as appropriate reference sites that are necessary to account for variability.

Objective 2.3.6.3 Research
A prioritized list of research projects that will support Refuge resource management decisions follows.
Strategies Applied to Achieve Objective
Conduct research to determine species-specific thresholds for disturbances from public use and habitat management actions implemented as a result of the CCP.
Conduct an on-refuge contaminant investigation to comprehensively evaluate potential contaminants in sediments, water, invertebrates, and vegetation associated with Lake Lowell to assess risks to fish and wildlife, especially fish-eating birds such as bald eagles, double-crested cormorants, western grebes, herons (great blue and black-crowned night), and pelicans.
Conduct a contaminant investigation to identify and quantify contaminants in water inflows to Lake Lowell in conjunction with Reclamation.
Conduct a contaminants investigation for the Leavitt Tract to determine if rehabilitation and ground disturbance are feasible.
Determine the population structure (age and sex ratios), movements, size, and potential habitat impacts of mule deer on the Lake Lowell Unit.
Determine the population structure (age and sex ratios), size, movements, and potential habitat impacts of mule deer on the Snake River Islands Unit.
Research shorebird disturbance and highest shorebird use areas and determine importance to shorebirds on a regional basis.
Determine if planting of crested wheatgrass in cheatgrass-dominated areas, followed by native bunchgrass planting is a successful restoration technique (Cox and Anderson 2004).

Research the efficacy of biological control methods for cheatgrass.
Evaluate the zone of influence of leashed versus unleashed dogs.
Assess current and potential fuel loading in riparian habitat.
Rationale: Results of research studies will help the Refuge to better accomplish the goals and objectives defined in this plan as well as study issues that will be addressed in step-down plans or issues that are outside of the scope of the CCP. A substantial body of scientific literature has documented the disturbance effects of human activities, including recreational activities on wildlife (Bartelt 1987; Boyle and Sampson 1985; Cole and Knight 1990; Hamann et al. 1999; Havera et al. 1992; Klein 1993; Knight and Cole 1995b; Madsen 1995; Pease et al. 2005). The Refuge is mandated by law to provide wildlife-dependent recreational opportunities that do not materially interfere with the Refuge's ability to manage according to its purposes. Nesting waterfowl and waterbirds, such as great blue herons, western grebes, and Clark's grebes, are a few species of particular concern on the Refuge because they are especially sensitive to disturbance. The Refuge must design and evaluate public-use programs and facilities based on the best available science while considering disturbance effects. By monitoring changes in wildlife use patterns that follow changes to public use programs and facilities, the Refuge manager will be able to make adjustments, should disturbance reach unacceptable levels.

Objective 2.3.6.4. Assessments and Information Needs
The following is a prioritized list of scientific assessments and information needs to support resource management decisions on the Refuge.
Strategies Applied to Achieve Objective
Assess use of goose nesting platforms to determine if they are important to the success of nesting Canada geese on the Snake River Islands Unit.
Conduct soil survey of shrub-steppe habitats as a basis for long-term restoration potential and to create a data layer for use in GIS.
To identify the islands with maximum potential long-term value to nesting waterfowl and landbirds, conduct an assessment to prioritize Refuge islands considering the following factors: isolation (function of channel width and depth along with river flow); island size (smaller islands have less predation by mammalian predators); native species well represented in riparian and shrub-steppe; history of waterfowl nesting and nesting success; and >1 mile from livestock operations (for protection from trespass and cowbird parasitism). For isolation consider the worst-case scenario (lowest potential flows in the future).
Conduct real-time kinematic surveys to determine wetland bottom topography and assess Ferrari's (1995) bathymetry mapping.
Complete water resource assessment for the Refuge through the Division of Engineering, Water Resources Branch.
Develop a National Vegetation Classification Standard vegetation data layer for use in GIS for both units.
Assess quality of Refuge wetlands (i.e., conduct function and values assessment).
Assess the quality/importance of grassland areas on the south side of the Lake Lowell Unit.
Work with partners to obtain funding for a feasibility study that will identify the best methods to improve the water quality (e.g., reducing phosphorus and silt) of Lake Lowell.
Rationale: The Refuge is tasked with using the best available scientific information to make adaptive management decisions in accordance with 522 DM 1 (Implementing Adaptive Management Policy). Many of the tasks described above will serve as baseline information that the Refuge could use to better manage its public-use programs and to achieve the biological goals and objectives of this plan. Much of the information to be collected is baseline information, such as the vegetation map and accurate bathymetry of the lake, and will aid the Refuge in developing more precise management prescriptions (e.g., invasive species treatment, forest management, desired water level conditions) and evaluating the results of habitat restoration and wildlife management actions.

2.4 Public Use and Cultural Resource Goals, Objectives, and Strategies

2.4.1 Goal 1 (General Visitor Services): Visitors of all ages will enjoy native wildlife and increase their understanding and appreciation of the importance of the Refuge as wildlife habitat

Objective 2.4.1.1. Welcome and orientation
Within 5 years, develop a visitor services plan to integrate welcome and orientation features, facilities, programs, activities, and experiences on the Refuge. Welcome and orientation features will: • Use both electronic and printed media to reach and orient visitors to the Refuge. • Provide daily opportunities for personal contact with Refuge staff or volunteers. • Be available in Spanish and English. • Provide appropriate visitor amenities at developed sites, such as toilets and picnic tables. • Be consistent with quality criteria in Section 2.2.2.
Strategies Applied to Achieve Objective
Install entrance signs at high-use visitor access points and along high-traffic roads bordering the Refuge.
Install orientation signs that alert visitors to the presence of nearby Refuge facilities (e.g., "boat launch," "fishing area," "Visitor Center") on main roads in appropriate locations.
Provide trail signs at all trailheads.
Provide positively worded welcome and orientation/interpretive materials (e.g., maps, brochures, signs) at attractive and visible kiosks near main Refuge access points and at areas where visitors tend to congregate. To encourage compliance, materials will explain, when possible, the regulation's benefit(s) to wildlife or wildlife habitat. • Provide kiosks at high-visitation areas at Lake Lowell Unit, such as Lower Dam Recreation Area and Upper Dam boat launches. • Provide kiosks at major Snake River Islands Unit access points. Within 5 years of CCP implementation, update panels on these kiosks.
Develop site plan for the Lower Dam Recreation Area to increase educational and interpretive opportunities, improve parking and safety, and improve wildlife habitat.
Develop a site plan for either Upper Dam East, Upper Dam West, or Lower Dam Recreation Area boat launch, to provide at least one ABA-accessible boating opportunity.
Construct a visitor contact station (VCS) at Lower Dam Recreation Area. If possible, the existing EE building will be used for the VCS. Continue to allow use of EE building for environmental education activities until building is converted to VCS.
Allow Refuge access through designated entrances marked as Parking Area or Refuge Access on Map 4.
Provide modern restroom facilities at Lower Dam Recreation Area.
Provide additional bathroom facilities at high-use access points.
Rationale: Customer service and first impressions are important to visitors feeling safe and welcome at national wildlife refuges. Although 96 percent of visitors to the Lake Lowell Unit of the Refuge are from the local area (Sexton et al. 2012), interactions with visitors make it clear that many do not realize that they are at a national wildlife refuge or do not realize what that means. Visitors to the Snake River Islands Unit may also not know. Refuge visitors will therefore benefit from increased opportunities to have personal contact with Refuge staff and volunteers, as well as an integrated set of welcome and orientation features that are easily found

and provide accurate, timely, and appropriate orientation materials and information on Refuge facilities, programs, activities, and experiences. These strategies will also increase the Refuge's visibility and promote visitor compliance with Refuge regulations. By increasing staff and volunteer contact with visitors at high-use areas, staff will also gain a better understanding of visitor use patterns.

The designated strategies focus on providing high-quality visitor services and improving information availability by using modern media, exhibits, and orientation panels that are clean, maintained, and accessible; that do not detract from the surroundings; and that provide clear, frequently updated information about where visitors can go, what they can do, and how to safely and ethically engage in Refuge recreational activities. Orientation materials will explain, when possible, the wildlife or habitat benefit of Refuge regulations to encourage compliance.

The Lower Dam Recreation Area will be redesigned to improve traffic flow, provide a VCS, and provide more wildlife-dependent recreational opportunities. Parking and access for boat launches, buildings, and beaches at the Lower Dam Recreation Area are extremely restricted on busy weekends. A new site plan will be developed to improve traffic flow, functionality, and safety at the Lower Dam Recreation Area. Providing volunteer and staff contact at a VCS at this high-use area will increase awareness of the Refuge and Refuge regulations, as well as increasing the enjoyment of visitors by providing information about recreational opportunities around the Refuge.

New restroom facilities are proposed in response to interest in improved restroom facilities.

Objective 2.4.1.2. On-site interpretation

Within 5 years of the CCP's approval, develop a visitor services plan to integrate accurate, timely, and appropriate interpretation of Refuge wildlife, habitats, and other resources at the Visitor Center and high-use access points through programs, activities, and experiences on the Refuge for 37,700 visitors of all ages and abilities annually. Interpretive programs will be characterized by:

- A mix of traditional and modern techniques to reach visitors with a variety of learning styles.
- Accessible facilities.
- Translation into Spanish (for interpretive materials).
- Consistency with quality criteria in Section 2.2.2.

Strategies Applied to Achieve Objective

Increase interpretive opportunities for visitors at high-use access points. For example:

- Use staff and volunteers to facilitate guided/roving interpretive programs (e.g., bird walks, nocturnal walks, canoe/kayak paddles, boating scavenger hunts) on designated themes at high-use visitor access points to increase visitors' awareness of these themes.
- Provide interpretive signs on new and existing trails and facilities.
- Develop a nature exploration area at Lower Dam Recreation Area initiated through a community-based design effort involving key stakeholder groups.

Within three years of CCP implementation, provide at least four on-site outreach events (e.g., BioBlitz, Creepy Critters, National Wildlife Refuge Week) annually, to expand public awareness of interpretive themes.

Update and replace existing Visitor Center interpretive materials. For example:

- Develop Refuge video to show at Visitor Center.
- Update and replace existing interpretive signs.

Allow use of Visitor Center auditorium only by wildlife-dependent recreation groups for their organizational meetings.

Rationale: Interpretation, when compatible, is a priority public use of the NWRS, it can foster an understanding of and appreciation for our natural resources. Many visitors to national wildlife refuges,

including Deer Flat NWR, enjoy participating in guided and self-guided interpretive opportunities. Interpretation can also be an effective resource management tool by providing visitors the opportunity to learn about natural resources, refuges, and the NWRS, as well as helping them understand their role and how their compliance with rules and regulations can help solve or prevent management problems. We will work with partners to provide enhanced interpretive opportunities at both units.

Interpretive themes will focus on increasing awareness and understanding of the Refuge and NWRS, of how to be a better Refuge visitor, and of issues facing the Refuge and Refuge wildlife and habitat. Examples of themes include:

- What is a national wildlife refuge? What is the Refuge's purpose?
- The North American model of wildlife management.
- The role of Lake Lowell in irrigation.
- How visitors can help conserve the Refuge and other wildlife habitats.
- Water quality, water conservation, and watersheds.
- Invasive species (e.g., carp, plants, domesticated animals, aquatics).
- Migration (e.g., waterfowl, neotropical migrants).
- Individual wildlife species (e.g., waterfowl, grebe) and their habitat requirements.
- Urbanization impacts.

Interpretation will be emphasized over EE because we will expect a wide diversity of user groups, and interpretation has the flexibility to reach broader audiences. On-site interpretation allows direct contact with and education of Refuge users and will therefore be more efficient than EE programming to increase visitor understanding of interpretive themes and to increase compliance with Refuge regulations. These programs will aim to interact with visitors at high-use access points to increase awareness of the Refuge and its wildlife and habitats. The VCS proposed at the Lower Dam Recreation Area could act as a base of operations for roving interpreters.

Interpretive materials are currently provided only at and near the Visitor Center/Refuge Headquarters at the Lake Lowell Unit and at kiosks at the most-used boat launches that access the Snake River Islands Unit, even though many visitors access the Refuge from other locations. Additional interpretive materials will be added and existing materials will be updated. Welcome and orientation/interpretive kiosks will be installed at the most-used visitor access points. Interpretive panels will be installed along existing and proposed trails to increase the audience for interpretive information. Appropriate electronic tools (e.g., Smartsigns to be used with cell phones to provide regulatory and interpretive information) will be implemented to provide land- and water-based interpretive opportunities.

To increase guided interpretive opportunities, staff-, volunteer-, or concessionaire-guided interpretive opportunities will be provided. Interpretive programs could include guided walks, on-water kayak/canoe trips, and guided walks at night or into closed areas. Guided walks/paddles could be on a variety of topics (e.g., eagle nesting, wintering waterfowl, songbird migration, nocturnal wildlife, grebes, and shorebirds). Both land- and water-based interpretive opportunities could better educate visitors about Refuge resources and recreational impacts on them.

Nature exploration areas provide opportunities for children to experience nature first-hand through unstructured outdoor play. Richard Louv identified the importance of first-hand unstructured experience in nature and the prevalence of "nature deficit disorder" as a serious issue in his book *Last Child in the Woods* (Louv 2005). Research supports Louv's arguments demonstrating that children's positive encounters with nature can lead to development of an environmental ethic (Chawla 1988; Palmberg and Kuru 2000; Wilson 1997).

Objective 2.4.1.3. Wildlife observation and photography
Provide quality wildlife and nature observation and photography opportunities for visitors of all ages and abilities on 13 miles of trail and 5 developed viewing facilities on the Refuge. Wildlife observation and photography programs will emphasize opportunities for casual visitors and beginning to moderate birders. Wildlife observation and photography programs will be characterized by: • Occasional guided opportunities in otherwise-closed areas when that will allow visitors access to unique wildlife/habitat observation opportunities. • Integration with the interpretive program to provide visitors opportunities to make discoveries. • Consistency with quality criteria in Section 2.2.2.
Strategies Applied to Achieve Objective
See Objective 2.4.1.4 for boating regulations and rationale.
Allow walking access to Snake River Islands Unit for wildlife observation and photography from June 15 to January 31 on goose-nesting islands and from July 1 to January 31 on heron- and gull-nesting islands.
Implement seasonal closures, as follows, on the Snake River Islands Unit to prevent disturbance to waterfowl and colonial-nesting birds. • All Refuge islands closed February 1 to June 14 during goose nesting season. • *Some* Refuge islands closed February 1 to June 30 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns currently nest on four to six islands).
Allow walking access, as follows, to Lake Lowell Unit for wildlife observation and photography: • To protect nesting birds, allow access only on maintained roads and trails from February 1 to July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel allowed August 1 to January 31. • To protect wintering birds, access to Murphy's Neck through the walk-through on Orchard Avenue allowed only March 15 to September 30. • In the East Side Recreation Area, off-trail travel allowed all year. • In the Gotts Point area, off-trail travel allowed February 1 to September 30. • Off-trail travel is allowed April 15 to September 30 in most of the Lower Dam Recreation Area. The wooded area west of Murphy's Neck is the exception, where off-trail travel is allowed August 1 to September 30 (see Maps 4-6). • Off-trail travel may be restricted in areas that have been rehabilitated (e.g., after a fire) to allow time for plants to re-establish.
Implement land-based seasonal closures, as follows, on the Lake Lowell Unit to protect important wildlife areas. See Map 4. • Protect all active and historical grebe nesting colonies by establishing an area up to 500-yards not open to public use during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony will be re-opened. Upland portions of the closures will be open to use from October 1 to January 31. • Establish a buffer up to 300 yards around eagle nests from February 15 to July 15. • Establish a seasonal closure buffer area around osprey nests up to 150 yards, from March 15 to August 1. • Establish a buffer up to 250 yards around heron rookeries from February 1 to July 1. • Establish a closure up to 100-yards around shorebird feeding and resting areas from July 15 to September 30 during years when the lake level elevation is lower than 2,522 feet. • Continue wildlife closure at Gotts Point from October 1 to January 31. • Establish wildlife closure at Murphy's Neck from October 1 to March 14 (see Map 4). • Continue wildlife closure at Lower Dam Recreation Area from October 1 to April 14.
Consider whether and how to develop a walking trail in the South Side Recreation Area.

Maintain existing trails and develop new trails at appropriate locations to provide wildlife observation and photography opportunities. For example: • Assess suitability for providing a 0.65-mile ABA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck that will include access to shoreline fishing. • Provide interpretive trail through restored native area at Lower Dam Recreation Area. • Provide 0.6-mile bike/walking path from entrance to Visitor Center along entrance road to provide connectivity to possible bike paths. • Provide 0.13-mile trail between loops of existing Observation Hill Trail System west of Visitor Center to provide a loop trail experience during eagle nesting season. • Provide 0.63-mile trail or improved trail to the observation platform west of the Visitor Center from the entrance road parking lot. • Provide a 1.5-mile self-guided or virtual geocaching on-water trail looping to the east from Parking Lot 1.
Maintain existing observation facilities (e.g., towers, platforms, blinds) and develop new at appropriate locations. For example: • Provide multipurpose (e.g., fishing, observation) dock/platform at north end of Lower Dam Recreation Area near existing Environmental Education Building. • Provide multipurpose (e.g., fishing, observation, hunting) dock at Parking Lot 1. • Provide a seasonal shorebird observation/photography blind on the northern shoreline of the East Pool east of Tio Lane. Access by SUP. Implement fee for use comparable to fees at other refuges. • Provide observation/photography blind at Upper Dam Marsh for reservation with SUP. Implement fee for use comparable to fees at other refuges.
Provide an ABA-accessible kayak/canoe launch at an appropriate location to access prime wildlife observation areas.
Maintain or provide remote observation opportunities through webcams, for example: • Maintain existing osprey nest webcam. • Install grebe, heron, or eagle nest webcam(s).
Rationale: Wildlife observation and photography, when compatible, are priority public uses of the NWRS. Many visitors to national wildlife refuges, including Deer Flat NWR, enjoy opportunities to watch and photograph wildlife. Scoping comments revealed a desire for additional trails and wildlife observation and photography facilities and programs. In addition, connecting people with nature is a priority for the Service and many other natural resource agencies interested in maintaining an active constituency. Providing accessible observation and photography opportunities will create greater visitor awareness and appreciation of the Refuge's purpose and its wildlife and habitat resources. Although wildlife observation and photography can result in disturbance to wildlife, disturbance will be intermittent and short-term when activities are conducted according to the stipulations designated in the Compatibility Determination for Wildlife Observation, Photography, Interpretation, and Environmental Education (in Appendix B). Pedestrian travel will be restricted to established trails during the nesting season to increase predictability of public use patterns on the Refuge and thus allow nesting wildlife to habituate to nonthreatening activities. Year-round off-trail travel opportunities will be allowed in the East Side Recreation Area, which is less biologically sensitive than other areas of the Refuge. Providing seasonal closures around sensitive wildlife areas will reduce impacts to wildlife while providing recreational opportunities in these areas when the wildlife is less vulnerable. To provide more observation and photography opportunities, new facilities are proposed, including trails that provide access to different habitats than existing trails provide and observation/photography blinds that provide access to areas with wildlife concentrations. New facilities will not be considered in upland areas that have been restored (the Sage Fire area northwest of the Visitor Center and the CC Lightning

Fire area east of Gotts Point) to provide sanctuary areas for wildlife and minimize introduction of invasive plants in restored areas.

A trail on the south side of the Refuge was suggested by several members of the public during the scoping period. Any ground-level trail in this area will be inundated by irrigation water for much of the winter, spring, and fall, causing major maintenance issues and unavailability to Refuge visitors. Because of these issues, any trail in the riparian zone on the south side of the Refuge will need to be elevated. Due to the projected cost for the 2-mile boardwalk between Parking Lots 1 and 3, it is not proposed; instead, the trail concept will be investigated further to determine if a lower-cost option is available.

Objective 2.4.1.4. Compatible nonwildlife-dependent public uses – Lake Lowell

Provide opportunities for visitors to enjoy water-based nonwildlife-dependent recreational activities (including motorized, wind-powered, and human-powered boating as well as tow-behind activities and swimming) at the Lake Lowell Unit on a variable* number of acres, including wake-causing activities on a variable number of acres. Provide two designated swim beaches. Provide opportunities to enjoy land-based, nonwildlife-dependent recreational activities (including horseback riding, jogging, and bicycling) on 8.75 miles of trails. The uses shall adhere to the following guidelines:

- Minimal disturbance to breeding and foraging wildlife.
- Minimal conflicts with wildlife-dependent recreationists.
- Consistent with quality criteria in Section 2.2.2.

*Areas critical to nesting birds (e.g., grebe colonies, heron rookeries, bald eagle nests) will be closed to public entry on a seasonal basis. These areas will be sized appropriately according to best available science. The area will remain closed until no nesting is observed within the same area the following year.

Strategies Applied to Achieve Objective

Nonwildlife-dependent motorized and nonmotorized boating will be allowed on Lake Lowell. No-wake zones, seasonal lake closures, and area closures will be applied to protect wildlife and reduce conflicts with wildlife-dependent recreational activities.

- Allow boating from April 15 to September 30 during daylight hours. Establish no-wake zone east from line between Parking Lot 1 and Gotts Point and within the Narrows
- Allow nonmotorized boating from October 1 to April 14 in Fishing Areas A and B (200 yards in front of the Upper and Lower Dams) during daylight hours.

To protect emergent beds for nesting grebes and other wildlife, institute appropriate seasonal closures. See Map 4.

- Protect emergent plant beds on the lake's south side with a 200-yard no-wake zone measured from the shoreline edge or emergent vegetation, whichever is closer to the center of the lake.
- Establish no-wake area in the Narrows between the east and west pools.
- Protect all active and historical grebe nesting colonies by establishing an area up to 500 yards not open to public use (Berg et al. 2004) during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony will be reopened. Upland portions of the closures will be open to use from October 1 through January 31.

To protect sensitive nesting habitat, institute appropriate seasonal closures. See Map 4.

- Up to a 300-yard seasonal closure around eagle nests (Anthony et al. 1995) from February 15 to July 15.
- Up to a 150-yard seasonal closure around osprey nests from March 15 to August 1.
- Up to a 250-yard seasonal closure around heron rookeries (Vos et al. 1985) from February 1 to July 1.

To protect mudflat habitat and migrating shorebirds, institute up to a 100-yard seasonal closure around sensitive shorebird areas (Rodgers and Smith 1997) from July 15 to September 30 when the water elevation level falls below 2,522 feet. See Map 4.

Allow tow-behind activities (e.g., waterskiing, wakeboarding) in areas open to wake activities.
Allow sailing regattas in April and May. All no-wake zones and area closures must be followed. Sailing regattas only allowed every other weekend (to provide opportunities for other users). All regattas must launch from the Lower Dam Recreation Area. Fee of $100, with 25-boat limit. See the Compatibility Determination for Sailing Regattas in Appendix B for other stipulations.
Prohibit boaters from anchoring or pulling onto land adjacent to closed areas.
To minimize noise disturbance to wildlife, enforce Idaho State noise ordinances on Lake Lowell.
To minimize negative impacts to water quality, promote the use of CARB star-rated motors at the level of two stars and above.
Allow kiteboarders and windsurfers to launch from any open shoreline and require compliance with speed limit in no-wake zones.
Allow swimming as follows: • From April 15 to September 30 direct swimmers to designated swim beaches at the Upper Dam east-side boat launch and at Lower Dam Recreation Area in a buoyed area closed to boating and monitored for water quality effects to human health. • Shoreline swimming will be allowed in designated areas and elsewhere, except for around fishing or other wildlife-dependent facilities (e.g., docks), or immediately adjacent to boat launch areas. • Swimming will be allowed from boats, in the open waters of Lake Lowell outside no-wake zones.
To protect important wildlife areas, implement land-based seasonal closures surrounding important wildlife areas. See Objective 2.4.1.3.
Allow horseback riding access to Lake Lowell Unit for wildlife observation and photography on designated multi-use trails (see Maps 4-6).
Require equestrian groups of more than 10 horses and riders to obtain an SUP.
Allow walking with on-leash pets on designated multi-use trails (see Maps 4-6), maintained roads, and in the Lower Dam Recreation Area, with a requirement for removal of pet feces.
Provide pet waste removal stations at the Visitor Center, Gotts Point, and Tio Lane access points.
Allow jogging and bicycling on designated multi-use trails and maintained roads, and on the proposed trail adjacent to the entrance road.
Require groups of more than 10 joggers or bicyclists to obtain an SUP.
Allow picnicking in designated areas at the east end of Upper Dam and at Lower Dam Recreation Area. Because of the potential for injury of visitors, prohibit glass containers on the Refuge.
Rationale: **Boating at Lake Lowell Unit:** Providing opportunities for priority wildlife-dependent recreational activities is in keeping with provisions under the NWRS Administration Act as amended in 1997. Although boating itself is not a wildlife-dependent recreational activity, many wildlife-dependent activities like fishing and wildlife observation are enhanced by boating. Boating can negatively impact wildlife (see the Compatibility Determination for Recreational Boating in Appendix B). To reduce impacts of boating activity on wildlife and habitat, seasonal closures or no-wake zones will be implemented around important wildlife areas, such as eagle nests, grebe colonies, osprey nests, heron rookeries, and shorebird feeding areas. Although most literature recommends disturbance buffers from 400 yards to 1,500 yards for osprey, the Colorado Division of Wildlife (2008) and Van Daele and Van Daele (1982) suggest that some osprey populations are tolerant of human activity in the vicinity of their nests. Ospreys currently nesting at the Refuge seem to tolerate the 150-yard distance to the highly used Visitor Center. The use of a 150-yard nesting closure will be assessed during the life of the plan and changed to more closely meet the distances cited in scientific literature, if needed. Implementing these restrictions, as well as the boating closure from October 1 to April 14, will provide adequate habitat for migratory birds.

The West Pool and western portion of the East Pool will continue to allow wake boating activities and be managed for a safe, multiuse experience. The east end of the East Pool will be managed for wildlife-dependent activities (especially fishing, wildlife observation, and wildlife photography) using watercraft at no-wake speeds to provide a quality experience with minimal impact to wildlife and other users.

Boating capacity decisions will be made with the Canyon County Marine Patrol and other boating management experts. These decisions will be used in site planning and in determining the number of designated boat trailer parking spots to provide at launches. To prevent an excess of boat trailer parking, the Refuge will work with Reclamation to manage overflow parking at the east side of the Upper Dam to improve safety and reduce congestion at the boat ramp and on the lake.

Nonwildlife-dependent boating visitors provide the Refuge opportunity to reach out to nontraditional user groups and to encourage boating users to observe wildlife and learn about the NWRS. Due to the close proximity of the Refuge to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, boating at Lake Lowell may provide an introduction to a national wildlife refuge.

Swimming at Lake Lowell Unit: Although not a priority general public use as determined by the NWRS Improvement Act of 1997, compatible nonwildlife-dependent beach use at Deer Flat NWR is popular. There have been several near-drowning incidents at Lake Lowell in the past few years, and one fatality (one swimming fatality occurred in 2011); therefore, we hope that encouraging shoreline swimmers to use two designated swimming areas that are easily accessible to rescue personnel will help minimize safety issues. There will be no lifeguards stationed at the swimming areas. If swimming is managed according to the stipulations in the Compatibility Determination for Swimming, Beach Use, and Picnicking (including Lower Dam Recreation Area) in Appendix B, visitors can enjoy the chance to relax on the shores of Lake Lowell. Although their primary activities may be swimming, sunbathing, reading, or relaxing, this activity could result in wildlife observation opportunities as well. For many visitors, swimming and beach use at Lake Lowell may provide an introduction to a national wildlife refuge.

There is currently human health and safety concerns related to swimmers in Lake Lowell during certain conditions, including when blue-green algae blooms occur, when swimmer's itch is reported, and when fecal coliform levels exceed State health standards. The Refuge will work with IDEQ and Southwest District Health (SDH) to monitor water quality, and if necessary, close the swimming areas. When water quality testing at the swimming areas indicates health concerns, testing will also be conducted at other lake sites. The Refuge will work with IDEQ and SDH to establish water contact warnings and closures at these locations, when warranted.

Upland nonwildlife-dependent uses: Visitors will be allowed to walk with their pets in accordance with the stipulations in the Compatibility Determination for Walking with Pets in Appendix B, including restricting leashed pets to designated trails and the Lower Dam Recreation Area, and requiring removal of pet waste. Keeping pets on designated trails will allow wildlife-dependent visitors the opportunity to use several trails without having to interact with pets.

Horseback riding, jogging, and bicycling are not wildlife-dependent public uses of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.). However, these uses of the existing trails are potential modes for wildlife-dependent uses and are expected to result in only minor additional impacts to wildlife. Restricting the disturbance to an established trail will increase predictability of public use patterns on the Refuge, allowing wildlife to habituate to nonthreatening activities (see the Compatibility Determination for Horseback Riding, Jogging and Bicycling in Appendix B). Groups of more than 10 horses and riders will be required to obtain an SUP, because large groups may restrict use for other wildlife-dependent users due to the limited space both on trails and in parking lots.

To reduce impacts to visitors engaging in wildlife-dependent activities, especially those involved in EE and interpretive programs, pets, horses, and bikes will not be allowed on the Nature, Centennial, Murphy's Neck, or Boardwalk Trails (for more information on trails, see Chapter 5). These trails are, for the most part, narrower than the patrol road trails (East Dike, Kingfisher, Gotts Point, and Observation Hill Trail System) and therefore do not lend themselves to multiple uses. The Centennial and Nature Trails are currently used for EE and interpretive programs. To reduce disturbance to these programs, increase the safety of the visiting public, and provide adequate space for multiple-use activities, on-leash pets, horses, and bikes will be allowed only on the entrance road, the East Dike, Kingfisher, and Gotts Point Trails, and the Observation Hill Trail System. Leashed pets will also be allowed in the Lower Dam Recreation Area. Off-leash dogs have been reported fighting in public use areas. Off-leash pets increase the potential for visitor injury through biting incidents or trampling of children. To address comments regarding pet feces on trails, visitors walking pets will be required to pick up after their pets.

Visiting with pets, horseback riding, jogging, and bicycling provide opportunities for the Refuge to reach out to nontraditional user groups to encourage them to observe wildlife and learn about the NWRS. Due to its close proximity to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, multiple-use trails may provide an introduction to a national wildlife refuge.

Picnicking will be allowed only in designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area to reduce the potential for conflict with wildlife-dependent activities (e.g., fishing, wildlife observation, wildlife photography).

2.4.2 Goal 2 (Hunting): Hunters of all ages and abilities will enjoy a family-friendly, safe, quality hunt that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat

Objective 2.4.2.1. Hunting waterfowl
Provide a quality, safe waterfowl hunt program on 2,250 acres of the Lake Lowell Unit and 1,219 acres of the Snake River Islands Unit capable of supporting about 5,000 hunter visits per season. Hunt programs will include opportunities for youth hunting and hunters with disabilities. Hunts will be characterized by: • Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives. • To the extent practicable, consistency in Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations. • Increased opportunities while maintaining hunt quality. • Reliable/reasonable opportunities to experience a successful waterfowl hunt. • ABA compliance. • Consistency with quality criteria in Section 2.2.2.
Strategies Applied to Achieve Objective
Allow waterfowl hunting on all islands in the Snake River Islands Unit.
Allow waterfowl hunting at the Lake Lowell Unit (see Map 4) as follows: • Waterfowl hunting allowed between Parking Lots 1 and 8. Hunting allowed from an electric- or human-powered boat within 200 yards of the shoreline of hunt zones on the south side of the lake. • Walk-in waterfowl hunting allowed from the east boundary of the Leavitt Tract west to the Greenhurst Road entrance at Gotts Point.
Prohibit waterfowl hunting on foot from the ice on the Lake Lowell Unit.

During waterfowl hunting season, allow public use activities in all waterfowl hunting areas.
Post signs at Refuge access points to notify Refuge users when a hunt is underway.
Take measures to improve goose nesting success on Snake River Islands Unit (e.g., implement predator control measures, shorten the end of waterfowl hunt season, or implement habitat restoration) if shown to be necessary by goose nesting analysis/study.
Allow use of dogs for waterfowl hunting. Require dogs to be leashed unless actively hunting and remain under strict voice control at all times.
Provide youth waterfowl hunt in accordance with IDFG regulations in all designated waterfowl hunt zones. Allow hunting from an electric- or human-powered boat within 200 yards of the shoreline of hunt zones on the south side of the lake.
Evaluate whether to charge a hunt fee and/or institute a more structured hunt opportunity.
Provide ABA-compliant hunting blind at appropriate location(s) available to parties with at least one hunter with an IDFG-issued disabled hunt license.
Establish daily limit of 25 shotgun shells in possession per hunter on Lake Lowell Unit.
Rationale: Hunting, when compatible, is identified as one of the priority recreational uses of the NWRS. Waterfowl hunting is compatible at the Refuge and will continue to be allowed. Current hunters report that the Lake Lowell Unit provides a unique hunting opportunity for southwest Idaho when the riparian zone is flooded because hunters can jump shoot ducks in the wooded areas. At the Lake Lowell Unit, waterfowl hunters seem to view hunting from Parking Lots 5 through 7 as a higher-quality hunting opportunity. To improve safety and minimize conflict with other priority uses, signs will be posted at Refuge access points to notify Refuge users when a hunt is underway. Refuge staff will evaluate whether to charge a fee and/or institute a more structured hunt opportunity to address complaints about limited access. We considered but rejected the possibility of a controlled hunt with blinds because it will require too much management, due to the fluctuating water levels at Lake Lowell. There will be a limit of 25-shotgun shells in possession per hunter to address complaints about sky busting. Sky busting is a term used by waterfowl hunters to describe the act of shooting at waterfowl that are too high overhead to be within effective range of a shotgun. In an area like Lake Lowell where hunters are relatively close together, sky busting is a nuisance because it deters waterfowl from coming into a decoy spread where close, ethical shots can be achieved. There is concern that sky busting decreases the probability of making a clean kill and/or recovery of a wounded bird after being hit from a long distance. According to the IDFG 2009 Progress Report for Waterfowl Fall and Winter Surveys, Production, Summer Banding and Harvest, the three-year average for breeding pairs in the Snake River/Payette River survey area was below the minimum goal for the fifth consecutive year (IDFG 2009a). Analyzing the possible reasons for this discrepancy may lead to several possible solutions to increase the number of breeding pairs in the area. The Refuge hopes to work closely with IDFG to determine and implement possible solutions. Some solutions may include predator control efforts, habitat restoration, and/or shortening of the hunting season to reduce the impact to breeding pairs.

Objective 2.4.2.2. Hunting upland game
Provide a quality, safe upland game hunt program on 2,250 acres of the Lake Lowell Unit and 1,219 acres of the Snake River Islands Unit, capable of supporting about 1,100 hunter visits per season. Hunt programs will include opportunities for disabled hunters. The hunt will be characterized by: • No stocking of nonnative game. • Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives.

• To the extent practicable, consistency of Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations. • Reliable/reasonable opportunities to experience a successful upland game hunt. • As possible, upland hunting opportunity for mobility-impaired hunters. • Consistency with quality criteria in Section 2.2.2.
Strategies Applied to Achieve Objective
Allow upland game hunting on the Snake River Islands Unit.
Allow upland bird hunting at the Lake Lowell Unit from the east boundary of the Leavitt Tract west to the Greenhurst Road entrance at Gotts Point and between Parking Lots 1 and 8.
During upland hunting season: • Allow public use activities in all upland hunting areas. • Post signs at Refuge access points to notify Refuge users when a hunt is underway.
Allow use of dogs for upland hunting. Require dogs to be leashed, unless actively hunting, and to remain under strict voice control at all times.
Evaluate whether to implement restricted hunting hours to reduce conflicts with waterfowl hunters.
Rationale: Hunting, when compatible, is one of the priority recreational uses of the NWRS. Upland hunting will continue to be allowed. Hunting is provided for existing naturalized populations of nonnative upland game birds (e.g., ring-necked pheasant, California quail). These populations will not be supplemented, and no habitat management will be performed solely for the benefit of these species. To improve safety and minimize conflict with other priority uses, signs will be posted at Refuge access points to notify Refuge users when a hunt is underway. Refuge staff will evaluate whether to implement restricted hunting hours to reduce conflicts with waterfowl hunters. If upland hunters reduce the quality of the waterfowl hunt, a start time of 10 AM for upland hunting may be imposed.

Objective 2.4.2.3. Hunting deer on the Snake River Islands Unit
Provide and promote quality, safe deer hunt on 1,219 acres of the Snake River Islands Unit of the Refuge capable of supporting about 75 hunter visits per season. The hunt will be characterized by: • Close cooperation and coordination with IDFG and ODFW for management of hunting opportunities on the Refuge and in setting population management goals and objectives. • To the extent practicable, consistency of Refuge hunting regulations with IDFG and ODFW fish and wildlife laws and regulations. • Reliable/reasonable opportunities to experience a successful deer hunt. • Consistency with quality criteria in Section 2.2.2. Deer Hunting at Lake Lowell Unit.
Strategies Applied to Achieve Objective
Allow deer hunting on the Snake River Islands Unit.
Prohibit use of lead buckshot.
Rationale: Hunting, when compatible, is identified as one of the priority recreational uses of the NWRS. A deer hunt will therefore continue to be provided at the Snake River Islands Unit. Lead buckshot is prohibited to reduce consumption of lead shot by target and nontarget species.

2.4.3 Goal 3 (Fishing): Anglers will enjoy a family-friendly, quality, accessible fishing opportunity that minimally impacts Refuge habitats and wildlife and increases their understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat

Objective 2.4.3.1. Provide quality fishing opportunities
Provide quality shoreline and boat fishing opportunities at Lake Lowell aimed at providing successful fishing for beginning, casual, and local anglers on a variable number of acres* of the Lake Lowell Unit and 66 miles of shoreline at the Snake River Islands Unit. Together, these areas are capable of supporting about 45,300 angler visits per season. Fishing programs will include youth event(s) and opportunities for disabled anglers. The fishing opportunity will be characterized by: • Close cooperation and coordination with IDFG and ODFW for management of fishing opportunities on the Refuge and in setting population management goals and objectives. • Stocking of the following species by IDFG as appropriate to provide a quality fishery: black crappie, bluegill, channel catfish, Lahontan cutthroat trout, largemouth bass, yellow perch, rainbow trout, and smallmouth bass. • To the extent practicable, consistency of Refuge fishing regulations with IDFG and ODFW fish and wildlife laws and regulations. • Minimal disturbance from artificial noise. • ABA-compliant accessibility. • Consistency with quality criteria in Section 2.2.2. *** A**reas critical to nesting birds (e.g., grebe colonies, heron rookeries, bald eagle nests) will be closed to public entry on a seasonal basis. These areas will be sized appropriately according to best available science. The area will remain closed until no nesting is observed in the same area the following year.
Strategies Applied to Achieve Objective
Implement seasonal closures on Snake River Islands Unit to prevent disturbance to waterfowl and colonial-nesting birds as follows: • All Refuge islands closed February 1 to June 14 during goose nesting season. • Some Refuge islands - closed February 1 to July 1 to reduce disturbance to colonial-nesting birds (e.g., herons, gulls, and terns are currently nesting on four to six islands).
Apply boating regulations and facilities described in Objective 2.4.1.4 for Lake Lowell Unit, to float tubes used for fishing.
Allow wading access to fishing anywhere at Lake Lowell Unit from April 15 to September 30 and all year in Fishing Areas A and B.
Allow access to bank fishing at Lake Lowell Unit as follows: • To protect nesting birds, access only on maintained roads and trails from February 1 to July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 yards of shoreline on either side of trails accessing the lakeshore. Off-trail travel allowed August 1 to January 31. • To protect wintering birds, access to Murphy's Neck through the walk-through on Orchard Avenue allowed from March 15 to September 30. • In the East Side Recreation Area, off-trail travel allowed all year. • In the Gotts Point area, off-trail travel allowed February 1 to September 30. • In areas accessed through the Lower Dam Recreation Area, off-trail travel is allowed April 15-September 30. • During waterfowl hunting season from any open shoreline. • Implement seasonal closures surrounding important wildlife areas (eagle nests, grebe colonies, osprey nests, heron rookeries, and shorebird feeding and resting areas). See Objective 2.4.1.3.

• Implement land-based seasonal closures on the Lake Lowell Unit to protect important wildlife areas. See Map 4. • Protect all active and historical grebe nesting colonies by establishing an area of up to 500 yards not open to public use during boating season. If there is no nesting in a colony by July 15 of the following year, the closure around that colony will be reopened. Upland portions of the closures will be open to use from October 1 to January 31. • Establish a buffer of up to 300 yards around eagle nests from February 15 to July 15. • Establish a seasonal closure of up to 150 yards around osprey nests from March 15 to August 1. • Establish a buffer of up to 250 yards around heron rookeries from February 1 to July 1. • Establish a closure up to 100 yards around shorebird feeding and resting areas from July 15 to September 30 during years when the lake level elevation is lower than 2,522 feet. • Continue wildlife closure at Gotts Point from October 1 to January 31. • Establish wildlife closure at Murphy's Neck from October 1 to March 14. • Continue wildlife closure at Lower Dam Recreation Area from October 1 to April 14.
Provide access at Gotts Point as follows: • Fully open Gotts Point to vehicle access upon completion of memorandum of understanding or cooperative agreement with Canyon County to resolve law-enforcement issues. • Provide designated fishing ABA-accessible trails from parking areas at Gotts Point. • Provide ABA-accessible dock at Gotts Point.
Ice fishing allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by Reclamation.
Develop new trails to access the lake for fishing at appropriate locations, for example: • At Parking Lots 4 and 7 • At Parking Lots 2 and 3 • From 0.65-mile ABA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck if that trail is installed.
Fishing access to Murphy's Neck may be moved if Murphy's Neck trail is installed (Objective 2.4.1.3).
Provide multipurpose (e.g., fishing, observation) docks or platforms at appropriate locations, such as: • At north end of Lower Dam Recreation Area near existing Environmental Education Building. • Just west of boat launch at east end of the Upper Dam. • Multipurpose (e.g., fishing, observation, hunting) dock at Parking Lot 1.
Allow fishing tournaments at Lake Lowell as follows: • During boating season except May 14 to July 9. All no-wake zones, area closures, and State fishing regulations must be followed (exception to catch and release with permission from IDFG before the end of June). Bass tournaments only allowed every other weekend (to provide opportunities for nontournament anglers). All bass tournaments must launch from the Lower Dam Recreation Area. Fee of $100, with 100-boat limit.
Prohibit live, nonnative aquatic bait per Service policy (605 FW 3).
Provide fishing line receptacles.
Coordinate with the Board of Control and IDFG to increase bottom structure to benefit fish that does not interfere with the irrigation purpose of the reservoir.
Coordinate with IDFG on the stocking of the following fish species at the Lake Lowell Unit: largemouth bass, smallmouth bass, bluegill, channel catfish, black crappie, yellow perch, rainbow trout, and Lahontan cutthroat trout. Stocking of any other fish species will require additional planning.
Develop a cooperative agreement with IDFG for resident fish and wildlife management.
Rationale: Fishing, when compatible, is identified as one of the priority recreational uses of the NWRS. Fishing attracts visitors to the Refuge and often enhances their appreciation of natural resources. Fishing will, therefore, continue to be provided at the Snake River Islands and Lake Lowell Units.

Currently, Refuge anglers complain about a reduced-quality fishing experience because of conflict with nonwildlife-dependent recreationists on the lake, limited bank- and dock-fishing, and difficulty in accessing bank-fishing opportunities. In a 2006 Idaho Angler Opinion Survey conducted by IDFG, most respondents were anglers who fished from the bank (IDFG 2007). Additional trails and docks will be provided to facilitate shoreline access and fishing. Improved facilities will mitigate negative impacts associated with concentrated shoreline fishing. These facilities will also concentrate use and thus reduce the footprint of deleterious impacts. Fishing line can injure or kill birds and other wildlife, so fishing line receptacles will be provided at major fishing access points.

Safety is a major concern for recreational users who rely on the structural integrity of the ice on Lake Lowell to enjoy their sport. According to the National Weather Service (accessed online at http://www.rssweather.com/climate/Idaho/Boise/), average monthly high temperatures in the Treasure Valley do not reach freezing levels. This, combined with high winds and long fetch, makes the freezing of the water on Lake Lowell very unpredictable, and any frozen areas of the lake unsafe. Systematic ice evaluations by qualified personnel are not conducted. However, ice fishing will be allowed to provide a quality fishing opportunity during years when ice conditions are favorable.

Ice fishing will be allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by Reclamation. The lake is closed to boating October 1 through April 14, and restricting ice-fishing access to these areas will reduce disturbance from human-caused flushing events. Anglers will be responsible for confirming that ice conditions are safe.

To provide safer access to a popular spring fishing area, walk-through access to Murphy's Neck may be removed after installation of the proposed 0.65-mile ABA-accessible interpretive Murphy's Neck loop trail and additional shoreline access trails.

The majority of the road to Gotts Point was closed to vehicles in 2007 after years of persistent law enforcement issues. The road to Gotts Point will be reopened upon completion of an MOU with Canyon County to formalize agreements about law enforcement and maintenance.

Refuge staff will monitor angling activities on the Refuge and apply adaptive management as issues arise. Monitoring efforts will be a part of an overall fisheries management plan that will help guide fisheries management into the future.

2.4.4 Goal 4 (Environmental Education): Students, teachers, and Refuge visitors will understand the biology and management of the Refuge and the mission of the National Wildlife Refuge System and will demonstrate stewardship of the Refuge and other wildlife habitats

Objective 2.4.4.1. Environmental education

Provide quality EE opportunities for 9,400 students aligned with grade-specific State curriculum standards. On-site and teacher-led programs will be emphasized over off-site programs. As a result of participating in Refuge EE programs, students will show an 80 percent increase in understanding about the topic presented, as measured by pre- and post-tests. EE programs will be characterized by:

- Techniques to reach students with a variety of learning styles.
- Emphasis on enjoyable, hands-on, inquiry-based learning.
- Maximum 10:1 student-to-adult ratio during field trips.
- Use of only local examples of flora and fauna.
- Appropriate facilities.

- Positive teacher feedback.
- Consistency with quality criteria in Section 2.2.2.

Strategies Applied to Achieve Objective

Within two years, meet with teachers and school districts (especially Caldwell, Nampa, and Vallivue) to determine which themes and age groups to target and to refine the Refuge's scope of EE programming to that best suited for Refuge field trips and traveling trunks. Eliminate EE programming that is better suited to other educational venues or that is delivered at other local educational sites.

Within seven years, develop EE curricula to be used with teacher-led classes and Refuge-specific instructor training for teachers ("teach the teacher" programs). Enlist local teachers to help develop curricula to ensure that educational requirements are met. After programs are developed, offer at least two teacher training workshops annually and establish a program to encourage and select trained teachers to use the Refuge's facilities, curricula, and programs for teacher-led EE. By the end of 15 years, teachers will lead 75 percent of educational visits.

Within two years, modify existing EE programs not targeted at school classrooms/field trips (e.g., day camps, Scout Day, Youth Conservation Corps) to be consistent with EE themes. Eliminate EE programs better suited to other educational venues or delivered at other local educational sites.

Provide at least 2 EE study sites for 25 students in areas that facilitate EE programs on designated themes. This might include a portable learning lab (i.e., a trailer).

Rationale: Environmental education, when compatible, is a priority public use of the NWRS and can be used to educate visitors and residents of local communities about natural resources, refuges, and the NWRS, as well as their role in wildlife conservation and how their compliance with Refuge rules and regulations can help solve or prevent management problems. EE will continue to be provided, however, the Refuge expects a wider range of user groups, and interpretation has greater flexibility to reach broader audiences. Therefore, interpretation will be emphasized over EE. Existing EE programs (e.g., Scout Day, day camps, off-site programs, and the on-site Discover Wildlife Journeys program) may be reduced or restructured to allow enough staff and volunteer time to provide for increased on-site interpretation.

Refuge staff will work with teachers and school districts (especially Caldwell, Nampa, and Vallivue) to determine which themes and age groups to target and to refine the Refuge's scope of EE programming to that best suited for Refuge field trips and traveling trunks. EE programming delivered at other local educational sites will be eliminated. Refuge EE staff will consider Idaho's Environmental Literacy Plan (Fletcher 2011).

EE themes will focus on increasing awareness and understanding of the Refuge and NWRS, of how to be a better Refuge visitor, and of issues facing the Refuge and its wildlife and habitat. Possible themes will include:

- What is a national wildlife refuge? What is the Refuge's purpose?
- The North American model of wildlife management.
- The role of Lake Lowell in irrigation.
- How visitors can help conserve the Refuge and other wildlife habitats.
- Water quality, water conservation, and watersheds.
- Invasive species (e.g., carp, plants, domesticated animals, aquatics).
- Migration (e.g., waterfowl, neotropical migrants).
- Individual wildlife species (e.g., waterfowl, grebe) and their habitat requirements.
- Urbanization impacts.

On-site EE programs will be prioritized over off-site programming, because higher-quality experiences are possible during an on-site field trip. When programs are conducted off-site, requests from Canyon and Owyhee counties will be top priority because they are closer to the Lake Lowell Unit where Refuge staff

members are stationed. Requests from Ada, Payette, and Washington counties in Idaho, and Malheur County in Oregon will be second priority. Even though the Snake River Islands Unit falls within Payette, Washington, and Malheur counties, the distance from Refuge Headquarters makes it less feasible to fulfill requests from these areas. The Refuge does not fall within Ada County and many other EE opportunities are based there, therefore, requests from Ada County will not be a top priority.

The Refuge will emphasize teach the teacher programs because this approach has the potential to both expand the potential number of students served and to broaden the base of knowledgeable EE instructors in the community. Indirectly, this might have the effect of broadening support for the Refuge within the local community. Because it takes time for teachers to receive training and become comfortable with the educational materials and familiar with the Refuge, there will be slow but gradual movement toward 75 percent of on-site programs being led by teachers over the life of the CCP.

EE study sites will be constructed; these structures will provide covered areas for students to gather during EE programs. Currently, students have no cover from weather during the outdoor portions of field trips. Because field trips are scheduled mostly in the spring and fall, weather can span the extremes of intense sunshine and pouring rain.

2.4.5 Goal 5 (Law Enforcement): Visitors will have limited impacts to wildlife, feel safe during their visit, and understand Refuge regulations and how they help protect wildlife and wildlife habitat as well as other visitors

Objective 2.4.5.1 Provide safe public use opportunities
Reduce illegal activities (e.g., trespass into closed areas, pets off leash, vandalism, trash dumping) by 10 percent per year from previous year.
Strategies Applied to Achieve Objective
Use variety of techniques to educate Refuge users about Refuge regulations and deter illegal public uses (e.g., brochures, leaflets, signage, news releases, and increased law enforcement patrols).
Pursue MOU with County Sheriff to patrol Gotts Point and Lower Dam Recreation Area; on-water, enforce existing State decibel limits.
Pursue codification of Refuge regulations with County Sheriff or creating a joint jurisdiction agreement.
Meet annually to educate County Sheriff's deputies on Refuge regulations and purposes, as well as other appropriate issues.
For both Refuge management and law enforcement officer(s), work with partners to facilitate safe public use opportunities, such as: • Meet with IDFG Conservation Officers annually to discuss law enforcement needs, issues, and opportunities to partner. • Coordinate with local emergency response entities for search and rescue. • Create a "neighborhood watch" for the Refuge in which Refuge neighbors notify Refuge staff about illegal activities.
Rationale: Reducing illegal activities that cause wildlife disturbance, trash issues, and safety concerns is a priority. Because of illegal activities, Refuge visitors and staff do not always feel safe everywhere on the Refuge. Eliminating illegal uses, defining access routes, restoring habitat, and promoting a sense of community pride in the Refuge will all be necessary for the Lake Lowell Unit to serve as high-quality wildlife habitat and for the public to feel safe using the site for priority public uses. To succeed in this endeavor, the Refuge will partner with others who can enforce Refuge regulations, use positively worded signs, explain the rationale behind regulations in brochures, signs, and interpretive talks; and install infrastructure that will help reduce illegal activities (e.g., lights and automatic gates).

Many comments were provided during the scoping period about visitors not following regulations, so the Refuge will investigate technologies that may reduce the likelihood of illegal activity. Remote video cameras and electronic gates may allow the Refuge to decrease illegal activities, increase the Refuge's ability to catch those engaged in illegal activities, and provide unobstructed use of the Refuge during daylight hours.

2.4.6 Goal 6 (Volunteers and Partners): The Refuge will initiate and nurture relationships and develop cooperative opportunities to nurture stewardship of the Refuge and instill in others an understanding and appreciation of the importance of Deer Flat NWR as wildlife habitat

Objective 2.4.6.1. Volunteers
Recruit, train, use, and retain volunteers for support of Refuge programs and activities. • Annually recruit new volunteers to replace volunteers lost through attrition. • Orient and train 30 new and returning volunteers annually • Use and retain volunteers so that within three years, the number of volunteers that provide 10 or more hours of service exceeds 100 annually
Strategies Applied to Achieve Objective
Offer at least 5 volunteer orientation, refresher, and training sessions annually.
Hold at least 2 volunteer appreciation events annually.
Hold at least 3 community work days annually.
Maintain at least 8 trained EE volunteers annually.
Rationale: In FY11, more than 550 people volunteered at the Refuge, serving more than 11,000 hours by removing noxious weeds and litter, assisting with EE programs and special events, and conducting wildlife surveys. However, most of the volunteers participated on a one-time basis; in FY11, just 66 of the 550 volunteers contributed more than 10 hours each. These repeat volunteers have excellent knowledge of the Refuge and its resources, and they often add value to programs by working on more than one project and better knowing the resource. Increasing this core of dedicated repeat volunteers will provide benefits to both habitat management and public use programs. Increasing local residents' participation in even one-time activities will increase awareness of and support for the Refuge and its programs.

Objective 2.4.6.2. Partners and Friends
Maintain and enhance one or more partnerships within each of the following themes to increase partner knowledge of Refuge purposes and leverage resources to increase the effectiveness of Refuge programs. • EE and interpretation • Fishing • Hunting • Photography and wildlife observation • Compatible nonwildlife-dependent surface-water recreation • Water quality • Urbanization and agriculture • Invasive species
Strategies Applied to Achieve Objective
Work with the Friends of Deer Flat NWR board on development, member recruitment, and involvement.
Work with partners to facilitate EE and interpretive opportunities such as: • Caldwell, Nampa, and Vallivue School Districts to develop educational programming for multiple disciplines and grade levels to maximize the Refuge as an educational resource.

• Colleges that identify use of the Refuge as a research, field lab, or service learning opportunity. • Caldwell YMCA to create programs for a proposed day camp. • The Friends group and community partners to create a community-wide Refuge event (like Snake River Days). • Partner with Be Outside, Idaho, and other efforts to connect people with nature. • Partner with Snake River Canyon Scenic Byway to post interpretive signs at the Lake Lowell and Snake River Island Units. • Partner with Snake River Water Trail to post interpretive signs at the Snake River Island Unit.
Work with partners to facilitate wildlife observation and photography opportunities such as: • Partner with Idaho Watchable Wildlife Committee and Idaho Birding Trail to promote and enhance wildlife observation and photography opportunities. • Work with partners to host photography workshops. • Partner with Canyon County and the cities of Caldwell and Nampa to connect their bike and pathways plans to Refuge facilities.
For Refuge management, work with partners to facilitate fishing opportunities such as: • Work with partners to provide fishing workshops that target new or novice anglers. • Work with partners to provide and promote fishing events for youth (e.g., Kids' Fishing Day). • Work with partners to provide fishing events that encourage participation by disabled visitors.
Seek partnerships with State and private groups for funding and publication of tear sheets (e.g., for fishing, hunting, wildlife observation, and photography).
For Refuge management, work with partners to facilitate wildlife and habitat objectives such as: • Work with IDFG and others to develop/implement methods to reduce Lake Lowell's carp biomass. • Work with partners to obtain funding for a feasibility study to identify the best methods for improving the water quality (e.g., reducing phosphorus and silt) of Lake Lowell. • Work with partners and volunteers to control the spread of weeds. • Work with adjacent landowners to address cattle trespass problems in targeted locations on the Snake River Islands Unit. • Work with partners and volunteers to install and maintain wildlife nesting structures (e.g., goose nesting platforms, wood duck boxes). • Work with a local nursery to propagate harvested seed for restoration.
Rationale: Partnerships are key to the successful management of public lands and vital to implementation of the Refuge's programs, plans, and projects, especially in times of declining budgets.

2.4.7 Goal 7 (Cultural Resources): The Refuge will protect and manage its cultural resources and look for ways to gain new understanding of the history and cultural resources of both the Lake Lowell and the Snake River Islands Units

Objective 2.4.7.1. Inventory, evaluate, monitor, and protect the Refuge's cultural resources
Work with Service Cultural Resources staff and interested Tribes to identify, protect, and enhance the Refuge's cultural resources.
Strategies Applied to Achieve Objective
Develop systematic cultural resource inventory and monitoring plan consistent with Section 110 of the National Historic Preservation Act.
Identify any resources for potential inclusion in the National Register of Historic Places.
Rationale: Advanced knowledge of cultural resources can help in the design and implementation of restoration activities.

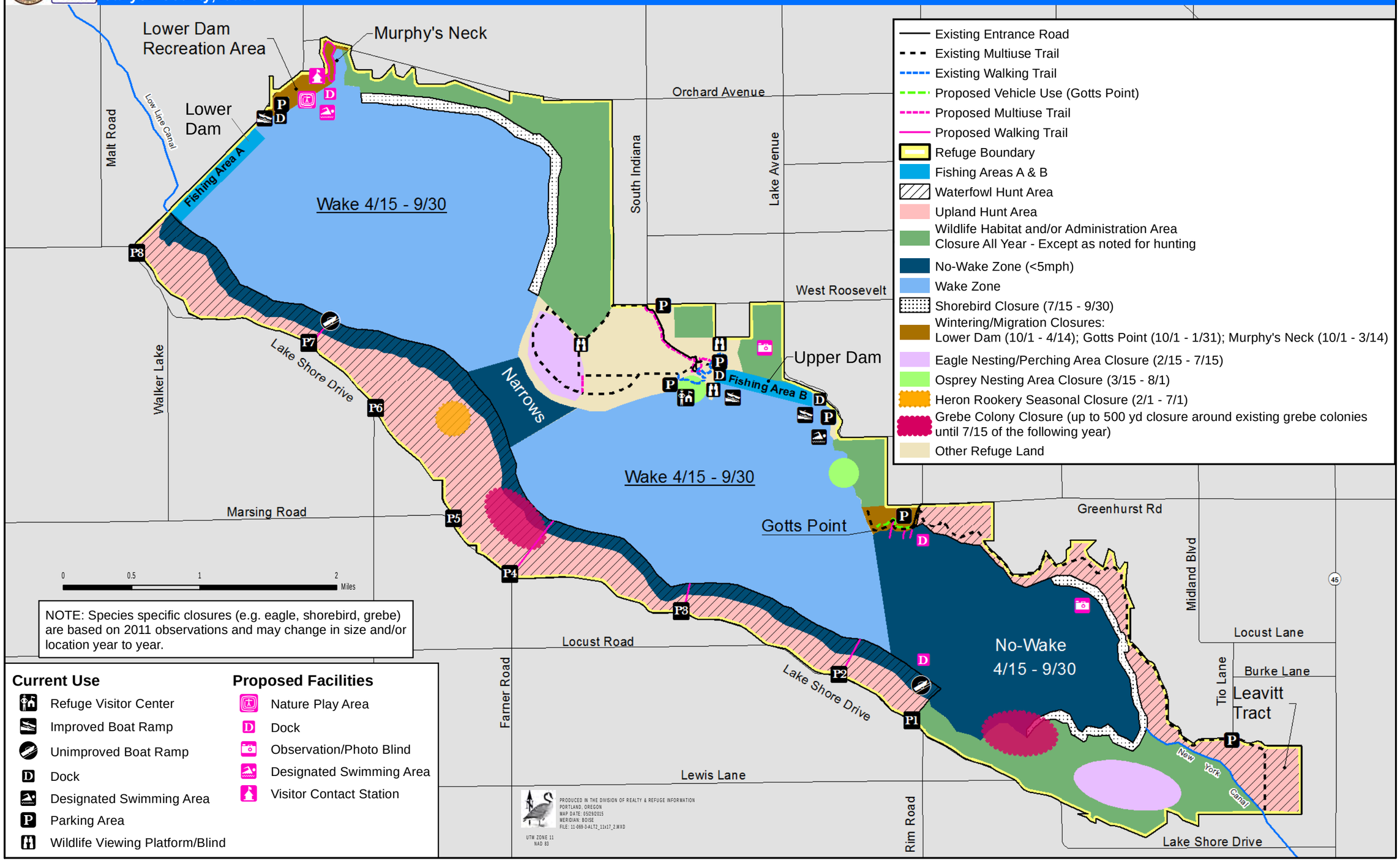
Objective 2.4.7.2. Present the Refuge's cultural resources
Work with Service Cultural Resources staff, interested Tribes, and the local community to interpret the Refuge's cultural resources.
Strategies Applied to Achieve Objective
Increase public awareness and appreciation of the Refuge's historic and archaeological resources through interpretation.
Partner with the Tribes, historical societies, and volunteers to provide cultural and natural heritage interpretation to existing EE programs.
Rationale: Understanding cultural resources serves to protect these resources and connect visitors, Refuge staff, and the local community with tangible elements of shared heritage.

U.S. Fish & Wildlife Service

Deer Flat National Wildlife Refuge - Lake Lowell Unit

Canyon County, Idaho

MAP 4 - Management Direction



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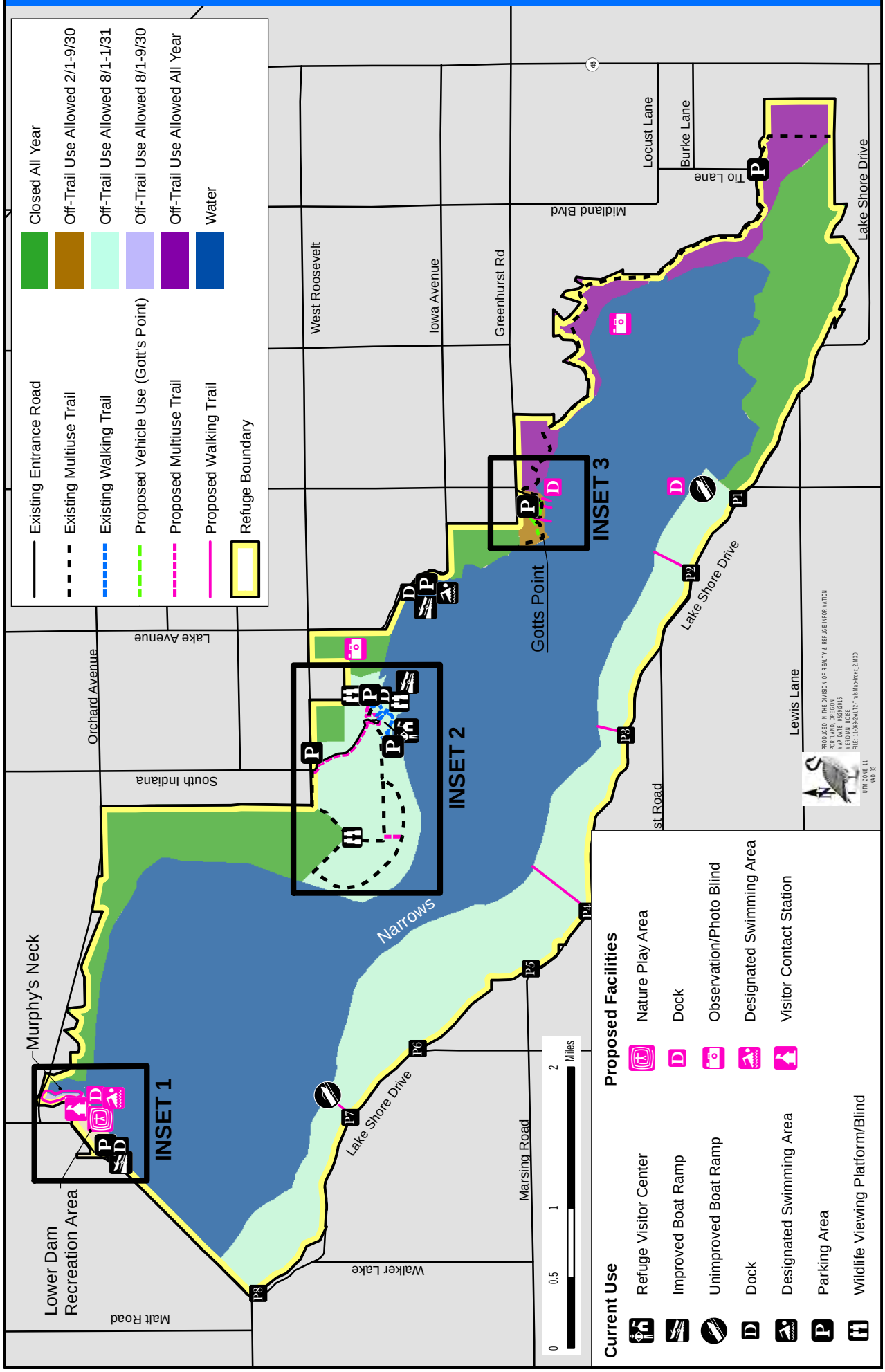
U.S. Fish & Wildlife Service

Deer Flat National Wildlife Refuge - Lake Lowell Unit - Canyon County, Idaho

MAP 5 - Trails Map Index (Preferred)



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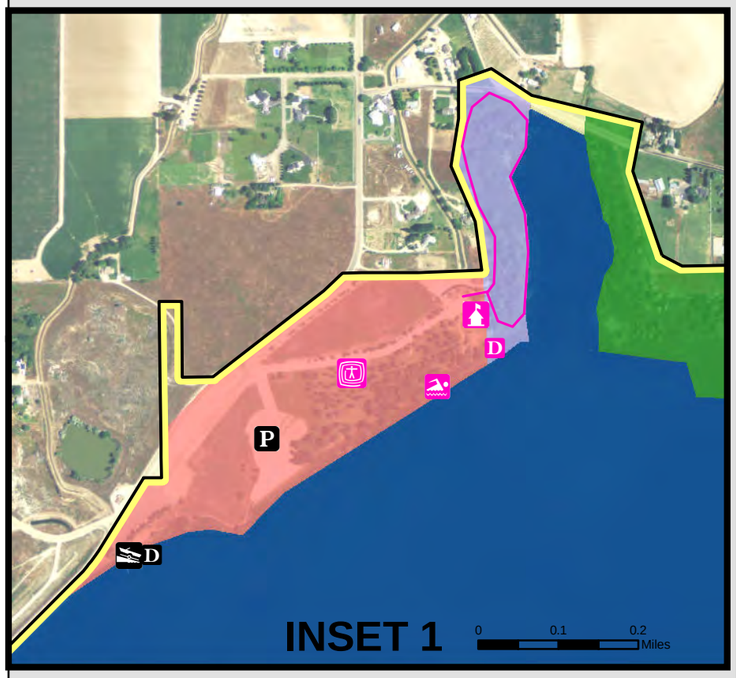
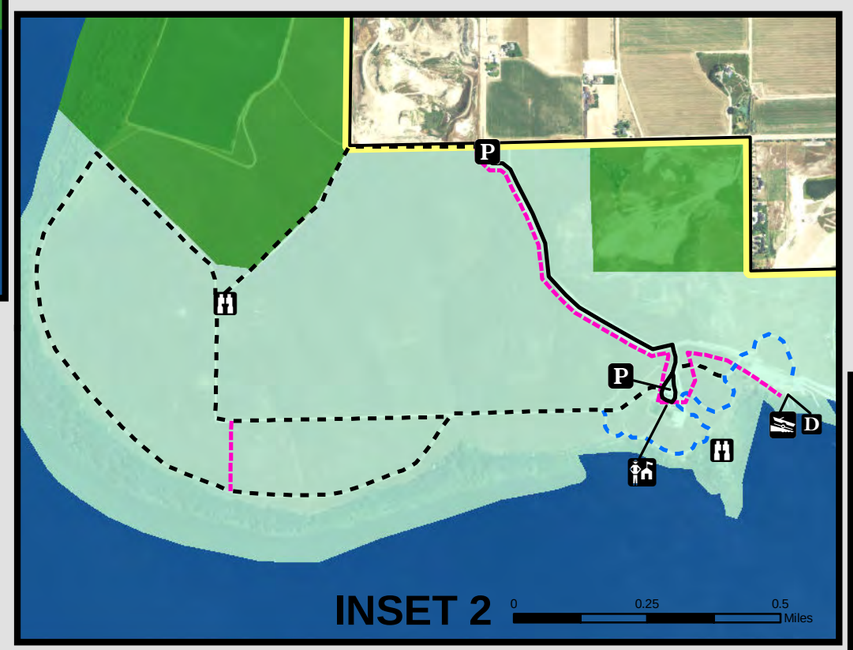
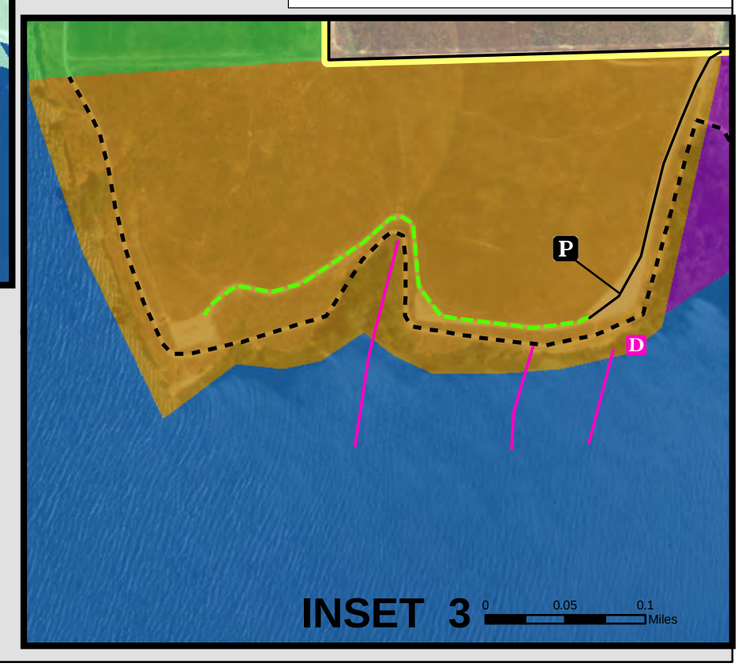
U.S. Fish & Wildlife Service
Deer Flat National Wildlife Refuge - Lake Lowell Unit
Canyon County, Idaho

MAP 6 - Trails Map - Inset Maps (Preferred)





- Existing Entrance Road
- Existing Multiuse Trail
- Existing Walking Trail
- Proposed Vehicle Use (Gotts Point)
- Proposed Multiuse Trail
- Proposed Walking Trail
- Refuge Boundary
- Closed All Year
- Off Trail Use Allowed 4/15 - 9/30
- Off-Trail Use Allowed 3/15 - 9/30
- Off-Trail Use Allowed 2/1-9/30
- Off-Trail Use Allowed 8/1-1/31
- Off-Trail Use Allowed 8/1-9/30
- Off-Trail Use Allowed All Year
- Water



Current Use

Type

- Refuge Visitor Center
- Improved Boat Ramp
- Unimproved Boat Ramp
- Dock
- Designated Swimming Area
- Parking Area
- Wildlife Viewing Platform/Blind

Proposed Facilities

- Nature Play Area
- Dock
- Observation/Photo Blind
- Designated Swimming Area
- Visitor Contact Station

PRODUCED IN THE DIVISION OF REALTY & REFUGE INFORMATION
PORTLAND, OREGON
MAP DATE: 05/29/2015
MERIDIAN: BOISE
FILE: 11-069-2-ALT2-TrailsMap-InsetMaps_2.MXD

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Darkling beetle
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Chapter 3 Physical Environment

Chapter 3 Physical Environment

This chapter describes the existing conditions of the physical environment in the Deer Flat Refuge planning area. The planning area consists of both the Lake Lowell Unit and the Snake River Islands Unit of the Refuge.

3.1 Climate

3.1.1 General Climate

The Deer Flat NWR planning area is situated in a dry climate region characterized by hot and dry summer months and cold and wet mild winters (IDEQ 2010). Climate in Idaho is largely governed by two influences: the Continental Divide and the Pacific Ocean. Even though the Refuge is located more than 300 miles from the Pacific Ocean, its climate is nevertheless affected by the air that is borne eastward on the prevailing westerly winds from the coast (WRCC 2011a). Additional information about wind is presented below. The growing season in the Deer Flat NWR region, including the central Snake and lower Boise, Payette, and Weiser river basins, averages 150 days or more (WRCC 2011a).

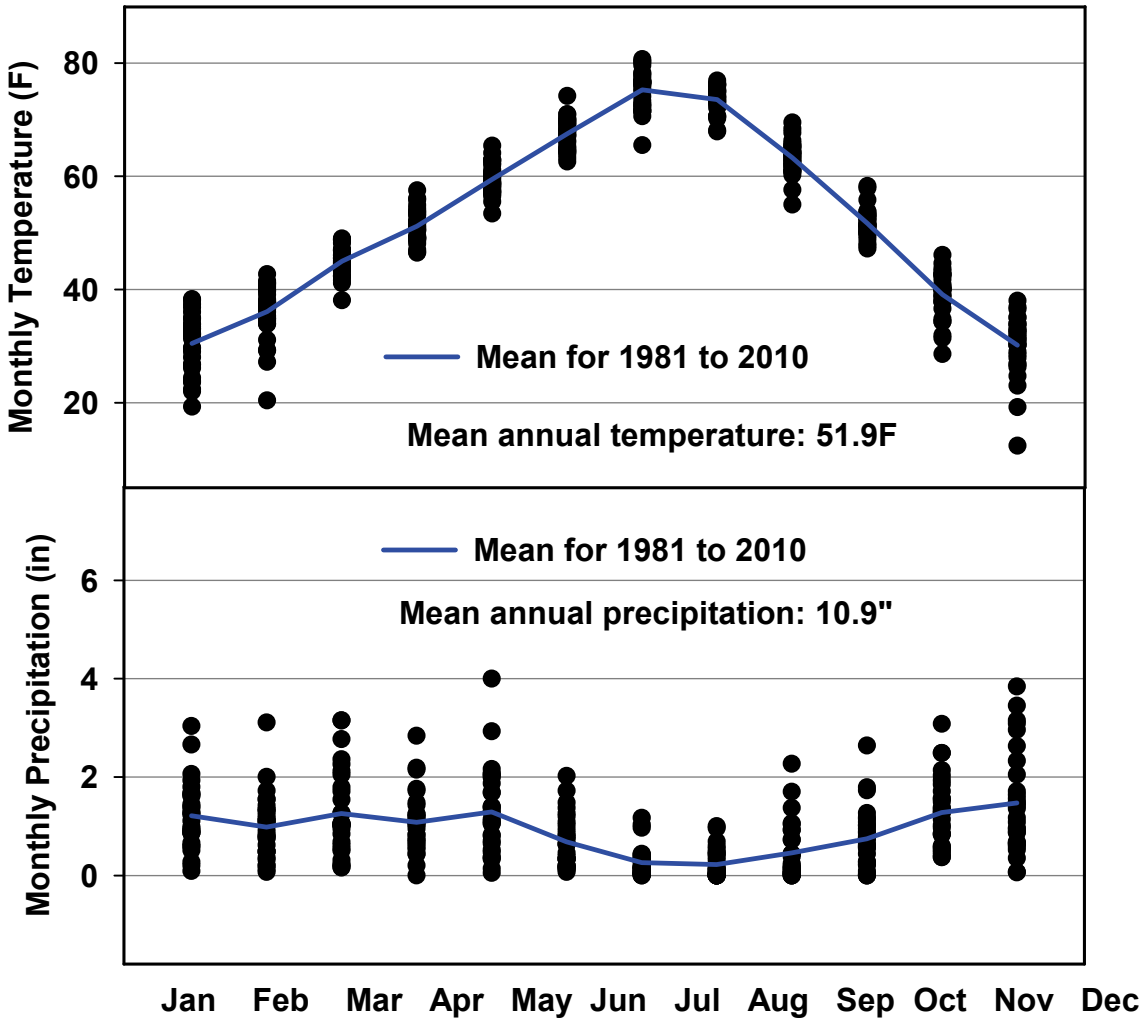
Climate influenced by the Pacific Ocean includes variability that is strongly shaped by two large-scale patterns: the El Niño/Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). Each ENSO phase typically lasts six to 18 months, and, during the twentieth century, each PDO phase typically lasted for 20 to 30 years (Climate Impacts Group [CIG] 2011). These climate drivers can act separately and in concert in creating patterns of warm/dry or cool/wet winters (CIG 2011). With their influence over both winter temperature and winter precipitation, these natural climate patterns exert significant influence on snowpack and hydrology.

3.1.1.1 Temperature

It is rare that Idaho experiences periods of extreme heat or cold that last more than a week at a time, because the normal ongoing progression of weather systems moving across the state usually results in weather changes at rather frequent intervals (WRCC 2011a). Figure 3-1 illustrates the distribution of historical monthly temperatures and precipitation at Nampa, Idaho from 1981 to 2010. The climate station at Nampa is located about 4 miles northeast of the Refuge. The Nampa climate station is within the U.S. Historical Climatology Network (USHCN), a high-quality data set of daily and monthly records of basic meteorological variables from 1,218 observing stations across the conterminous United States (Menne et al. 2011). The USHCN data have been corrected to remove biases or heterogeneities from nonclimatic effects such as urbanization or other landscape changes, station moves, and instrument and time of observation changes. The network has been developed over the years at the National Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC) to assist in the detection of regional climate change and for monitoring temperature and precipitation across the United States. Data are accessible at http://cdiac.ornl.gov/epubs/ndp/ushcn/monthly_doc.html.

The average annual temperature at Nampa is 52°F. The highest monthly temperatures tend to occur in July and August and average 74°F to 75°F. The lowest monthly temperatures occur in December and January and average 30°F to 31°F.

Figure 3-1. Mean and Distribution of Monthly Temperature (top plot) and Precipitation (bottom plot) for the Nampa, Idaho USHCN Station for the Period 1981 to 2010



Source: Menne et al. (2011).

3.1.1.2 Precipitation

The primary source of moisture for precipitation in Idaho is the Pacific Ocean (WRCC 2011a). In winter, air masses moving inland from the Pacific Ocean to the continent pick up unlimited moisture from the ocean. The Cascade Range, some 200 miles west of the Refuge, forces this moisture-laden marine air from the Pacific Ocean to rise as it moves eastward. The resultant cooling and condensation produces heavy winter moisture on the western side of the Cascades and a rain shadow effect that extends across eastern Oregon and western Idaho.

Annual precipitation averages 10.9 inches per year at the USHCN station in Nampa, Idaho, for the period 1981 to 2010 (Figure 3-1). Summers are typically quite dry; July, August, and September all average less than 0.5 inch of precipitation per month. In portions of the Boise, Payette, and Weiser river drainages, less than 30 percent of the annual precipitation falls between the months of April and September (WRCC 2011a). The dry season in southern Idaho tends to end by October (IDEQ 2010). Snowfall occurs at the Refuge but rarely accumulates. However, snowmelt is an important contributing factor to the Snake River drainage.

3.1.1.3 Wind

Windstorms are not uncommon events, but there is an extremely small incidence of tornadoes and no history of destructive storms such as hurricanes (WRCC 2011a). Windstorms that are strong enough to cause minor damage to trees or disrupt power and communication facilities can occur at any time from October into July (WRCC 2011a). On average, prevailing winds in the Lake Lowell area are from the west-northwest from April through October and from the south-southeast the remainder of the year (WRCC 2011b). Monthly wind data as reported at Caldwell Airport (the nearest reporting station) are presented in Table 3-1.

Table 3-1. Average Prevailing Wind Speed and Direction at Caldwell Airport

Parameter (Period of Record)	Mean Monthly Data											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed (mph) (1997-2006)	5.8	7.5	7.9	7.7	6.7	6.6	5.6	5.3	5.0	5.3	5.8	6.1
Wind direction (1992-2002)	SSE			WNW							SSE	SE

Source: WRCC (2011b, 2011c).

3.1.2 Climate Change

As stated in Department of the Interior Secretarial Order 3226, issued in 2001, and the Service's Climate Change Strategic Plan, the Service considers and analyzes climate change in long-range planning and other activities.

3.1.2.1 Potential Effects from Climate Change

Global Greenhouse Gases: The greenhouse effect is a natural phenomenon that assists in regulating and warming the temperature of our planet. Just as a glass ceiling traps heat inside a greenhouse, certain gases in the atmosphere, called greenhouse gases (GHGs), absorb heat from sunlight. The primary GHGs occurring in the atmosphere include carbon dioxide (CO_2), water vapor, methane, and nitrous oxide. CO_2 is produced in the largest quantities, accounting for more than half of the current impact on the Earth's climate.

A growing body of scientific evidence from basic theory, climate model simulations, and observations has emerged to support the idea that humans are changing the Earth's climate (Intergovernmental Panel on Climate Change [IPCC] 2007; National Academy of Sciences 2008; U.S. Global Climate Change Research Program [USGCRP] 2009). The concentrations of heat-trapping GHGs have increased significantly over the last several hundred years due to human activities such as deforestation and the burning of fossil fuels.

Although climate variations are well documented in the Earth's history, even in relatively recent geologic time (for example, the Ice Age of 10,000 years ago), the current warming trend differs from shifts earlier in geologic time in two ways. First, this climate change appears to be driven primarily by human activity, particularly the burning of fossil fuels, which results in a higher concentration of atmospheric GHGs. Second, atmospheric CO_2 and other GHGs, levels of which are strongly correlated with the Earth's temperature, are now higher than at any time during the last 800,000 years (USGCRP 2009). Prior to the start of the Industrial Revolution in 1750, the amount of CO_2 in the atmosphere was about 280 parts per million (ppm). Current levels are about 390 ppm and are

increasing at a rate of about 2 ppm per year. The current concentration of CO_2 and other GHGs and the rapid rate of increase in recent decades are unprecedented in the prehistoric record.

Temperature and Precipitation: There is a direct correlation between GHG concentrations and the temperature of the Earth's surface. Global surface temperatures have increased about 1.3°F since the late nineteenth century (USGCRP 2009), and the rate of temperature increase has risen in more recent years (Figure 3-2). The IPCC, a large group of scientists convened by the United Nations to evaluate the risk of climate change caused by human activities, reported in 2007 that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level" (IPCC 2007).

In the Northern Hemisphere, recent decades appear to be the warmest since at least about A.D. 1000, and the warming since the late nineteenth century is unprecedented over the last 1,000 years. Globally, 2010 and 2005 are tied as the warmest years in the instrumental record from 1880 to the present. 1998, 2002, 2003, 2006, 2007, and 2009 are all tied for the second warmest on record, according to independent analyses by NOAA and the National Aeronautics and Space Administration (NASA; Table 3-2). The new 2010 record is particularly noteworthy because it occurred in the presence of a La Niña (a period of unusually cold ocean temperatures in the Equatorial Pacific) and a period of low solar activity, two factors that have a cooling influence on the planet. However, in general, decadal trends are far more important than any particular year's ranking.

Trends in global precipitation are more difficult to detect than changes in temperature because precipitation is generally more variable. Over the last century, there have been increases in annual precipitation in the higher latitudes of both hemispheres and decreases in the tropical regions of Africa and southern Asia (USGCRP 2009). Most of the increases have occurred in the first half of the twentieth century, and it is not clear that this trend is due to increasing GHG concentrations.

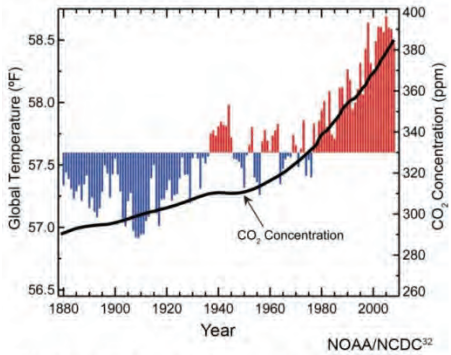
Just as important as precipitation totals are changes in the intensity, frequency, and type of precipitation. Warmer climates, owing to increased water vapor, lead to more intense precipitation events, including more snowstorms and possibly more flooding, even with no change in total precipitation. The prevalence of extreme single-day precipitation events over time has increased, especially in the last two decades. On the other hand, more droughts and heat waves have occurred because of hotter, longer-lasting high pressure systems that dry out the land.

3.1.2.2 Pacific Northwest Climate Indicators and Trends

Temperature and Precipitation: In the Pacific Northwest, regionally averaged temperature rose 1.5°F between 1920 and 2000 (Figure 3-3), slightly more than the global average. Warming was largest for the winter months of January through March. Minimum daily temperatures have increased faster than maximum daily temperatures. Longer-term precipitation trends in the Pacific Northwest are more variable and vary with the period of record analyzed (Mote et al. 2005). Looking at the period 1920 to 2000, precipitation has increased almost everywhere in the region. Most of that increase occurred during the first part of the record.

In the Pacific Northwest, increased GHGs and warmer temperatures have resulted in a number of physical and chemical impacts to the region. These include changes in snowpack, streamflow timing and volume, flooding and landslides, sea levels, ocean temperatures and acidity, and disturbance regimes like wildfires, insect, and disease outbreaks (USGCRP 2009).

Figure 3-2. Global Average Temperature and CO_2 Concentration from 1880 to 2008



Global annual average temperature (as measured over both land and oceans). Red bars indicate temperatures above and blue bars indicate temperatures below the average temperature for the period 1901-2000. The black line shows atmospheric carbon dioxide (CO_2) concentration in parts per million (ppm). While there is a clear long-term global warming trend, each individual year does not show a temperature increase relative to the previous year, and some years show greater changes than others.[33] These year-to-year fluctuations in temperature are due to natural processes, such as the effects of El Niños, La Niñas, and the eruption of large volcanoes.

Source: USGSRP (2009).

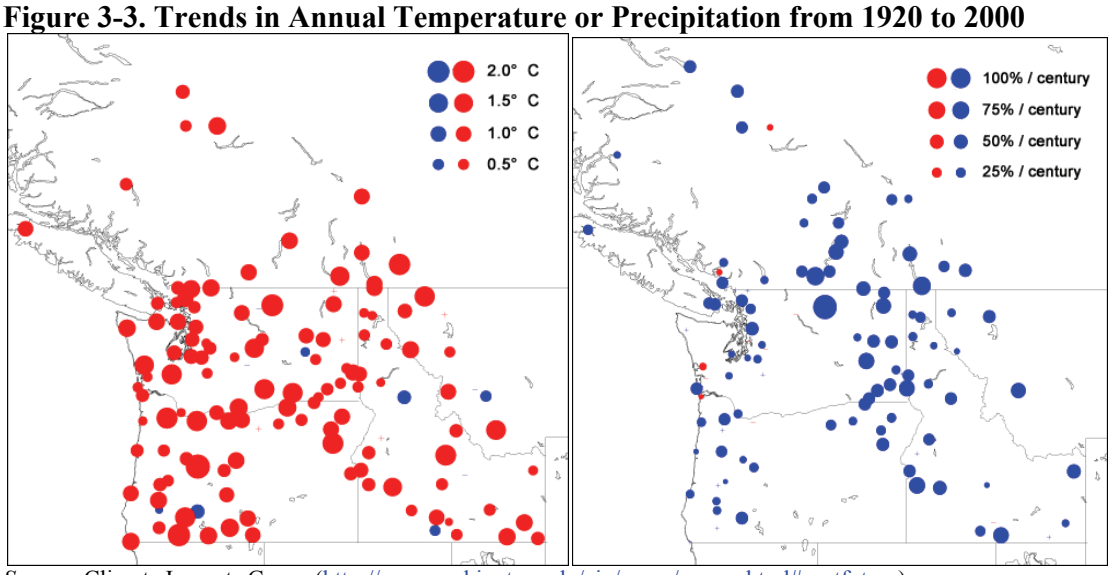
Table 3-2. Top 10 Warmest Years in the Instrumental Record from 1880 to 2010

Global Top 10 Warmest Years (	Anomaly (˚F)
2010	1.12
2005	1.12
1998	1.08
2003	1.04
2002	1.04
2009	1.01
2006	1.01
2007	0.99
2004	0.97
2001	0.94

Source: NCDC (2010).

The *instrumental record* refers to the period with recorded temperatures. Anomalies are differences from the mean.

Figure 3-3. Trends in Annual Temperature or Precipitation from 1920 to 2000



Source: Climate Impacts Group (http://cses.washington.edu/cig/pnwc/pnwc.shtml#pastfuture).
Red (blue) circles indicate warming (cooling) air temperatures or decreasing (increasing) precipitation.

Snowpack Changes: One of the most important responses to warmer winter temperatures in the Pacific Northwest has been the loss of spring snowpack (Mote et al. 2005). As temperatures rise, the likelihood of winter precipitation falling as rain rather than snow increases. This is especially true in the Pacific Northwest where mountainous areas of snow accumulation are at relatively low elevation and winter temperatures are near freezing. Small increases in average winter temperatures can lead to

increased rains, reduced snowpack, and earlier snowmelt. The loss of spring snowpack in the Pacific Northwest has been significant, with most of the weather stations showing a decrease on average (Figure 3-4). The fact that the declines are greatest at low-elevation sites and that the trend has occurred in the absence of significant decreases in winter precipitation implicates temperatures rather than precipitation as the cause of the trend.

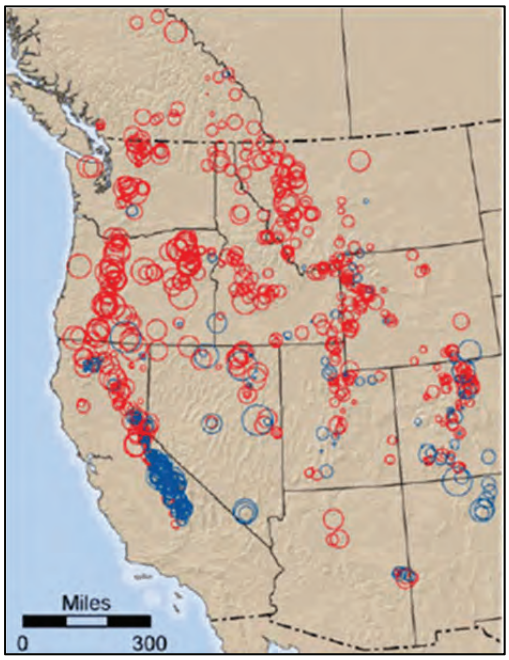
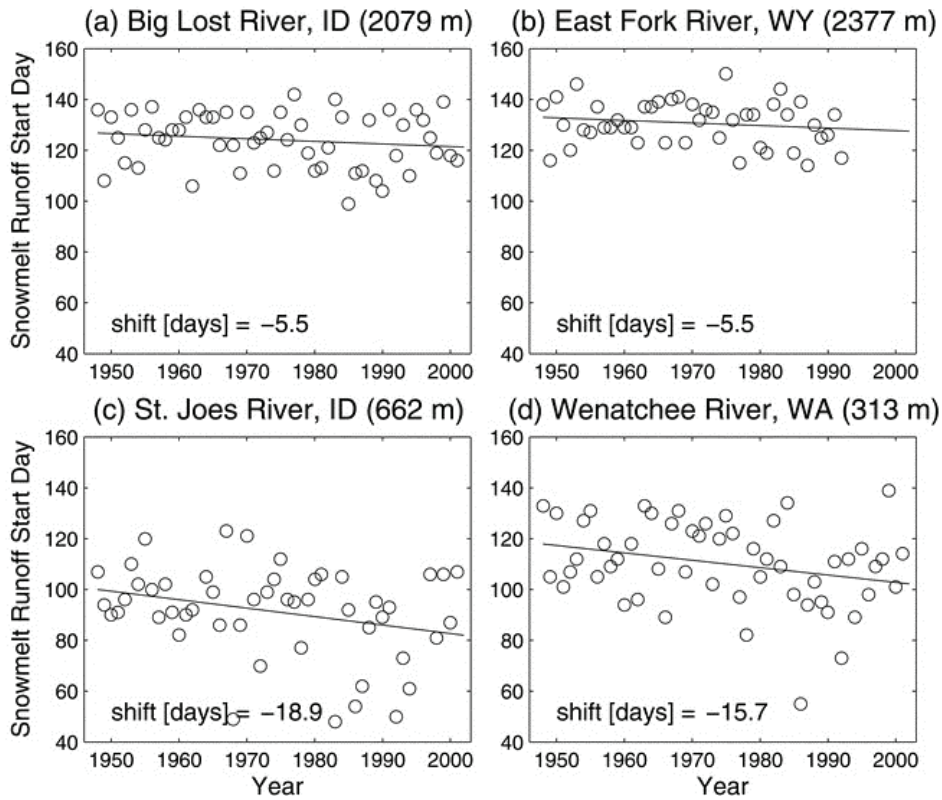


Figure 3-4. Trends in April 1 Snow Water Equivalent in the Western United States from 1950 to 1997
Source: Mote et al. (2005).
Red (blue) circles indicate decreasing (increasing) snow water equivalent, with the size of the symbol indicating the magnitude of the trend.

Streamflow Changes: The decrease in spring snowpack and earlier snowmelt has led to a change in streamflow in many systems, including earlier spring runoff peaks, increased winter streamflow, and reduced summer and fall streamflows. Stewart et al. (2005) examined 302 streamflow gages in the western United States and reported that the timing of winter runoff and annual streamflow had advanced by one to four weeks from 1948 to 2002. The degree of change depends on the location and elevation of the specific river basin. Basins located significantly above freezing levels have been much less affected by warmer temperatures than those located at lower elevations (Figure 3-5). River basins whose average winter temperatures are close to freezing are the most sensitive to climate change, as is apparent from the dramatic shifts in streamflow timing that have resulted from relatively small increases in wintertime temperatures. The advance in streamflow timing also results in decreased summer and fall base flows, at precisely the time when streamflow is needed most. In addition, warmer temperatures have lengthened the growing season (defined as the time between the last frost of spring and the first frost of fall) in the western United States by an average of about 10 to 15 days. Warmer temperatures and longer growing seasons increase water requirements for evapotranspiration, hydropower, and irrigation, resulting in potential water supply shortages and conflicts.

Figure 3-5. Observed Spring Pulse of Snowmelt-generated Streamflow for Two High (a and b) and Two Mid-elevation (c and d) Pacific Northwest Streams, Illustrating the Much Greater Advance in Timing in the Mid-elevation Streams



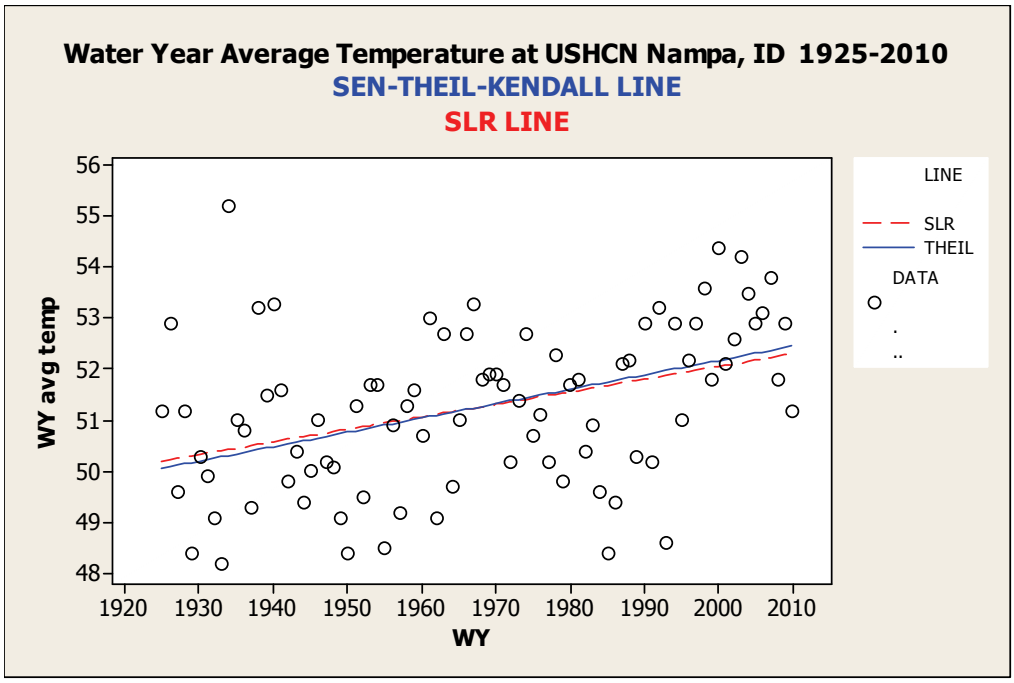
Source: Stewart et al. (2005).

3.1.2.3 Climate Change Indicators and Historical Trends at Deer Flat NWR

There has been a statistically significant increase of 2.4˚F ($p<0.000$) in average annual temperature from 1925 to 2010 at the USHCN Nampa, Idaho station (Figure 3-6). This is greater than the average for the Pacific Northwest (Mote et al. 2005). Trends in monthly temperatures at Nampa over the same period vary from month to month. January and March monthly temperatures have increased about twice as much as annual temperatures. Increases in July, August, and September are also significant. Winter temperatures, particularly in January and March, have been shown by other studies to be increasing significantly across the West (Hamlet and Lettenmaier 2007; Knowles et al. 2006). Such increases are important; warmer winters can cause more precipitation to fall as rain versus snow, resulting in reduced spring snowpack, earlier snowmelt, and changes in streamflow. Warmer summers can lead to increased fire frequency and drought, longer growing seasons, and increased water requirements.

There is no overall trend in precipitation at Nampa for the same period but precipitation has become more variable in recent decades, with alternating multiyear cycles of wet and dry years.

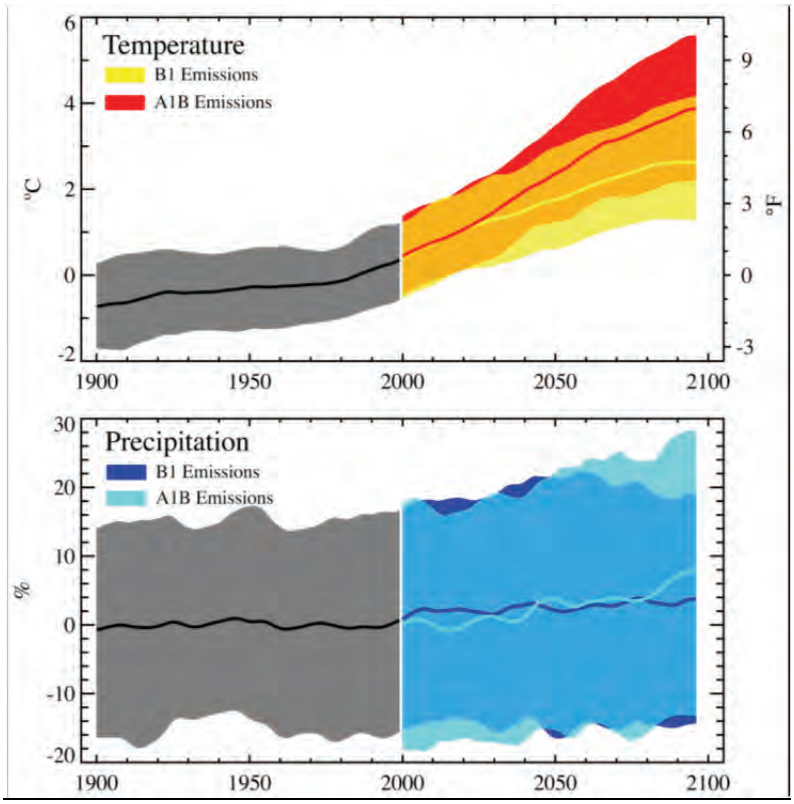
Figure 3-6. Trend in Water Year Average Temperature for Nampa, Idaho, from 1925 to 2010



3.1.2.4 Projecting Climate Change into the Future

Looking toward the future, the University of Washington CIG has projected changes in mean annual temperature and precipitation for the Pacific Northwest, based on several global climate models and two carbon emissions scenarios (Figure 3-7) (Mote and Salathé 2009, 2010). Considering both scenarios, average annual temperature is projected to increase 2.0°F by the decade of the 2020s, 3.2°F by the decade of the 2040s, and 5.3°F by the decade of the 2080s, relative to the 1970-1999 average temperature. The projected changes in average annual temperature are substantially greater than the 1.5°F (0.8°C) increase in average annual temperature observed in the Pacific Northwest during the twentieth century. Seasonally, summer temperatures are projected to increase the most. It should be noted that actual global emissions of GHGs in the past decade have so far exceeded even the highest emissions scenario (the A2 scenario), which was not modeled by CIG. If this trend continues, the temperature increases could actually turn out to be much greater than those projected in Figure 3-7.

Figure 3-7. Simulated Temperature Change (top panel) and Percent Precipitation Change (bottom panel) in the Pacific Northwest from Twentieth and Twenty-first Century Global Climate Model Simulations



Sources: Mote and Salathé (2009, 2010).
The black curve for each panel is the weighted average of all models during the twentieth century. The colored curves are the weighted average of all models in that emissions scenario ("low" or B1, and "medium" or A1B) for the twenty-first century. The colored areas indicate the range (5th to 95th percentile) for each year in the twenty-first century. All changes are relative to 1970-1999 averages.

The CIG also performed projections using two regional climate models (Salathé et al. 2010), versus ensembles of global climate models as described above. Regional climate models provide the advantage of accounting for local geographic features and their effect on regional climate patterns, such as the strong influence of the Cascade Mountain Range. The results of these models confirm the warming increases described above, with variations—both slightly higher and slightly lower.

Projected changes in mean annual precipitation are less clear (Figure 3-7). The projected trends are very small relative to the inter-annual variability in precipitation. Seasonally, precipitation is projected by Mote and Salathé (2009, 2010) to decrease in summer and increase in autumn and winter by most climate models, although the average shifts are small. However, even small changes in seasonal precipitation could have impacts on streamflow flooding, summer water demand, drought stress, and forest fire frequency. Salathé et al. (2010) projected wetter autumns and drier or stable summers. But the regional models vary whether winter and spring seasons will turn wetter or drier.

In addition to changes in the amount of precipitation, a major concern in the Pacific Northwest is the change in the form of winter precipitation expected due to warmer temperatures. CIG has modeled changes in the current and future peak snowpack versus October-to-March precipitation for

watersheds in the Columbia Basin area, including basins surrounding the Snake River Plain. Generally, there is a large shift in the form of winter precipitation from snow to rain, with basins in the Lower Snake River Plain affected before those in the Upper Snake River Plain, because of the lower basin elevations in this area. As these changes occur, there will likely be a tendency for higher winter flows and possible increased flooding risk, earlier snowmelt and runoff peaks, and lower summer streamflows.

Casola et al. (2009) evaluated the impact of global warming upon Pacific Northwest snowpack using the Cascades portion of the Puget Sound drainage basin as an example that can be extrapolated for the region. They evaluated four analytical and modeling methods to determine the temperature sensitivity of snowpack: (1) simple geometric considerations, (2) regression of April 1 snow water equivalent measurements upon seasonal mean temperature, (3) a hydrological model forced with historical daily temperature and precipitation data, and (4) a simple analysis of inferred accumulated snowfall. The researchers concluded that a 20 percent reduction in snowpack (mean April 1 snow water equivalent) occurs for each degree Celsius of warming (1.8°F) in the absence of indirect effects, and a 16 percent reduction occurs taking into account a projected warming-induced increase in precipitation.

Considering projected warming scenarios (as described above [Mote and Salathé 2009, 2010]), Table 3-3 shows the decrease in snowpack using the analysis by Casola et al. (2009).

Table 3-3. Projected Decrease in Snowpack

Average Annual Temperature Projected Increase (relative to the 1970-1999 average temperature)	Projected Decrease in Snowpack (taking into account a projected warming-induced increase in precipitation)
2.0°F by the decade of the 2020s	18% decrease in snowpack by 2020s
3.2°F by the decade of the 2040s	28% decrease in snowpack by 2020s
5.3°F by the decade of the 2080s	47% decrease in snowpack by 2020s

This loss of snowpack is especially the case for the most vulnerable, lower-elevation snowfields. Spring snowpack is a good indicator for summertime flows in most watersheds, and these snowpack loss projections therefore foretell strong negative impacts to the region's overall water resources. In many watersheds in the Pacific Northwest, snowfields act as reservoirs that collect fresh water during the wetter winter months and release this water during the drier summer months, effectively distributing water more equitably across the seasons. Loss of snowpack would disrupt this cycle, vastly altering streams with hydrologies that are largely determined by snowpack runoff and/or groundwater input.

3.2 Hydrology

The major surface waters within the Deer Flat NWR planning area are Lake Lowell and the Snake River. The entire upland area of the Lake Lowell Unit drains into the lake, and all of the Refuge islands drain directly to the river. The two surface-water features are described below.

3.2.1 Lake Lowell

Lake Lowell is an off-stream storage reservoir within Reclamation's Boise Project Arrowrock Division (Ferrari 1995; IDEQ 2010; Reclamation 2011). It is formed by three earth-fill embankments and one dike that hold water in a natural topographic depression: Deer Flat Upper Dam, Deer Flat

Middle Dam, Deer Flat Lower Dam, and Deer Flat East Dike (Ferrari 1995; IDEQ 2010; Reclamation 2011; Simonds 1997). Construction of these embankments took place from 1906 through 1911(Ferrari 1995), with closure and first storage occurring in 1909 (pers. comm., S. Dunn 2012). IDEQ (2010) describes the tributaries contributing to the lake as consisting of: New York Canal, Ridenbaugh Canal, Highline Canal, two canal wasteways, six named agricultural drains, and many unnamed drains that discharge to the lake (IDEQ 2010). However, Ridenbaugh Canal and Garland Drain actually flow into New York Canal before it enters Lake Lowell, and Highline Canal flows into the lake through the two canal wasteways. Table 3-4 describes the average annual inflows to Lake Lowell.

Table 3-4. Average Annual Measured Inflows to Lake Lowell

Lake Lowell Tributary	Average Annual Inflow (acre-feet)
New York Canal (including Ridenbaugh Canal and Garland Drain)	180,000
Deer Flat Highline Wasteway #1	1,800
Deer Flat Highline Wasteway #3	20,000
Coulee Drain	1,900
Bernard Drain	1,200
Garner Drain	400
Donaldson Drain	900
Farner Drain	1,800
Other minor unmonitored drains	5,900
Total	**213,900**

Source: IDEQ (2010).

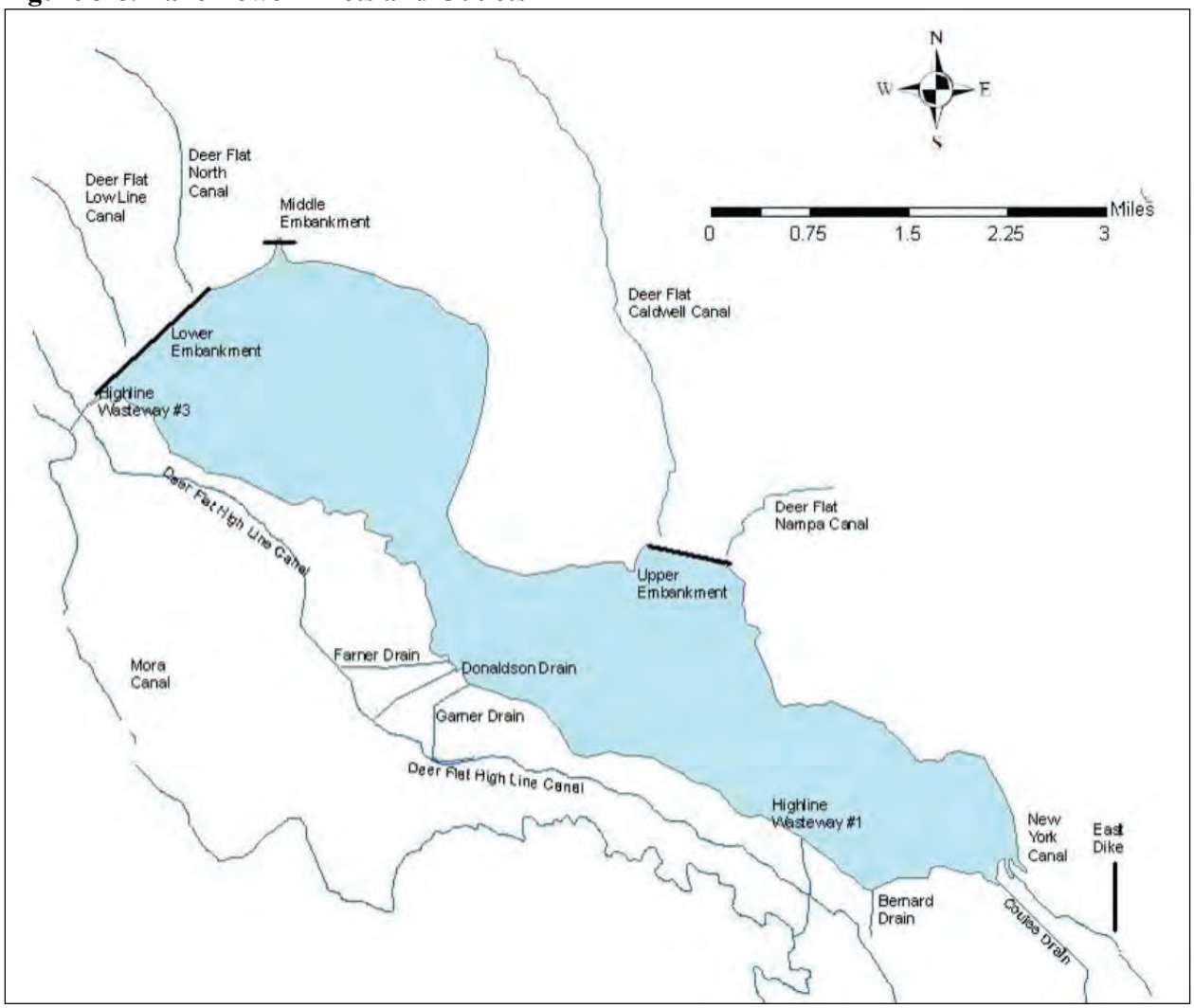
Outlets from the lake at the Deer Flat Lower Dam feed the Deer Flat North Canal and the Deer Flat Lowline Canal and outlets from the Deer Flat Upper Dam feed the Deer Flat Caldwell Canal and Deer Flat Nampa Canal (IDEQ 2010). The Blinkenstaff pumps, located near Deer Flat Highline Wasteway Number 3, lift lake water to the Mora Canal (IDEQ 2010). Approximately 3,200 acre-feet of water is also lost from the lake through evaporation and groundwater infiltration. Table 3-5 describes the average annual outflows from the lake. Lake Lowell inlets and outlets are shown in Figure 3-8.

Table 3-5. Average Annual Measured Outflows from Lake Lowell

Lake Lowell Tributary	Average Annual Inflow (acre-feet)
Deer Flat Lowline Canal	203,000
Deer Flat Caldwell Canal	2,900
Deer Flat Nampa Canal	3,600
Blinkenstaff pumps	1,200
Total	**210,700**

Source: IDEQ (2010).

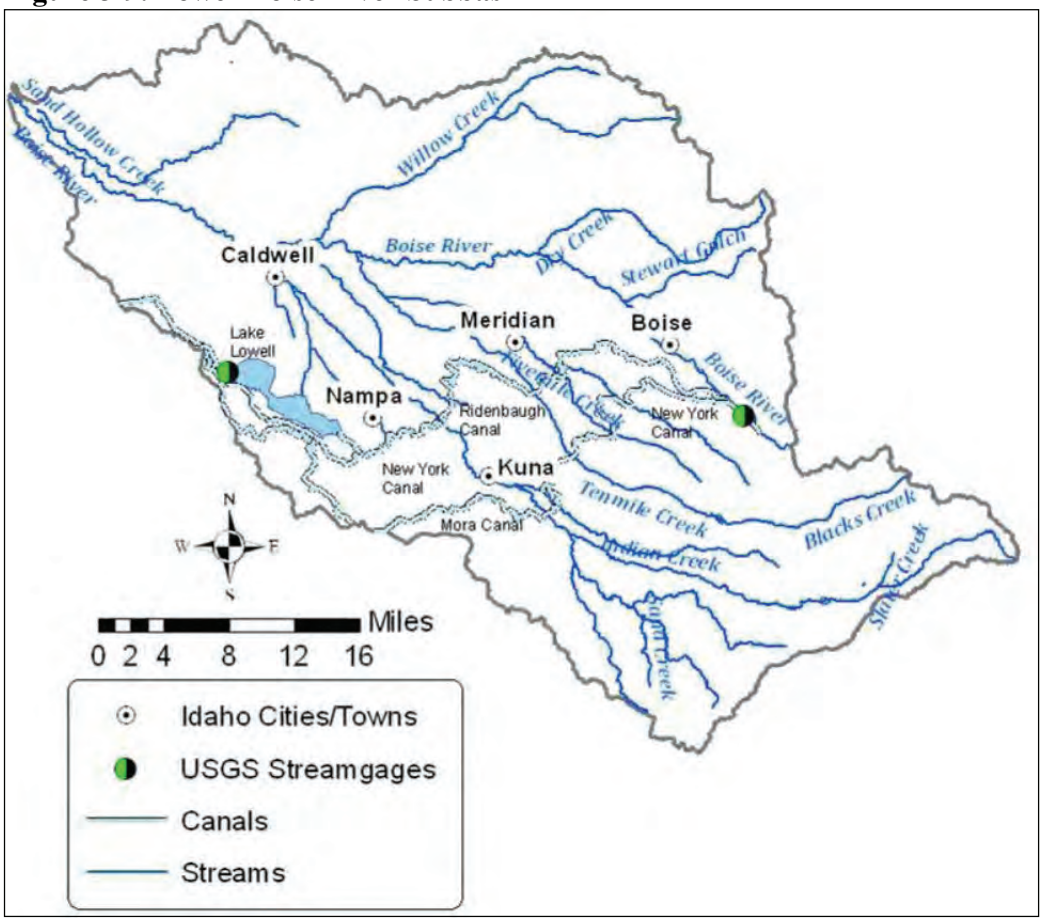
Figure 3-8. Lake Lowell Inlets and Outlets



Source: IDEQ (2010).

The Lake Lowell watershed covers approximately 63.5 square miles of the Lower Boise River Subbasin within Ada and Canyon counties (IDEQ 2010). During the nonirrigation season, Lake Lowell is primarily filled by water diverted at the Boise River Diversion Dam and conveyed to the lake via the 40-mile-long New York Canal, which discharges into the eastern (upper) end of the lake (Reclamation 2011). Ridenbaugh Canal is also diverted off the Boise River and flows through the densely populated areas of Boise, Meridian, and southeast Nampa before joining the New York Canal just before it flows into Lake Lowell (IDEQ 2010). Other water inputs to the lake via the New York Canal include stormwater from surrounding population centers and agricultural runoff from lands in southern Ada and Canyon counties as well as septic system inputs and groundwater (IDEQ 2010). Stream gages maintained by the U.S. Geological Survey (USGS) monitor the flow directed to Lake Lowell as well as the reservoir storage levels (IDEQ 2010). Figure 3-9 shows the Lower Boise River Subbasin and inlets to Lake Lowell.

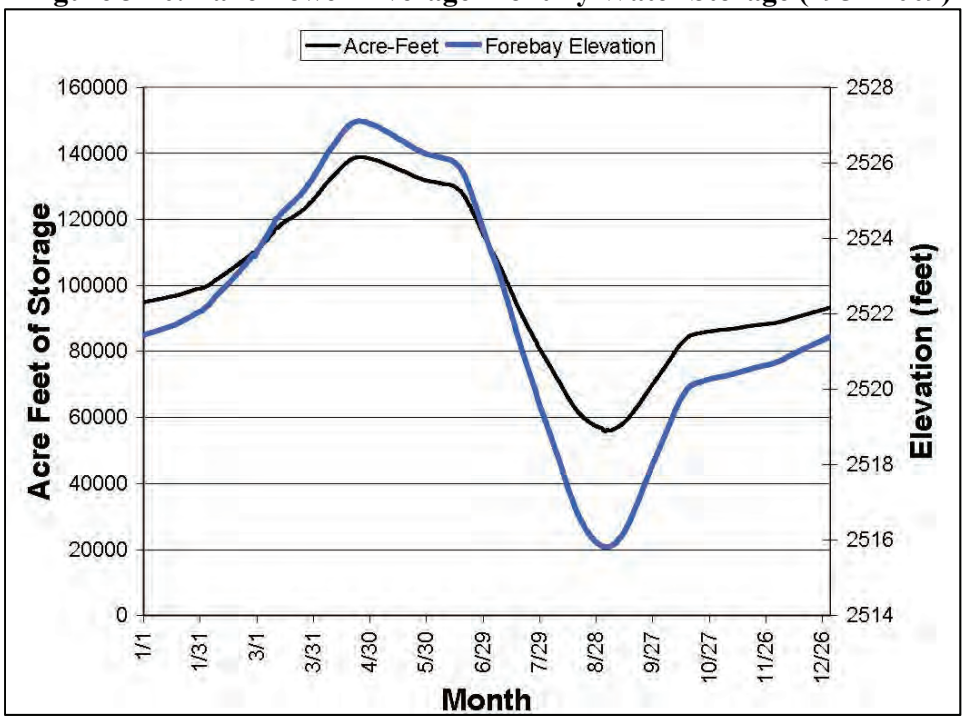
Figure 3-9. Lower Boise River Subbasin



Source: IDEQ (2010).

Lake Lowell is managed first for irrigation purposes. The irrigation season is from March 15 to October 15 (IDEQ 2010). The water stored in the lake irrigates 302,264 acres of land in the Snake and Boise River Basins throughout the summer (IDEQ 2010). Water storage in the lake declines rapidly from late June through August as the irrigation releases exceed inflow from the New York Canal (IDEQ 2010). The lowest water levels are generally reached in late August or early September, exposing mudflats around the shallower portions of the lake; levels rise again in the fall as irrigation demands subside and the New York Canal continues to flow (IDEQ 2010). Figure 3-10 provides a graph of the annual average water levels by month. Map 7 shows average low and average high water levels at Lake Lowell.

Figure 3-10. Lake Lowell Average Monthly Water Storage (1954-2009)



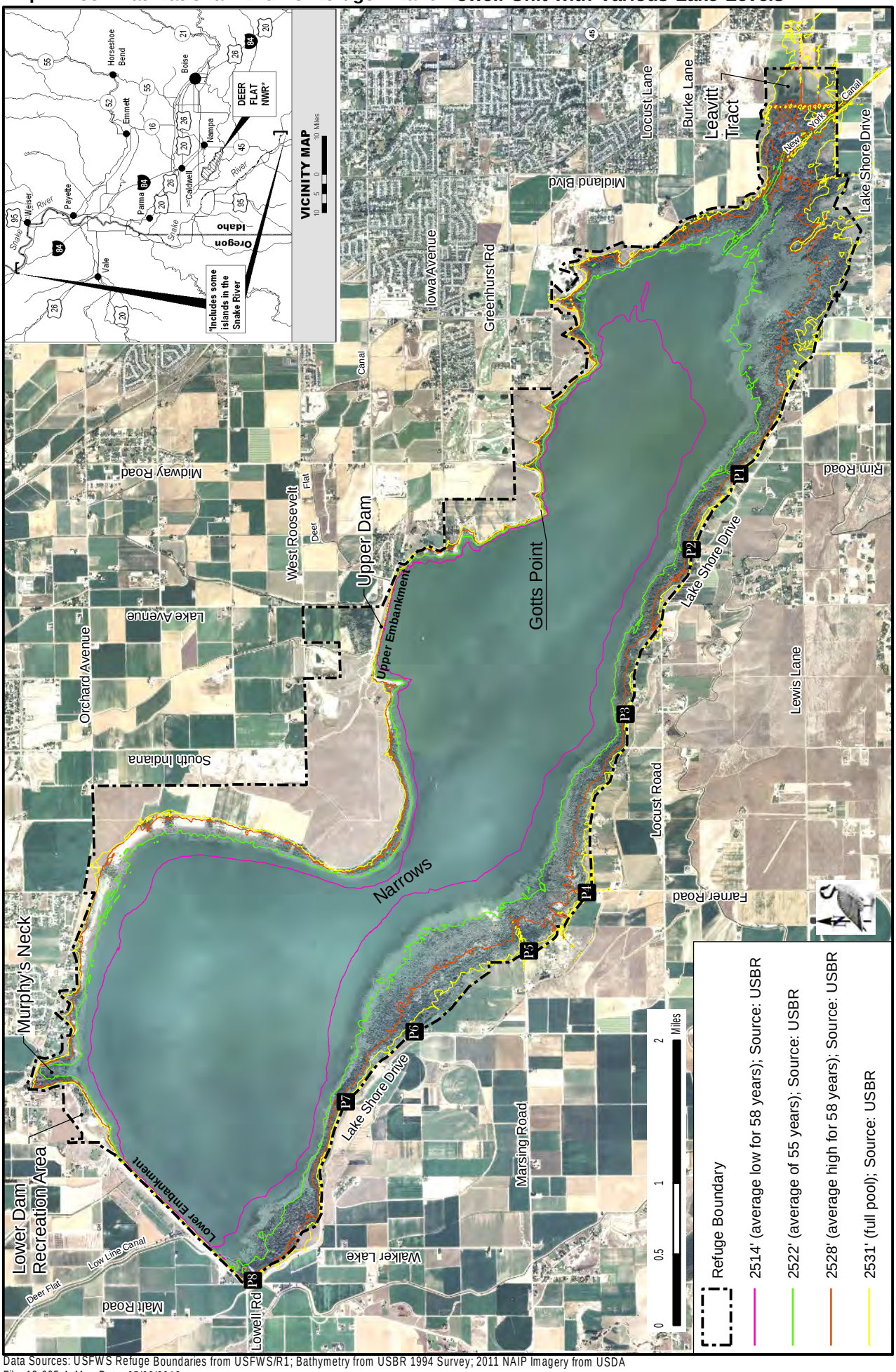
Source: IDEQ (2010).

There are three important elevation ranges for irrigation and reservoir operations (Ferrari 1995):

- 159,365 acre-feet of active capacity, or active irrigation conservation storage, occurs between elevations of 2,504 and 2,531 feet;
- 5,823 acre-feet of inactive storage of water between elevations of 2,501 and 2,504 feet; and
- 7,855 acre-feet of dead storage of water below 2,501 feet in elevation.

Active irrigation conservation storage refers to the water that will be available for gravity-fed irrigation through the four outflow canals. The inactive storage water cannot be gravity fed; it must be pumped out to the irrigation canal system. Dead storage water is not available for irrigation purposes; it provides for sediment settling, fish habitat during low water levels, and a hydraulic head for the upper layers of water storage. A detailed account of the canal's inflows and outflows can be found in the Lower Boise River Subbasin Assessment and TMDLs (IDEQ 2010). Table 3-6 describes the various areas and capacities of Lake Lowell. The hydrologic operations of the lake affect the quality and quantity of Refuge habitats, which are discussed in more detail in Chapter 4.

Map 7 Deer Flat National Wildlife Refuge - Lake Lowell Unit with Various Lake Levels



Data Sources: USFWS Refuge Boundaries from USFWS/R1; Bathymetry from USBR 1994 Survey; 2011 NAIP Imagery from USDA
File: 12-005-4 Map Date: 05/09/2012

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Table 3-6. Lake Lowell Area and Capacity

Lake Lowell Reservoir Parameter	Measurement
Maximum water surface elevation	2,531.2 feet
Surface area (at full pool)	9,024.8 acres
Total capacity	173,043 acre-feet
Active capacity	159,365 acre-feet
Length of reservoir at full pool	9.2 miles
Average width of reservoir at full pool	0.65 mile

Source: IDEQ (2010).

Depending on the storage level in Lake Lowell, the lake will gain or lose water from or to local groundwater. During periods of high storage volume (December to June), Lake Lowell loses water to groundwater, and during low lake water level periods (July to October), groundwater flows into the lake (IDEQ 2010). On average, the lake gains 3,750 acre-feet of water volume annually from groundwater (IDEQ 2010).

Water rights affecting Lake Lowell are managed by Idaho Department of Water Resources (IDWR), Water District 63 (Boise District). Water rights are authorizations to use water in a prescribed manner and not ownership of the water. The Refuge holds three water rights. Table 3-7 provides details of the Refuge's water rights.

Table 3-7. Deer Flat Refuge Water Rights

Water Right No.	Source	Beneficial Use	From	To	Diversion Rate (cfs)	Volume (afa)	Diversion Location	Place of Use/ Total Acres
63-2898	Groundwater	Irrigation	March 1	November 15	1	315	T3N R3W Sec. 36 NWSE	70
63-2997	Groundwater	Irrigation	March 1	November 15	1.12	495	T3N R3W Sec. 27 NWNE	110
63-7594	Groundwater	Domestic	January 1	December 31	0.09	1.5	T3N R3W Sec. 35 NENW	Refuge office and visitor center

cfs: cubic feet per second. afa: acre-feet per annum. *Source:* IDWR (2011).

3.2.2 Snake River

The source of the Snake River is in the Rocky Mountains of Wyoming. The river flows for 1,040 miles and drains approximately 108,000 square miles before it discharges into the Columbia River (Krammerer 1990). The elevation at its source is 8,927 feet above mean sea level (MSL); the river elevation drops over its course to 358 feet above MSL at its mouth near Burbank, Washington. The Snake River Islands Unit of the Refuge is contained within the Middle Snake River, between river miles (RMs) 335 and 448. The Middle Snake Subbasin consists of the Snake River and all the lands that drain to it from Shoshone Falls to Hells Canyon Dam (Ecovista and IDFG 2004).

Major tributaries to the Middle Snake River include the Malheur, Owyhee, Boise, Payette, Weiser, Powder, Burnt, and Bruneau Rivers. The subbasin drains approximately 8.3 million acres and includes 367 miles of the Snake River mainstem as well as many small tributaries (Ecovista and IDFG 2004). The majority of the Middle Snake Subbasin (82 percent) is located in southern Idaho, with the remainder in small portions of Oregon and Nevada (Ecovista and IDFG 2004). Much of the portion of the river that contains the Snake River Islands Unit forms the border between Idaho and Oregon.

Streamflows in the spring and early summer in the Snake River are driven by snowmelt and runoff from areas where precipitation falls in the form of snow (Ecovista and IDFG 2004). The Middle Snake River is one of the most regulated portions of the Snake River, with much of the annual flow diverted for irrigation. There are many storage and run-of-the-river dam facilities located along the Middle Snake River, but there are no facilities within the portion of the river containing the Refuge islands (U.S. Army Corps of Engineers 2010). The first facility upstream of the Refuge islands is the Swan Falls Dam, a hydroelectric dam, and the first facility downstream of the Refuge islands is the Brownlee Dam, a storage and hydroelectric dam (Ecovista and IDFG 2004). With such a high degree of water regulation, it has been estimated that the late summer and early fall flows downstream of the Snake River Islands Unit are typically greater than they were before flow regulation began (IDEQ and Oregon Department of Environmental Quality [ODEQ] 2004).

Typical mean annual flow volumes in the Middle Snake River are between 11,000 and 16,000 cubic feet per second (cfs). The mean daily flow over a 77-year record period (1914-1990) at the Murphy gage, near Swan Falls Dam, was 11,159 cfs with mean annual minimum flow of 6,427 cfs (Dixon and Johnson 1999). At approximate RM 351 near Weiser, Idaho, the river flow volume averages 15,700 cfs (IDEQ and ODEQ 2004). Pre-dam flow volumes are not available because construction of the dams was completed in 1911, prior to installation of stream gages. Anomalies to these typical volumes were experienced in the early 1990s. Zoellick et al. (2004a, 2004b) studied Snake River flows between RMs 409 and 449 from 1990 through 1992 to identify the level of island isolation in relation to flows and rates of mammalian predation on waterfowl nests. They describe 1992 Snake River flows in the upper 40 RMs of the Snake River Islands Unit as being the lowest on record since the river was first gaged in 1914. Average daily flows during March, April, and May (Canada goose nesting season) in 1992 were only 5,898 cfs. Conversely, the average during the same season from 1937 through 1992 was 11,689 cfs (Zoellick et al. 2004a, 2004b). Dixon and Johnson (1999) describe similar flow anomalies during their 1990 fieldwork season as compared to the previous 25-year flow history. Table 3-8 provides mean monthly flow volumes for the Murphy and Weiser gages.

Table 3-8. Mean Monthly Discharge Volumes for the Snake River at the Upstream and Downstream Extents of the Snake River Islands Unit

Gage Location (Period of Record)	Mean Discharge (cfs)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Murphy (1913-2010)	11,300	11,500	11,900	13,100	12,700	12,500	7,880	7,310	8,330	10,300	11,000	11,100
Weiser (1910-2010)	16,200	18,300	22,000	26,900	27,600	25,100	11,800	9,760	11,500	13,900	14,700	15,300

cfs: cubic feet per second. *Source:* USGS (2011).

3.3 Topography and Bathymetry

The Deer Flat NWR units are situated in the Middle Snake Subbasin. The Middle Snake Subbasin lies in the Snake River Plain and is surrounded by several mountain ranges: Jarbidge and Owyhee Mountains to the southwest, Boulder Mountains and the Sawtooth Range in the northeast, and the Seven Devils and Wallowa Mountains surrounding the northwestern areas of the subbasin (Ecovista and IDFG 2004). The highest elevation in the subbasin is 11,817 feet and occurs in the Boulder Mountains; the lowest elevation (1,568 feet) is at Hells Canyon Reservoir (Ecovista and IDFG 2004).

3.3.1 Lake Lowell Unit

The Lake Lowell Unit of Deer Flat NWR is situated on a plateau between the Snake River and Boise River (IDEQ 2010). The lake itself was constructed in a natural depression in the Lower Boise River Valley (IDEQ 2010). Its shoreline sits at 2,531 feet above MSL at full pool, 300 feet lower in elevation than the origin of the New York Canal (IDEQ 2010). The Deer Flat Upper Dam is 74 feet high with a crest elevation of 2,539.2 feet (±0.2 feet). The Deer Flat Lower Dam is 46 feet high with a crest elevation of 2,539.3 feet (±1.6 feet). The Deer Flat Middle Dam is 16 feet high with a crest elevation of 2,536.0 feet (±0.1 feet) (Ferrari 1995). The crest of the Middle Dam is lower than that of the Upper and Lower Embankments and serves as an emergency spillway (IDEQ 2010). The highest upland areas within the Refuge boundary at Lake Lowell sit at approximately 2,640 feet above MSL (USGS 1971a).

Lake Lowell is 14.5 square miles in surface area, has 28 miles of shoreline, and covers approximately 9,000 surface acres at full pool (IDEQ 2010). Much of the lake is fringed with riparian habitat and mudflats that are pronounced at low-pool elevation levels (IDEQ 2010). The maximum water surface elevation of the lake is 2,531 feet above MSL (IDEQ 2010). The deepest part of the lake is 2,483.6 feet above MSL, just in front of the Upper Dam headwall (Ferrari 1995). The other deep spot of the lake is just in front of the Lower Dam headwall, at 2,501 feet above MSL (Ferrari 1995). At full pool, these areas are approximately 47 and 30 feet deep, respectively.

In general, the bathymetric map created as a result of the 1994 reservoir survey effort (Ferrari 1995) shows that the banks along the northern portion of the lake are more steeply sloped than those along the southern shoreline. The east end of the lakebed is shallow with a broad, gentle slope (Ferrari 1995). The large pool at the western end of the lake, in front of the Lower Dam, has a deeper lakebed that is also broad and relatively flat (Ferrari 1995).

3.3.2 Snake River Islands Unit

A review of the USGS 7.5-minute series of topographic maps in which the Refuge islands are located indicates the topographic relief of the Refuge islands above the waterline varies from just a few feet to as much as 20 feet; the vast majority of the islands have 10 feet or less of relief (USGS 1951, 1952, 1967, 1968, 1971b, 1971c, 1971d, 1974a, 1974b, 1974c, 1975, 1992a, 1992b, 1992c, 1992d). Although the Snake River falls 7,000 feet over its entire length (IDEQ and ODEQ 2004), it only loses 140 feet of elevation over the course of its flow within the Snake River Islands Unit. The topography of the river path drops from approximately 2,260 feet above MSL at RM 448 (USGS 1992d) to approximately 2,120 feet above MSL at RM 335 (USGS 1974a).

3.4 Geology and Geomorphology

3.4.1 Lake Lowell Unit

The Lake Lowell Unit is located within a large alluvial-filled basin that is underlain by hundreds of meters of unconsolidated to slightly consolidated sediments (IDEQ 2010). The majority of the sediments are fluvial but some are lacustrine in origin (IDEQ 2010). Outcropping in some areas near the lake are composed of the Ten-Mile Gravel formation, described as being as much as a 152-m (500-foot) layer of poorly consolidated silt, sand, gravel, and cobbles; scattered, thin deposits of sand, gravel, and windblown silt cover the thick layer of sediments (IDEQ 2010). Geologically, the

vast majority of the area draining to Lake Lowell consists of detritus deposited by the action of water during the Pleistocene epoch (1.8 million to 10,000 years ago). The soils types that dominate the area draining to Lake Lowell are moderately erosive. Soils are discussed in detail in the following section.

3.4.2 Snake River Islands Unit

The Snake River Islands Unit is located within the western Snake River Plain. The river flows through a major hydrologic and topographic transition between the eastern and western Snake River Plains, which are divided near King Hill, Idaho (Ecovista and IDFG 2004). Groundwater permeability and transmissivity are quite high in the eastern plain and fairly low in the western plain (Ecovista and IDFG 2004). The western plain is 30 to 43 miles wide and trends northwest; it is far lower in elevation than is the eastern plain (Ecovista and IDFG 2004). The Snake River Islands Unit sits within a fault-bound basin with the land surface and rock layers dipping toward the axis of the plain (Ecovista and IDFG 2004). The western plain is filled with lacustrine and fluviatile sedimentary deposits that are interbedded with basalt (Ecovista and IDFG 2004). For most of its course in the Snake River Plain, the river is deeply incised in the sedimentary deposits (O'Connor 1993). Two significant geologic flood events that have made marked impacts on the geomorphology of the Snake River and the Snake River Plain are described below. The Lake Idaho and the Lake Bonneville geologic flood events are not only responsible for the course and character of the Snake River itself but also for features such as the depression in which Lake Lowell was developed.

3.4.2.1 Lake Idaho

The present course and character of the Snake River in the Snake River Plain are the result of the integration of the Snake River and Columbia River drainages (O'Connor 1993). Until about 1.5 million years ago, the Snake River Plain was isolated from the Columbia River Basin. At that time, Lake Idaho sat behind a lava flow that dammed the Snake River at the narrows of Hells Canyon and backed up the river to Twin Falls, Idaho (Orr and Orr 1996). Lake Idaho eventually cut through the lava flow dam at what is now Hells Canyon and eventually drained Lake Idaho, creating a free-flowing river; once the Snake and Columbia River Basins were connected, the Snake River and its tributaries began to cut their current valleys (Malde 1991; Wood and Clemens 2002). Prior to the integration of these two river drainages, the western Snake River Plain was a depositional center characterized by low-energy fluvial and lacustrine environments (Malde 1991). The remnants of Lake Idaho are evident in the lake sediment and playa lithologies above Hells Canyon Dam (Ecovista and IDFG 2004).

3.4.2.2 Lake Bonneville Flood

More recently, approximately 14,500 years ago, the Lake Bonneville Flood resulted from nearly 1,200 cubic miles of water spilling out of the Great Basin and into the Snake River drainage (O'Connor and Costa 2004). This basin-breach flood occurred when Lake Bonneville (the ice-age predecessor to the Great Salt Lake) overtopped its basin rim at Red Rock Pass, and the spillover caused rapid erosion that further released huge volumes of flow into the Snake River Plain (O'Connor 1993; O'Connor and Costa 2004). The flood entered the Snake River Plain north of Pocatello and followed the vast volcanic plain westward for about 370 miles before turning north and entering Hells Canyon (O'Connor 1993). The Snake River is the primary topographic feature on the plain, and its canyons and valleys were the major conduit for the floodwaters (O'Connor 1993). The sustained peak discharge of about 1 million cfs filled a canyon that was 328 feet deep and overflowed onto the basalt uplands of the Snake River Plain (O'Connor and Costa 2004).

3.5 Soils

3.5.1 Lake Lowell Unit

The *Soil Survey of Canyon Area, Idaho* (Priest et al. 1972) describes the soils surrounding Lake Lowell as primarily consisting of a mix of Vickery and Marsing soils with lesser areas of Scism, Purdam, Power-Purdam, and Bram soils (Map 8). Some of the areas on the Refuge lands immediately surrounding Lake Lowell are mapped as Marsh and the lake itself, of course, is mapped as Water. With the exception of the Bram soils, which are somewhat poorly drained, the soils mapped on the Lake Lowell Unit are well drained. According to the soil survey, typical vegetation in the Canyon County area consists mainly of big sagebrush, bluebunch wheatgrass, Sandberg's bluegrass, giant wildrye, and cheatgrass. About 85 percent of the county is used for irrigated crops or improved pasture, and the principal crops are irrigated small grains, corn, sugar beets, and alfalfa (Priest et al. 1972). The soils surrounding the Refuge, and to a lesser extent, on the Refuge, have been affected by agriculture. They have been irrigated under artificial hydrology patterns and altered through the typical soil-turning activities associated with agriculture.

The area surrounding upper Lake Lowell (the east pool) consists primarily of soils in the Vickery and Marsing series: Vickery-Marsing silt loams, 1 to 3 percent slopes (Map Unit VmB) and Vickery-Marsing silt loams, 3 to 7 percent slopes (Map Unit VmC) (Priest et al. 1972). Small areas of Purdam silt loam, 1 to 3 percent slope (Map Unit PrB), which occurs in old stream terraces, are also mapped in the upper lake area (Priest et al. 1972). In addition to areas of Vickery-Marsing silt loams, the Refuge uplands north of middle Lake Lowell are also characterized by areas of Scism silt loam (Map Units ScB [1 to 3 percent slopes] and ScC [3 to 7 percent slopes]). The erosion hazard from irrigation water in the 1 to 3 percent slope unit is slight to moderate, and in the 3 to 7 percent slope unit it is severe (Priest et al. 1972). Lower Lake Lowell (the west pool) is also surrounded by a great deal of Vickery-Marsing silt loam, especially to the immediate northeast. In addition, there is a mix of Power-Purdam silt loams (Map Units PpA and PpB), Purdam (Map Unit PrB), and Purdam-Sebree silt loam (Map Unit PtB) to the north and a small area of Bram silt loam (Map Unit BrA) in the most northwestern area of the Refuge surrounding the lake.

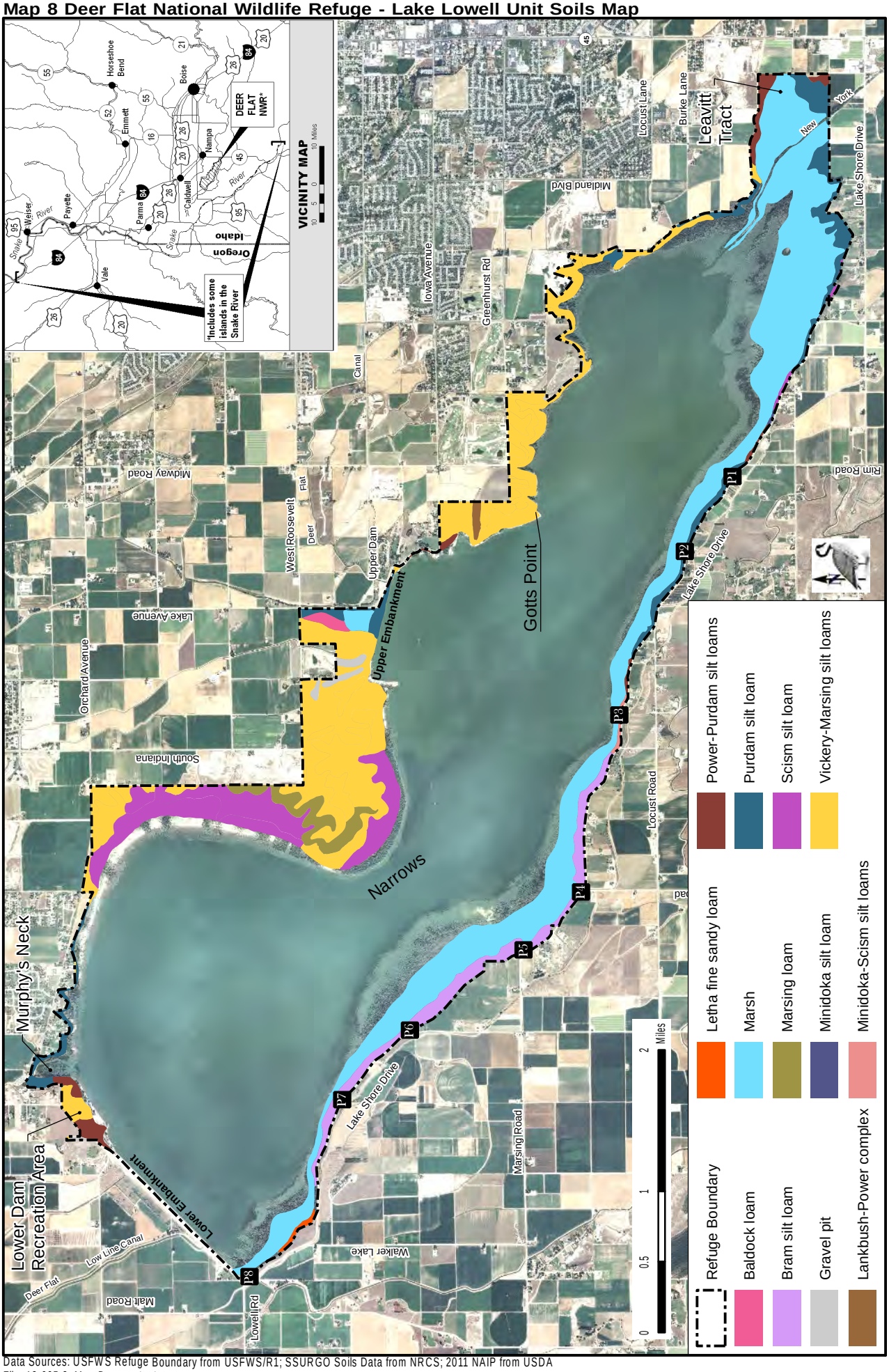
Table 3-9 lists the soil types mapped in the Lake Lowell Unit and the characteristics of the upper layers (i.e., the root zone for vegetation growth).

Table 3-9. Soil Series Mapped in the Lake Lowell Unit and Characteristics of Upper Soil Layers

Soil Series	Typical Root Zone Soil Profile of Soil Series	Soil Formation	Typical Native Vegetation
Marsing series	• 0 to 9 inches: loam; very fine, granular structure; friable • 9 to 23 inches: loam; hard; friable; calcareous	Formed in alluvium derived from quartzic, basaltic, and rhyolitic materials; moderately deep soils over sand and gravel	Big sagebrush and shadscale
Power series	• 0 to 9 inches: silt loam; very fine to medium coarse, granular to blocky structure; friable • 9 to 12 inches: silty clay loam; prismatic structure; noncalcareous • 12 to 21 inches: silt loam; blocky structure; moderately calcareous	Formed in loess or loesslike alluvium derived mainly from granitic and other acid igneous rock material	Bluebunch wheatgrass, Sandberg's bluegrass, big sagebrush, and forbs
Purdam series	• 0 to 10 inches: silt loam; fine to medium, granular to blocky structure; slightly hard and friable • 10 to 13 inches: silty clay loam; blocky structure; noncalcareous • 13 to 24 inches: silt loam; blocky structure; slightly calcareous	Formed in moderately deep loess mantle over medium-textured or moderately coarse textured alluvium or lacustrine sediments derived mainly from acid igneous rock	Bluebunch wheatgrass, Sandberg's bluegrass, and big sagebrush
Scism series	• 0 to 8 inches: silt loam; very fine, granular structure; very friable; calcareous • 8 to 21 inches: silt loam; massive structure; slightly hard, very friable; strongly calcareous • 21 to 30 inches: light silt loam; massive structure; hard, very friable; strongly calcareous	Formed in light silty loess or loesslike alluvium derived from calcareous mixed minerals	Big sagebrush, wild mustard, and Sandberg's bluegrass
Sebree series	• 0 to 1 inch: silt loam; massive structure; soft, very friable • 1 to 3 inches: silty clay loam; very fine prismatic to very fine, angular, blocky structure; hard; noncalcareous • 3 to 11 inches: silty clay loam; very fine and fine to moderate, subangular blocky structure; hard; noncalcareous	Formed mainly in a thin layer of wind-laid silts underlain by unconsolidated or very weakly consolidated sediments	Medusahead wildrye and annual weeds
Vickery series	• 0 to 4 inches: silt loam; moderate, thin, and very thin platy structure; slightly hard; friable; noncalcareous • 4 to 7 inches: silt loam; medium and coarse, subangular blocky structure; slightly hard; friable • 7 to 13 inches: heavy silt loam; medium and coarse prismatic structure; slightly hard; friable; noncalcareous • 13 to 23 inches: silt loam; coarse prismatic to medium, subangular blocky structure; slightly hard; friable	Formed in a thin mantle of wind-laid silt deposited over unconsolidated sediments high in quartz, feldspar, and mica content	Bunchgrasses, big sagebrush, and herbaceous plants

Source: Priest et al. (1972).

Map 8 Deer Flat National Wildlife Refuge - Lake Lowell Unit Soils Map



Data Sources: USFWS Refuge Boundary from USFWS/R1; SSURGO Soils Data from NRCS; 2011 NAIP from USDA
File: 12-005-3 Map Date: 05/03/2012

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3.5.2 Snake River Islands Unit

Soil types are mapped for the majority of islands in the Snake River Islands Unit, and of the mapped islands, the majority are mapped as Riverwash (Map Unit Re). Riverwash is loose water-washed sand, gravel, cobblestones, and stones and occurs mostly as gravel bars along the Snake River (Lovell 1980; Rasmussen 1976). According to the Canyon County soil survey, Riverwash soils in general support very little plant growth, but when plants are present they typically consist of weeds, willows, sagebrush, and annual grasses; it is generally only suitable as wildlife habitat (Lovell 1980; Rasmussen 1976). The vegetation on Refuge islands differs from the soil survey's characterization of vegetation found on Riverwash soils. Refuge islands contain trees and thick stands of vegetation in many areas, and there are also islands, on which vegetation has been altered by past farming and grazing.

A baseline study conducted along the reach of the middle Snake River containing the Snake River Islands Unit summarizes island vegetation as consisting of approximately 44 percent riparian habitats, 48 percent upland vegetation, and 9 percent agriculture (Dixon and Johnson 1999). The baseline study further concluded that the islands' riparian vegetation is composed of 65 percent riparian shrub, 23 percent dense woodland, and 3 percent herbaceous riparian. Approximately two-thirds of the trees were exotic species, principally Russian olive and tamarisk. Regionally, native species included peachleaf willow and netleaf hackberry (Dixon and Johnson 1999). There are also several other soil types represented among the islands. Table 3-10 lists the soils types and the survey areas in which they are described as well as the drainage class for each. Although the majority of the unit's islands were mapped for soil types in various surveys, none of the islands in Owyhee and Washington counties were mapped for soil types; therefore, other soil types may occur in addition to those included in Table 3-10.

Table 3-10. Soil Types Mapped for the Snake River Islands Unit of Deer Flat NWR

Map Unit Code	Soil Name	Drainage Class
Canyon Area, Idaho		
BdA	Baldock loam, 0 to 1 percent slopes	Somewhat poorly drained
BdB	Baldock loam, 1 to 3 percent slopes	Somewhat poorly drained
BhA	Baldock loam, high water table, 0 to 1 percent slopes	Somewhat poorly drained
BsA	Bram silt loam, saline-alkali, 0 to 1 percent slopes	Somewhat poorly drained
Cu	Cruickshank fine sandy loam	Somewhat poorly drained
FeB	Feltham loamy fine sand, 0 to 3 percent slopes	Somewhat excessively drained
GaB	Garbutt silt loam, 1 to 3 percent slopes	Well drained
MtB	Moulton fine sandy loam, 1 to 3 percent slopes	Somewhat poorly drained
OgA	Oliaga loam, 0 to 1 percent slopes	Somewhat poorly drained
Re	Riverwash	NA
TuB	Turbyfill fine sandy loam, 1 to 3 percent slopes	Well drained
Malheur County, Oregon		
7	Falk variant fine sandy loam	Moderately well drained
8A	Feltham loamy fine sand, 0 to 2 percent slopes	Excessively drained
12A	Garbutt silt loam, 0 to 2 percent slopes	Well drained
20	Notus-Falk variant complex	Moderately well drained
29	Riverwash	NA
33A	Turbyfill fine sandy loam, 0 to 2 percent slopes	Well drained
34	Umapine silt loam	Somewhat poorly drained
Payette County, Idaho		
No	Notus coarse sandy loam	Somewhat poorly drained
Rh	Riverwash	NA

Source: Lovell (1980); Priest et al. (1972); Rasmussen (1976).

3.6 Fire

The Refuge has an approved fire management plan, and much of the information described in this section is captured from that plan. A copy of the complete approved plan can be found in Appendix K. Despite the inclusion of prescribed fire in the approved plan, this method has not been used as a management tool for at least a dozen years because of smoke management concerns, proximity to urban interfaces, and lack of available fire personnel (USFWS 2009a). Mechanical fire suppression treatments have been completed on 1,002 acres of the Lake Lowell Unit during the decade prior to 2009. Treatments included reduction of fire fuels (i.e., invasive tree removal and riparian understory mastication) and fireline discing. No treatments have been implemented on the Snake River Islands Unit during that period.

Because of the arid conditions of this area, fires can occur during almost any month of the year. Most fires on the Refuge occur from June through August; most fires are caused by humans and result from high visitor use. From 1997 to 2007 the Refuge experienced 30 wildfires that burned a total of 320 acres (USFWS 2009a). The majority of the fires occurred in the sagebrush-steppe habitat with a few occurring in the dense riparian area next to Lake Lowell. The two largest fires, CC Lightning and Sage Fires, occurred in 2003 and 2006 and burned 100 and 105 acres, respectively, of sagebrush-steppe habitat (USFWS 2009a). The vast majority of the individual fires recorded during the 10-year reporting period burned less than 10 acres each. Fire frequency on the Refuge has ranged from 16 fires in one year (1977) to a five-year period (from 1951 to 1956) with no fires. The fire management plan in Appendix K includes the complete fire history for the Refuge.

Refuge habitats are heavily infested with cheatgrass, which has greatly increased the natural fire frequency of this sage-steppe community. Invasion by cheatgrass leads to a grass-fire cycle in which cheatgrass promotes large fires that allow further increases in cheatgrass (Baker 2006). Additional discussion of cheatgrass and habitat is contained in Chapter 4, Biological Environment.

3.7 Air Quality

The EPA has established national standards for six “criteria” pollutants: carbon monoxide, ozone, nitrogen dioxide, lead, particulate matter, and sulfur dioxide. The State of Idaho has adopted the EPA standards as state rules. The standards are for the protection of human, plant, and animal welfare and to prevent damage to the natural and built environment. IDEQ is responsible for supervising and administering the state air quality program. EPA and IDEQ also identify and regulate toxic or hazardous air pollution.

The mission of the Service’s Air Quality Program is to protect and enhance air quality in support of ecosystem management in the NWRS. The program’s vision is a Refuge System free of impacts from human-caused air pollution that is consistent with the Refuge System Improvement Act (Public Law 105-57), which requires that “the biological integrity, diversity, and environmental health of the [Refuge] System are maintained” (USFWS 2011b). Contributions to air quality on the Refuge, as well as to the larger Boise region, are likely negligible. Management activities such as prescribed fire are not currently being implemented on the Refuge, and sources of pollutant emissions due to heavy machinery use for habitat management and farming activities are limited.

Deer Flat Refuge is located in the IDEQ Boise Region, which encompasses 10 southwestern Idaho counties, including those in which the Refuge lands are located: Canyon, Owyhee, Payette, and

Washington. Most of the air quality focus in this region is centered on the Treasure Valley, in which much of the Refuge lands are located. The majority of the valley's population and emission sources are concentrated in Ada and Canyon counties; other counties in the region are sparsely populated and have few emission sources (IDEQ 2011a). It is likely that emission sources in eastern Oregon and northern Nevada contribute to the air quality of the Treasure Valley as well.

Topography and weather patterns in the Treasure Valley create some of the most severe wintertime inversions in the Intermountain West, during which pollution accumulates in the colder, denser air that is trapped at the earth's surface beneath a warmer air layer (IDEQ 2011a). It is during these events that the air pollution monitors in the valley have recorded levels above the national ambient air quality standards for both fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}) (IDEQ 2011a). The valley experiences air pollution in the summer months as well when stagnant air conditions, heat, and intense sunlight combine to produce an accumulation of unhealthy levels of ozone (IDEQ 2011a). Monitoring in the IDEQ Boise Region has shown occurrences of unhealthy ozone levels during the past several summers (IDEQ 2011a). The IDEQ uses the Air Quality Index (AQI) as a guide for reporting the daily air quality. The AQI is a scale that runs from 0 to 500, and it is divided into six categories. Each category corresponds to a different level of health concern. The six categories of health concern are: good; moderate; unhealthy for sensitive groups (USG); unhealthy; very unhealthy; and hazardous. The higher the AQI value is, the greater the level of air pollution and the greater the health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality. Table 3-11 shows the number of days per month in each AQI category for Canyon County in 2006.

Table 3-11. 2006 Air Quality Index for Canyon County

Month	Good	Moderate	USG	Unhealthy	Max AQI	Date	Pollutant	Location
January	28	3	0	0	57	1/26/06	$PM_{2.5}$ [a]	Nampa
February	27	1	0	0	53	2/19/06	$PM_{2.5}$	Nampa
March	31	0	0	0	35	3/12/06	$PM_{2.5}$	Nampa
April	30	0	0	0	49	4/26/06	PM_{10} [b]	Nampa
May	30	1	0	0	59	5/16/06	Ozone	Nampa
June	29	1	0	0	54	6/28/06	PM_{10}	Nampa
July	25	6	0	0	73	7/22/06	Ozone	Nampa
August	14	17	0	0	84	8/10/06	$PM_{2.5}$	Nampa
September	15	13	2	0	108	9/7/06	$PM_{2.5}$	Nampa
October	30	1	0	0	61	10/14/06	$PM_{2.5}$	Nampa
November	28	2	0	0	58	11/1/06	$PM_{2.5}$	Nampa
December	26	5	0	0	65	12/4/06	$PM_{2.5}$	Nampa
Totals	313	50	2					

Source: IDEQ (2007).
[a] $PM_{2.5}$: coarse particulate matter.
[b] PM_{10}: fine particulate matter.

Based on an evaluation of potential air pollution problems in the Treasure Valley, IDEQ has developed an airshed management strategy. An airshed is an area covered by a volume of air that has similar characteristics and is separated from other volumes of air by weather patterns or topography (IDEQ 2011a). The IDEQ's airshed management strategy focuses on particulate matter, carbon monoxide, ozone, and toxic air pollutants (IDEQ 2001). The valley had a history of issues with coarse particulate matter (PM_{10}) and carbon dioxide resulting from woodstove smoke, emissions from older vehicles, and road dust (IDEQ 2011a). These problems have been mostly resolved

through Federal regulations, technological changes, and implementation of comprehensive air quality management plans. However, IDEQ continues to monitor PM_{10} and carbon monoxide levels in Ada and Canyon counties (IDEQ 2011a).

3.8 Visual Quality

The quality of a viewshed is generally defined on a spectrum from the most natural state of the landscape to the degree in which it is altered with regard to basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. A viewshed is an area that is visible from a specific location. It may be considered as the viewshed toward or from a particular area or point.

The Service has not classified the Refuge's viewsheds nor is the undertaking of a key observation point analysis part of this planning effort. On a broad landscape level and as part of the effort to develop resource management plans, the BLM has classified much of the land surrounding the Refuge units based on BLM's Visual Resource Management (VRM) classification system (classes 1 through 4). VRM classifications are based on measures of scenic quality, sensitivity levels, and distance zones. Scenic quality is a measure of visual appeal and visual sensitivity is a measure of public concern for scenic quality. Distance zones are based on relative visibility from travel routes or observation points (BLM 2008).

The broad landscape surrounding the Lake Lowell Unit is classified as VRM 4. This classification level is reserved for areas with the most alteration or disturbance in the viewshed. For example, the BLM's management objectives for VRM 4 areas describe activities that may require major modification of the existing character of the landscape (BLM 2008). Because of the high level of agricultural practices and urban interface in the Lake Lowell area, as well as continuing urban development, VRM 4 is an appropriate classification for the surrounding area. In contrast, the Refuge itself is mostly undeveloped; however, the landscape of the Refuge has been altered to some extent by past human development. The Refuge contains human-made structures including dams, roads, and recreational facilities surrounding Lake Lowell, the Visitor Center, and Maintenance Area.

The BLM Four Rivers Field Office Resource Management Plan (RMP) and EIS defines the Snake River corridor from approximately RM 352 to approximate RM 447 as VRM 3 (BLM 2008). The BLM's management objectives for VRM 3 areas are to partially retain the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer (BLM 2008). The same RMP/EIS defines the Snake River downstream to approximate RM 266 as VRM 2 (BLM 2008). BLM describes that overall Snake River corridor as providing high-quality scenery with diverse vegetation, water features, rock formations, and potential for wildlife viewing (BLM 2008). BLM further defines the characteristics of high-quality scenery as providing color variations from the more muted upland hues; incorporating seasonal variations in color that are more dynamic along the river relative to the uplands; and including water that moves through the corridor, draws the eye, and dominates the foreground views (BLM 2008). The Owyhee RMP also defines the Snake River corridor from approximate RM 407 to approximate RM 446 as VRM 3 (BLM 1999). The Owyhee RMP planning area borders the Four Rivers planning area at the Snake River in Idaho. The portion of the Snake River corridor bordering the Four Rivers planning area in Oregon is not classified for VRM (BLM 2001).

3.9 Water Quality

The Idaho water quality standards program is a joint effort between IDEQ and EPA. IDEQ develops and enforces water-quality standards that protect beneficial uses. According to the Idaho Administrative Code, beneficial use is defined as "any of the various uses which may be made of the water of Idaho, including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics. The beneficial use is dependent upon actual use, the ability of the water to support a nonexisting use either now or in the future, and its likelihood of being used in a given manner (Idaho Administrative Procedure Act [IDAPA] 58.01.02.010 [08])." Lake Lowell has three designated beneficial uses: support of warm water aquatic life, use for primary contact recreation, and a special resource water (IDEQ 2010). Lake Lowell is designated as a special resource water (for wildlife habitat) because it is within the Refuge and is of prime importance to the mission of the Refuge.

The Clean Water Act (CWA; 33 U.S.C. 1251) requires states to adopt water quality standards for each of the possible designated uses they assign to their waters. Section 303(d) of the CWA establishes requirements for states to identify and prioritize water bodies that are water quality-limited (i.e., water bodies that do not meet water quality standards). States must periodically publish a priority list (a "303(d) list") of impaired waters. Currently, this list must be published every two years. For waters identified on this list, states must develop a TMDL for the pollutants resulting in the impaired water quality. A TMDL is a calculation of the maximum amount, or load, of a pollutant that a water body can receive from human-caused sources and still meet water quality standards (IDEQ 2011b). Data collected for development of the Lake Lowell TMDL indicate that the beneficial uses of Lake Lowell are not met due to excessive algal and macrophyte growth (IDEQ 2010).

The EPA develops regulations, policies, and guidance, to help the State of Idaho implement its water quality program and to ensure that Idaho's adopted standards are consistent with the requirements of the CWA. The State has adopted both numeric and narrative water quality standards to protect beneficial uses. Numeric criteria have been adopted for pollutants such as bacteria, dissolved oxygen (DO), pH, ammonia, temperature, and turbidity, and narrative criteria have been adopted for pollutants such as sediment and nutrients (IDAPA 58.01.02.250). Examples of narrative criteria include the following:

- "Sediment shall not exceed quantities specified in Sections 250 and 252 or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350" (IDAPA 58.01.02.200.08).
- "Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses" (IDAPA 58.01.02.200.06).

Table 3-12 includes the numeric criteria commonly used in TMDLs in Idaho's water quality standards.

Table 3-12. Selected Numeric Criteria Supportive of Designated Beneficial Uses in Idaho Water Quality Standards

Designated and Existing Beneficial Uses			
Water Quality Parameter	**Primary Contact Recreation**	**Secondary Contact Recreation**	**Warm Water Aquatic Life**
Bacteria, pH, and DO	Less than 126 *E. coli* per 100 mL[a] as a geometric mean of five samples over 30 days; no sample containing greater than 406 *E. coli* organisms per 100 mL.	Less than 126 *E. coli* per 100 mL as a geometric mean of five samples over 30 days; no sample containing greater than 576 *E. coli* organisms per 100 mL.	pH between 6.5 and 9.0 DO[b] exceeds 5.0 mg/L[c] This does not apply to the bottom 20% of water depth in lakes or reservoirs 35 meters or less and waters of the hypolimnion in stratified lakes and reservoirs.
Temperature[d]			33°C or less daily maximum; 29°C or less daily average.
Mercury			Surface waters of the State shall be free from deleterious materials in concentrations that impair designated beneficial uses. For purposes of aquatic life protection it is assumed that if the weighted trophic level average of fish tissue samples meets the human health consumption standard of 0.03 mg/kg[e] methylmercury, that aquatic life will also be protected.
Turbidity			Turbidity shall not exceed background by more than 50 NTU[f] instantaneously or more than 25 NTU for more than 10 consecutive days.
Ammonia			Ammonia not to exceed calculated concentration based on pH and temperature.

Source: IDEQ (2010).
[a] *Escherichia coli* per 100 milliliters.
[b] DO: dissolved oxygen.
[c] mg/L: milligrams per liter.
[d] Temperature exemption: Exceeding the temperature criteria will not be considered a water quality standard violation when the air temperature exceeds the ninetieth percentile of the seven-day average daily maximum air temperature calculated in yearly series over the historical record measured at the nearest weather reporting station.
[e] mg/kg: milligrams per kilogram.
[f] NTU: nephelometric turbidity unit.

In order to meet CWA requirements, every two years IDEQ prepares an integrated report containing the 303(d) list of impaired waters as well as a general report on water quality of all State waters, the 305(b) report. Each integrated report is submitted by the State to the EPA for approval. In each integrated report, all State waters are assigned to one of five different water quality categories. Table 3-13 describes the five categories.

Table 3-13. State of Idaho Water Quality Categories

Water Quality Category	Description
1	Waters are attaining water quality standards and no uses are threatened.
2	Waters are attaining some designated uses, and no uses are threatened, but there are insufficient (or no) data and information available to determine if the remaining uses are attained or threatened.
3	Waters have insufficient data (or no data) and information to enable determining if designated uses are being attained.
4	Waters do not support (or threaten) a standard for one or more designated uses, but they do not require the development of a TMDL. There are three subcategories under Category 4: • *Category 4a* waters have had a TMDL completed and approved by EPA. • *Category 4b* waters have had pollution control requirements placed on them—other than a TMDL—and these waters are reasonably expected to attain the water quality standard in the near future. • *Category 4c* waters are those waters for which nonsupport of the water quality standard is not caused by a pollutant.
5	Waters do not meet (or they threaten) applicable water quality standards for one or more designated uses by one or more pollutants. Category 5 water bodies make up the 303(d) list of impaired waters.

Source: IDEQ (2009).

3.9.1 Lake Lowell

The Service works with State and Federal agencies to help identify and implement water quality improvements where possible. The opportunity to partner on water quality improvement projects may increase given that the TMDL Implementation Plan was recently released (Idaho Soil and Water Conservation Commission 2012). Lake Lowell is a filter and containment basin for upstream pollutants and was added to the 1998 303(d) list for nutrients and low DO; these designations were carried forward to subsequent lists. Lake Lowell is included in the 2010 Integrated (303[d]/305[b]) Report's list of waters impaired by pollutants and for which a TMDL is needed (IDEQ 2011d), which indicates that the lake is listed for "phosphorus (total)" with an observed effect of "low dissolved oxygen" (IDEQ 2011d). Excessive algae and macrophyte production result in oxygen depletion. Algal mats interfere with the primary contact recreation and aesthetic values of this special resource water. Decreased levels of DO impair warm water aquatic life. The sources of nutrient loading include phosphorus contributed by canal and drain tributaries and waterfowl. Very high concentrations of phosphorus from agricultural runoff were measured in tributary waterways to Lake Lowell (IDEQ 2010). To address these two narrative criteria impairments and to improve water quality, IDEQ developed a TMDL plan for Lake Lowell, which has been approved by the EPA (IDEQ 2010). The Lake Lowell TMDL includes a loading limit for total phosphorous, which acts as a surrogate for DO (IDEQ 2010). Implementation of the TMDL is predicted to result in a 37 percent reduction of incoming loads of total phosphorus, which is expected to eliminate nuisance levels of aquatic vegetation and attain the water quality standard of 5 milligrams per liter (mg/L) DO for warm water aquatic life. All TMDLs required for Lake Lowell are complete; therefore, Lake Lowell will be moved to category 4a of the next integrated report (IDEQ 2010).

While the 303(d) list does not specify the beneficial uses that are impacted as a result of the impaired water status, data collected for development of the Lake Lowell TMDL indicate that the beneficial uses of warm water aquatic life, primary contact recreation, special resource water (for wildlife habitat), and aesthetics are not met due to excessive algal and macrophyte growth (IDEQ 2010).

Table 3-14 provides a description of all beneficial use designations used by the State and identifies those that apply to Lake Lowell as well as those that are recognized as impaired.

Table 3-14. Beneficial Uses of Waters within Idaho and Lake Lowell Designations

Idaho Surface Water Use Designations	Description	Lake Lowell Designated Beneficial Uses	Impaired Designated Beneficial Use
Aquatic life support			
Bull trout	Species-specific use.		
Cold water	Water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species.		
Salmonid spawning	Waters that provide or could provide a habitat for active self-propagating populations of salmonid fishes.		
Seasonal cold water	Water quality appropriate for the protection and maintenance of a viable aquatic life community of cool and cold water species, where cold water aquatic life may be absent during, or tolerant of, seasonally warm temperatures.		
Warm water	Water quality appropriate for the protection and maintenance of a viable aquatic life community for warm water species.	X	X
Modified	Water quality appropriate for an aquatic life community that is limited due to one or more conditions that preclude attainment of reference streams or conditions.		
Contact recreation			
Primary (swimming)	Applies to waters where people engage in activities that involve immersion in, and likely ingestion of, water, such as swimming, waterskiing, and skin diving.	X	X
Secondary (boating)	Applies to waters where people engage in activities where ingestion of water may occasionally occur, such as fishing, boating, and wading; also where swimming is infrequent.		
Water supply			
Domestic	Water quality appropriate for drinking water supplies.		
Agricultural	Water quality appropriate for the irrigation of crops or as drinking water for livestock. This use applies to all surface waters of the State.		
Industrial	Water quality appropriate for industrial processes. This use applies to all surface waters of the State.	X	
Wildlife habitats	Protect water quality appropriate for wildlife habitat. This use applies to all surface waters of the State.	X	X
Aesthetics	Applies to all surface waters of the State.	X	X

Source: IDEQ (2011c).

Sources of nutrient loading in Lake Lowell include high concentrations of phosphorus contributed through the canal and drain tributaries flowing into the lake from the surrounding agricultural lands. The New York Canal brings the largest phosphorus load into Lake Lowell; it averages almost 158 pounds per day (IDEQ 2010). By comparison, the second-largest phosphorus conveyance into the lake is Deer Flat Wasteway Number 3, which carries a load of approximately 48 pounds per day (IDEQ 2010). Monitoring conducted by the Idaho State Department of Agriculture indicated that irrigation drains were major contributors of phosphorus to the lake (10.8 tons) during the irrigation season (Campbell 2003). Based on analysis of total suspended solids at the sampling sites, 88 percent of the phosphorus entering Lake Lowell was in particulate form (Campbell 2003). It should be noted that monitoring sites in the Campbell study were all located along the southern shoreline of the lake. The monitoring report stated that the bulk of the total suspended solids entering from one sample site

was due to high discharge rates and not high concentrations; however, the high load quantities recorded at the other two sample sites were due to high concentrations of total suspended solids. Sediment loads from the drains that enter along the south side of Lake Lowell appear to settle out in the shallow bay areas along the shoreline, where the bulk of aquatic plant (macrophyte) growth occurs (Campbell 2003). These excessive loads of sediment and nutrients may lead to human-induced eutrophication consisting of increases in phytoplankton biomass, macrophyte biomass, nuisance algae blooms, loss of water clarity, and loss of oxygen in bottom waters (Campbell 2003). The amount of nutrient-rich sediment recycled or flushed from the system likely depends upon the speed of drawdown during the irrigation season (Campbell 2003).

Lake Lowell has a history of green and blue-green algal blooms associated with increased levels of phosphorus (Reclamation 1977, Reclamation 1980, IDFG 1965, and USFWS 2000 as cited in IDEQ 2010). In addition to algae being a nuisance for recreation, blue-green algae (cyanobacteria) can pose a health hazard; under certain conditions, blue-green algae can release toxins that are harmful to humans, pets, and livestock (IDEQ 2010). For example, in July 2009, an incident of blue-green algae on Lake Lowell prompted Southwest District Health to issue advisories for Lake Lowell and outlet canals, warning recreationists to avoid swimming in areas with algae blooms and to restrict pet access to the water (IDEQ 2010). Blooms typically form in late summer and dissipate in mid- to late fall when water temperatures cool (IDEQ 2010).

Additional water quality concerns for Lake Lowell include mercury and pesticides. As mentioned above, the lake is designated to support beneficial uses of warm water aquatic life and special resource water. The special resource water designation is applied here because of the importance of migratory waterfowl and other habitat within Deer Flat NWR. Mercury and contaminants that are present and/or bioaccumulate in fish can have a detrimental effect on wildlife, particularly on fish-eating birds. In October 2006, IDEQ collected fish from Lake Lowell for fish tissue methylmercury analysis. The goal was to determine the mean methylmercury fish tissue concentration across fish trophic levels in the reservoir. The data were used to determine whether methylmercury concentrations exceed water quality standards in Lake Lowell. The trophic-level weighted average concentration of mercury for fish sampled in 2006 is 0.241 mg/kg, which is 0.059 mg/kg less than the water quality standard (WQS) of 0.3 mg/kg. Sucker and carp are used in Lake Lowell trophic level weighted averages as a conservative measure, because the average fish tissue mercury concentration is relatively high in comparison to bass and bluegill tissue concentrations. In 2007, IDEQ developed a monitoring plan to identify and quantify methylmercury concentrations in fish in Idaho surface waters, including Lake Lowell, and fish samples were collected for analysis. The calculated trophic level weighted average of mercury from fish collected in 2007 is 0.277 mg/kg, which is 0.023 mg/kg below the WQS. Two separate data collection events document that the WQS for mercury is not exceeded and so a TMDL is not required (IDEQ 2010). Although the mercury level in fish tissue samples did not exceed water quality standards when last tested in 2007, it has been increasing over time (IDEQ 2010). Additional discussion of mercury and pesticide presence is provided below in Section 3.11.

3.9.2 Snake River

Several segments of the Snake River within the Snake River Islands Unit are listed on the Idaho and Oregon 303(d) lists of impaired waters. Those segments, as well as their designated beneficial uses and listed pollutants, are listed in Table 3-15. TMDLs have been approved for the Snake River–Hells Canyon Subbasin, which includes the river portion containing the Refuge islands. TMDL implementation and management here is a joint effort between Idaho and Oregon.

Table 3-15. Snake River Islands Unit–Specific 303(d) Listings for the Snake River (RM 335-449)

Segment (from upstream to downstream)	State 303(d) Listed Pollutants	State-designated Beneficial Uses
Idaho segments		
RM 409 to 396.4 (Oregon-Idaho border near Homedale to Boise River inflow)	• Bacteria • Dissolved oxygen • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 396.4 to 351.6 (Boise River inflow to Weiser River inflow)	• Bacteria • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 351.6 to 347 (Weiser River inflow to Scott Creek inflow)	• Bacteria • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply
RM 347 to 285 (Scott Creek inflow to Brownlee Dam)	• Dissolved oxygen • Mercury • Nutrients • pH • Sediment	• Cold water aquatic life • Primary contact recreation • Domestic water supply • Special resource water
Oregon segments		
RM 409 to 395	• Mercury • Temperature	• Public/private domestic water supply • Industrial water supply • Irrigation water • Livestock watering • Salmonid rearing and spawning (trout) • Resident fish (warm water) and aquatic life • Water contact recreation • Wildlife and hunting • Fishing • Boating • Aesthetics
RM 395 to 335 (Malheur Basin)	• Mercury • Temperature	• Public/private domestic water supply • Industrial water supply • Irrigation water • Livestock watering • Salmonid rearing and spawning (trout) • Resident fish (warm water) and aquatic life • Water contact recreation • Wildlife and hunting • Fishing • Boating • Aesthetics

Source: IDEQ (2010).

3.10 Surrounding Land Uses

3.10.1 Lake Lowell Unit

The Lake Lowell Unit of Deer Flat NWR sits just outside the southwestern boundary of the Nampa comprehensive planning boundary (City of Nampa 2004) and just south of the Caldwell comprehensive planning boundary (City of Caldwell 2010). The remainder of the unit is surrounded by the Canyon County comprehensive planning area (Canyon County 2011a, 2011b). The Refuge is surrounded by developed and agricultural lands. As such, the Refuge is isolated from large, contiguous blocks of significant wildlife habitat areas.

The Nampa comprehensive plan recognizes there are conflicts associated with the agricultural/urban interface in the region such as the noise and dust created during the day and evening in the harvest season, and the difficulty of having to move tractors through subdivisions to change fields (City of Nampa 2004). The plan also acknowledges that the Lake Lowell Unit of the Refuge does not have adequate lands to support the existing diverse wildlife population and that the existing agricultural areas surrounding the Refuge provide food and cover for wildlife as well as protection for wetlands and watersheds (City of Nampa 2004). Therefore, the future land use map for the City of Nampa designates areas along Lake Lowell within the comprehensive plan impact area as agricultural with an open space overlay (City of Nampa 2004).

The *City of Nampa Comprehensive Plan* (2004) maps existing land uses north of the east pool as mostly agricultural land with a mix of rural residential (less than 1.45 dwelling units per acre) and low-density residential (1.46-4.00 dwelling units per acre). The plan's future land use map indicates a conversion of the agricultural lands bordering the Refuge to rural and low-density residential (City of Nampa 2004). A narrow band of rural residential lands will surround a larger core area of low-density residential lands. Table 3-16 illustrates the differences between existing and future land use inventory acreages. The plan states that the future land use inventory acreages represent a long-range vision of community development; however, a time frame for this future land use is not provided. These changes in land use patterns are driven by population growth forecasts and future housing need projections (City of Nampa 2004).

Table 3-16. City of Nampa Land Use Inventories

Land Use	Existing (2004) Acres per Land Use	Existing (2004) Percentage of Land Use Type	Future Predicted Acres per Land Use
Agriculture	39,781	67.2%	13,902
Rural residential	4,199	7.1%	10,940
Low-density residential	7,339	12.4%	19,955
Medium-density residential	677	1.1%	2,407
High-density residential	539	0.9%	937
Office	-	-	63
Commercial	1,896	3.2%	2,880
Industrial	3,290	5.6%	6,219
Public	696	1.2%	813
Parks	803	1.3%	1,104
Total	**59,220**	**100%**	**59,220**

Source: City of Nampa (2004).

The City of Caldwell adopted its current comprehensive plan in 2010. Although the Caldwell plan does not itemize a land use inventory like the Nampa plan, it does project similar population growth

rates and housing needs. The City of Caldwell Official Comprehensive Plan Map (City of Caldwell 2010) identifies the area surrounding the north end of the west pool (Lower Lake Lowell) as residential estate land use. It also illustrates a narrow band of land immediately adjacent to the shoreline as environmentally sensitive and as public open space (City of Caldwell 2010). Residential estate land use is characterized by similar qualities as rural residential and low-density residential with a semirural character (City of Caldwell 2010). The public open space areas are suitable for active and passive recreation; environmentally sensitive areas include lands preserved for open space or that are undevelopable, such as wetlands and floodways (City of Caldwell 2010).

The vast majority of the land surrounding the Lake Lowell Unit is in unincorporated Canyon County and is zoned for agriculture (Canyon County 2011b). In addition to acknowledging Lake Lowell as an important natural resource in the county, the *Canyon County 2020 Comprehensive Plan* (2011a) recognizes the importance of Deer Flat NWR as a special area in the county and encourages land use patterns around the Refuge that promote the integrity and purpose of the Refuge. The plan also acknowledges that the County needs to preserve its natural resources while allowing for the expansion of cities and growth of the unincorporated areas (Canyon County 2011a). The Canyon County future land use map (Canyon County 2011a) categorizes the County lands south of Lake Lowell as residential, which indicates that the land use of Lake Lowell is converting from agriculture to some form of residential use.

3.10.2 Snake River Islands Unit

The lands surrounding the Snake River Islands Unit are predominantly private and used for agriculture (Ecovista and IDFG 2004). In Canyon County, with the exception of a few small sections with rural residential zoning designations, the lands adjacent to the Refuge islands are zoned for agricultural uses (Canyon County 2011b). Similar uses exist on the lands across the river in Owyhee County (Owyhee County 2002). Surrounding land uses along the Snake River Islands Unit in Payette County and Washington County are similar (Payette County 2006; Washington County 2010).

3.11 Environmental Contaminants

3.11.1 Lake Lowell Unit

There is an abandoned Canyon County landfill site within the Refuge boundary. The former landfill is located northwest of the westernmost portion of the Deer Flat Upper Dam, near the Visitor Center. It is positioned approximately 40 feet above lake elevation. The 40-acre site served as a landfill for Canyon County from the late 1950s through approximately 1973 (GeoEngineers 2006). The site was seeded in 1976 and is now covered in soil and grass (GeoEngineers 2006). The majority of the waste is covered by 0 to 2 feet of nonengineered cap/fill, and the depth of waste is greater than 15 feet in certain areas; the waste primarily consists of ordinary household items (GeoEngineers 2006). Although minimal elevated levels of some chemicals of concern were detected in soil, groundwater, and surface water samples, none appeared to be at concentrations that could pose an unacceptable risk or hazard to human or ecological site receptors (GeoEngineers 2006).

Thomas and Burch (2005) conducted contaminant sampling at the Refuge by examining sediment, invertebrate tissue, whole-body bullfrogs, whole-body fish tissue, bird eggs, and bird feather samples. Detailed observations of nesting birds conducted in 2001 as part of this study indicated that all prey were being collected from Lake Lowell. Samples were analyzed for organochlorines and

inorganics, including trace scans for 26 compounds. They concluded that concentrations of inorganic contaminants were generally low in sediment from the Refuge and, for the most part, were below levels associated with adverse effects. One exception was the mercury concentrations in bald eagle feathers. The concentrations were within the range associated with impaired reproduction, suggesting that concentrations in the food chain may adversely impact bald eagles (Thomas and Burch 2005). The other exception was that although selenium concentrations in fish species were below the threshold for general toxic effects for whole-body fish samples (4 micrograms per gram), concentrations exceeded levels associated with mortality in species of fish known to be more sensitive to selenium exposure such as salmonids. This suggests that some fish species and sensitive life stages present in Lake Lowell may be adversely affected by current selenium concentrations (Thomas and Burch 2005). In the same study, Thomas and Burch concluded that organochlorine pesticide concentrations in sediment, fish, and invertebrates did not appear to be at levels harmful to aquatic resources with the exception of DDE levels in certain individual egg samples from grebe and heron species. On the whole, mean concentrations of DDE in grebe and heron eggs were below levels associated with adverse effects (Thomas and Burch 2005).

More recent recommendations in the Lake Lowell TMDL (IDEQ 2010) include additional sampling of reproductive success and mercury concentrations in bald eagles and continued monitoring of piscivorous water birds in order to reduce uncertainty regarding whether mercury is bioaccumulating in eagles and piscivorous water birds and resulting in population level impacts due to effects on reproduction, and to monitor trends in chemical concentrations.

3.11.2 Snake River Islands Unit

Contaminants in the Middle Snake River are the result of surrounding land uses in the subbasin, and nutrient loading to the Middle Snake River also comes from the upstream segment of the Snake River. The highest concentrations of nitrates in the river are driven by the agricultural and urban land uses (Ecovista and IDFG 2004; IDEQ and ODEQ 2004). Historical use and discharge of mercury to surface waters in mining operations has resulted in increased mercury concentrations in the rivers of the subbasin, including the Snake River (Ecovista and IDFG 2004; IDEQ and ODEQ 2004). Current mining operations are predominantly focused on sand and gravel extraction and are concentrated around the town of Ontario, Oregon (Ecovista and IDFG 2004). The highly regulated flow regimes resulting from dams and irrigation diversions influence pollutant transport and processing within the Middle Snake River Subbasin. Pollutants such as sediment, mercury, and nutrients tend to accumulate behind these structures. Concentrations of nutrient and organic loads in impoundments may result in nuisance algae growth and dissolved oxygen depletion (Ecovista and IDFG 2004).

Document continues on next page.

Western grebe on nest
Addison Mohler/USFWS

Chapter 4 Biological Environment

Chapter 4 Biological Environment

This chapter addresses the biological resources and habitats found on the Refuge. However, it is not an exhaustive review of all species and habitats.

The chapter begins with a discussion of biological integrity (historical conditions and ecosystem function), as required under the Refuge Administration Act (16 U.S.C. 668dd-668ee, et seq.). The bulk of the chapter is then focused on the presentation of pertinent background information for habitats used by each of the priority resources of concern and other benefitting species designated under the CCP. That background information includes descriptions, conditions, habitat trends, and threats (stresses and sources of stress) to the habitats and/or associated resources of concern. This information was used to develop goals and objectives for the CCP.

4.1 Biological Integrity, Diversity, and Environmental Health

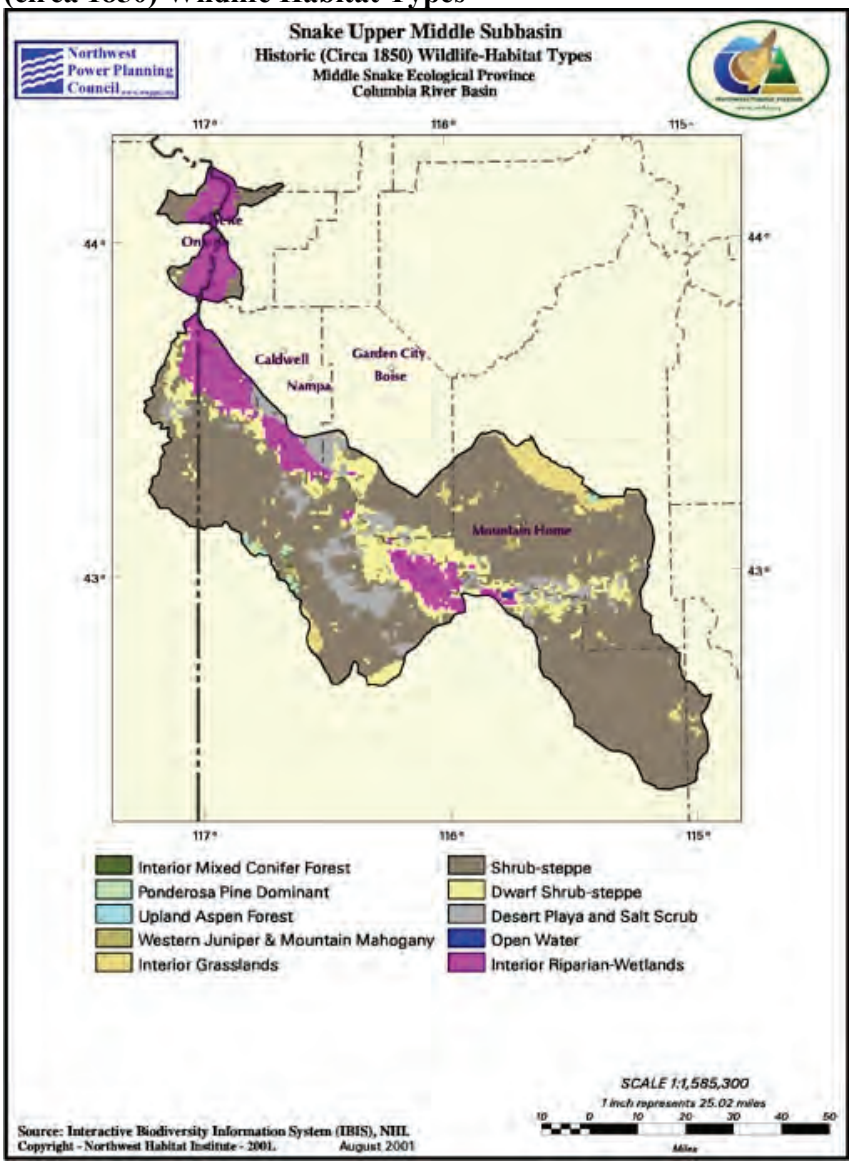
The NWRS Administration Act, as amended, directs the Service to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the NWRS are maintained for the benefit of present and future generations of Americans. Elements of BIDEH are represented by native fish, wildlife, plants, and their habitats, as well as those ecological processes that support them. The Refuge System policy on BIDEH (601 FW 3) also provides guidance on consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and in associated ecosystems that represents BIDEH.

Deer Flat NWR is located within the Columbia Plateau Ecoregion, which is characterized by a broad expanse of sagebrush-covered volcanic plains and valleys, punctuated by isolated mountain ranges and the dramatic river systems of the Snake, Owyhee, Boise, and Columbia. These large rivers contain islands that provide important habitat for migratory waterfowl and other birds. Almost half of the 226 islands downstream of Swan Falls Dam on the Snake River are part of the Snake River Islands Unit of the Refuge (Zoellick et al. 2004b). Historically, the Lake Lowell Unit of the Refuge was a low-lying area of sagebrush grasslands with natural springs, and the Snake River flowed freely through high-walled canyons and broader terraces shaped by the prehistoric Bonneville Flood event. The natural processes that historically maintained the BIDEH of the region included periodic flooding of the Snake River floodplain and lowland areas; seasonal fluctuations in precipitation and water levels, which supported a diversity of native plant communities in wetland and riverine systems; and periodic fires, which supported a diversity of successional stages of native shrub and forested plant communities.

In the early 1900s, settlers in the region sought to have reservoirs built to irrigate their crops. Several Snake River dams were constructed in the first decades of the 1900s, and Reclamation constructed Lake Lowell between 1906 and 1909. Construction of Lake Lowell was an early modification of BIDEH in the area that was later to be established as the Refuge. Construction of the reservoir also enabled further modifications of BIDEH to occur, as it facilitated increased agricultural use of the surrounding area. Current land use of the areas surrounding the Refuge is dominated by irrigated agriculture, pasture and open-range grazing, and residential development. Human settlement of the Snake River Plain has resulted in changes to vegetation communities and hydrologic regimes from historical conditions, which in turn has affected the wildlife populations they can support. Studies of the ecological integrity of the interior Columbia Basin, conducted by the U.S. Forest Service (USFS) and BLM, have documented that most forests, native grasslands, and shrublands have declined

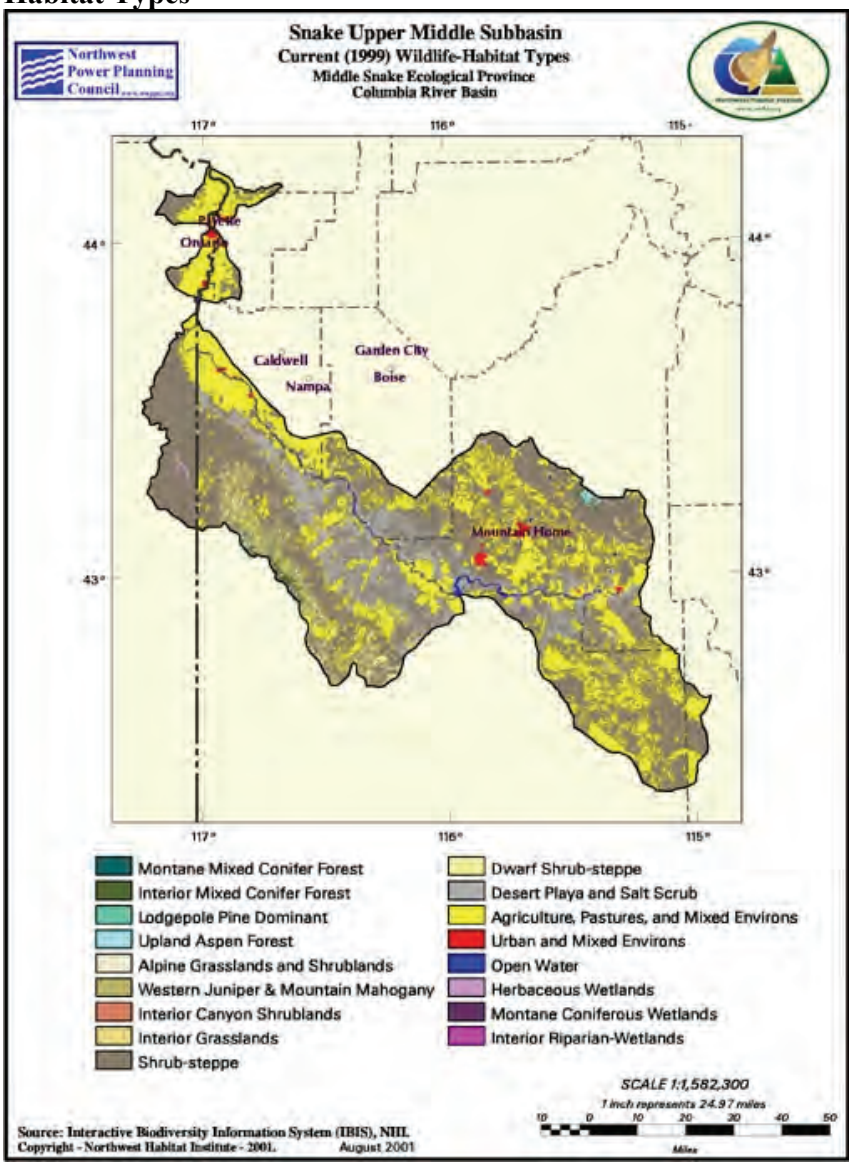
substantially in area, as has connectivity, since the basin was first settled by Euro-Americans. Native grasslands have decreased by 70 percent; native shrublands have decreased by 30 percent; large residual trees and snags have decreased by 20 percent; and old forest structures have decreased by 27 to 60 percent depending on vegetation type (Quigley et al. 1996). Habitat conditions for nearly all species with listing status under the Federal Endangered Species Act were more favorable historically, and the overall likelihood of extirpation has increased from historical to current times (Quigley et al. 1996). The changes in the abundance of wildlife habitat types from historical conditions (circa 1850) to conditions in 1999 are shown in Figures 4-1 and 4-2.

Figure 4-1. Snake River Upper Middle Subbasin Historical (circa 1850) Wildlife Habitat Types



Source: Northwest Habitat Institute (2011).

Figure 4-2. Snake River Upper Middle Subbasin 1999 Wildlife Habitat Types



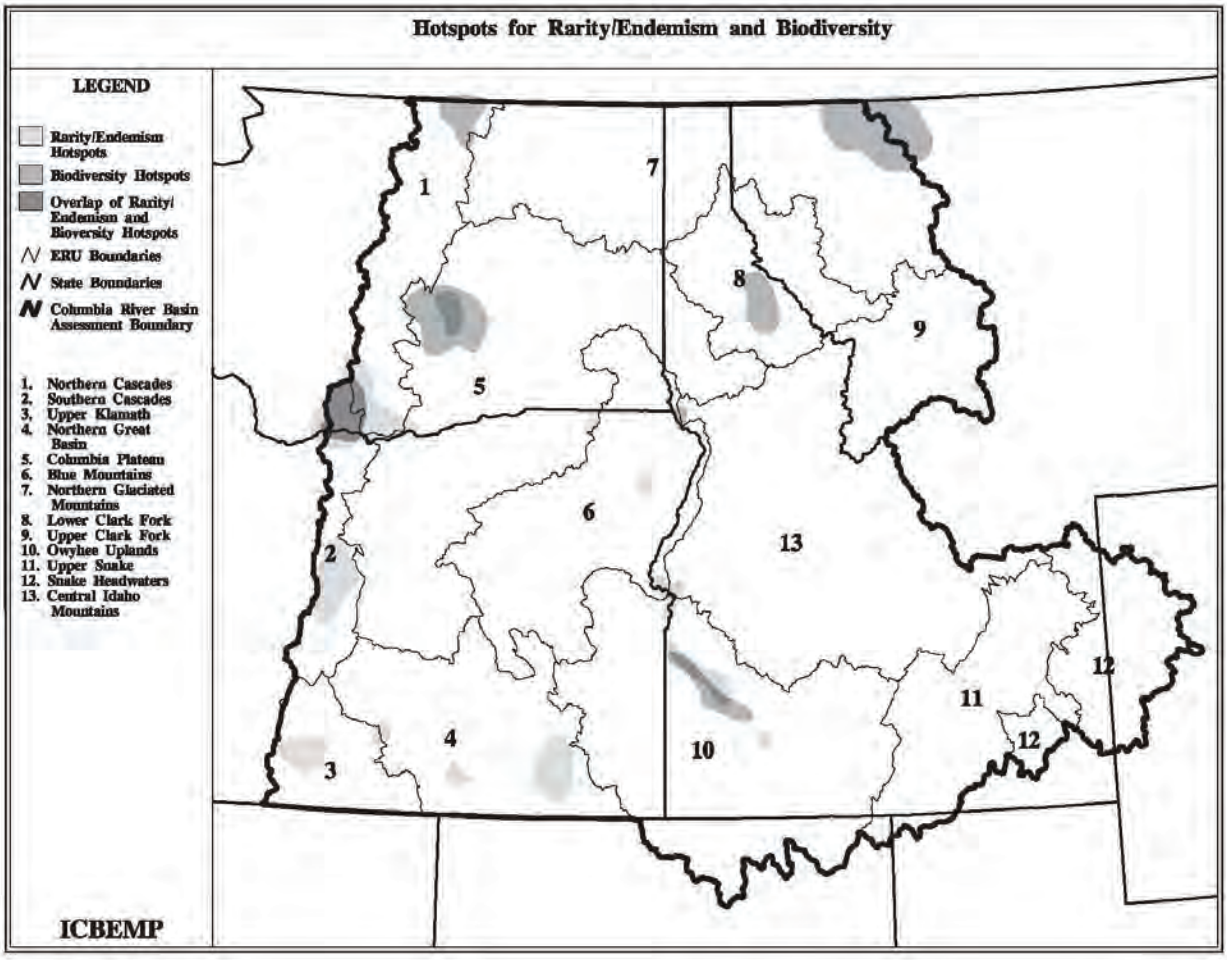
Source: Northwest Habitat Institute (2011).

Despite the effects of human settlement on wildlife habitats, the Snake River in the vicinity of the Refuge was identified in 1996 as one of 12 hotspots of species rarity and endemism and one of seven hotspots of high species biodiversity, as shown in Figure 4-3 (Quigley et al. 1996). Endemic species are those that are found only in a given region or location. An understanding of the importance of the Snake River in providing habitat for rare and endemic species and the biodiversity currently present in Snake River habitats is integral to managing the Refuge to continue providing habitat for these rare and diverse species assemblages.

The BIDEH table prepared by Refuge staff, which explores key aspects and alterations to the biological integrity and diversity of the natural environment encompassed by the Refuge, is included in Appendix E. Several limiting factors have been identified that affect the integrity of habitats on the Lake Lowell and Snake River Islands Units. Limiting factors include altered riverine hydrology and a

nonfunctioning floodplain, loss in perennial species diversity, grazing disturbance and resulting encroachment of invasive species, and altered fire regime.

Figure 4-3. Hotspots for Rarity/Endemism and Biodiversity in the Columbia Interior Basin



Source: Quigley et al. (1996).

4.1.1 Snake River Dams and Altered Hydrology

The Snake River system upstream and downstream of the Refuge has undergone major modifications since the early 1900s, due to the construction of dams. The Snake River Islands Unit is located along the longest free-flowing stretch of the Snake River, an approximately 51-mile section beginning at Swan Falls Dam upstream of the Refuge and continuing downstream to Brownlee Reservoir. The Swan Falls Dam was completed in 1918 and is the oldest dam on the Snake River (Dixon and Johnson 1999). The hydrologic flow record suggests an increase in annual minimum flows on this reach of the Snake River from 1914 until the 1950s, after which annual minimum flows decreased compared to historical flows. This decrease coincided with the completion of the Palisades Reservoir in eastern Idaho in 1957 (Dixon and Johnson 1999). Annual peak flows measured at the USGS gage near Murphy also appear to have declined from the pre-dam to early post-dam period. Peak flows in the interval from 1914 to 1926 averaged higher than peak flows in 1928-1956 and 1958-1990 (Dixon and Johnson 1999). Minimum flows in the mainstem Snake River, from C.J. Strike Dam to Brownlee Dam, have been identified for protecting aquatic, wildlife, and vegetation resources (Ecovista and

IDFG 2004). These minimum flows are often not met during the irrigation season (Ecovista and IDFG 2004). In addition to concerns about low flows, episodic high flows are necessary to maintain riparian and wetland vegetation dependent on periodic flooding.

4.1.1.1 Vegetation Changes

The dams on the Snake River have resulted in decreased scouring and flood disturbance, decreasing the frequency and duration of inundation in the floodplain and decreasing soil moisture from the water's edge to the top of the bank profile (Dixon and Johnson 1999). Decreased peak flows reduce tree mortality due to scouring, and low minimum flows have likely increased plant recruitment in the channel. Plant recruitment may also be heightened at the mouths of reservoirs where sediments fall out and create deltas.

4.1.1.2 Waterfowl Habitat

Historically, large flocks of migrating and wintering waterfowl have used the Pacific Flyway as they have migrated from breeding grounds in Canada, Alaska, and the northern continental United States to wintering areas farther south. The Snake River islands and Great Basin wetland habitats have provided migratory connectivity along the Pacific Flyway as well as critical breeding and wintering areas for waterfowl. Prior to construction of dams on the Snake River, periodic flooding of the Snake River floodplain and lowland areas provided additional areas used seasonally by waterfowl for refuge and forage. Modifications to the river hydrology due to dams reduced the amount of seasonally flooded waterfowl habitat but, overall, human-induced changes to hydrology appear to have been beneficial for waterfowl. For example, the construction of dams and reservoirs, including Lake Lowell, has increased the amount of open-water habitat available for migrating and wintering waterfowl.

4.1.2 Influx of Invasive Species

Invasive species are a major issue on public lands throughout the United States. In the last 100 years, exotic plant species have expanded throughout native forests and rangelands, especially in areas that were once dry native grasslands and shrublands (Quigley et al. 1996). The spread of invasive species across the West can be attributed to changes in land use. Grazing and agriculture alter vegetation communities and create soil disturbance, thereby providing opportunities for invasive species to become established. When shrub-steppe habitats are intensively grazed, native perennial grasses are eliminated and the shrubs, such as big sagebrush, tend to form dense monotypic stands. By 1890, the native perennial grasses, for all practical purposes, were no longer present on southern Idaho range. Soil erosion became a critical problem on Idaho rangelands. Part, but not all, of the void was filled by ever-denser stands of big sagebrush. Continued grazing pressure and an increase in abandoned croplands, set the stage for the invasion of exotic annuals (Yensen 1982).

The Refuge as a whole has been colonized by a variety of noxious weeds and invasive plant species. Several of the more common invasive species on the Refuge, including cheatgrass, Canada thistle, pepperweed, poison hemlock, and purple loosestrife are also common throughout the region. Invasive woody trees and shrubs on the Refuge include Russian olive, tamarisk, and false indigo bush. Refuge management activities such as fire control have inadvertently contributed to the spread of invasive herbaceous species. For many years, fire breaks have been maintained on the Refuge to prevent the spread of a fire both within the Refuge and from the Refuge onto private land, and fire

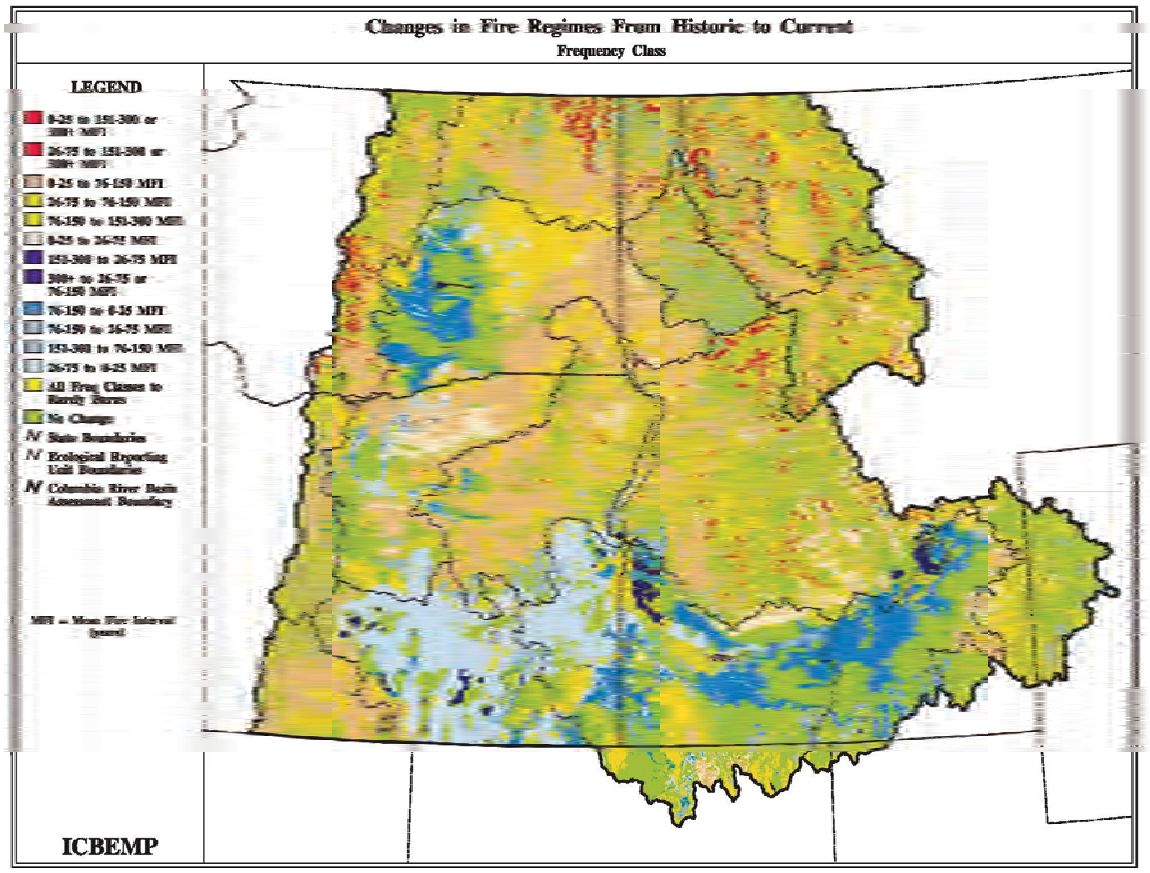
breaks have been colonized by invasive species such as reed canarygrass, Canada thistle, purple loosestrife, and pepperweed (USFWS 2008).

4.1.3 Altered Fire Regime

In prehistory and in the first half of the 1900s, fires were endemic to the Snake River Basin, burning sometimes in one basin and at other times in another, until the fall rains extinguished them. The result was a mosaic of early-seral and mid- to late-seral plant communities (Idaho Power 2003). Biological integrity was maintained historically by natural processes such as lightning strikes or by intentional burning by Native Americans. Periodic fire kept underbrush from accumulating, so that when fires did occur, they burned with lower intensity than fires now, due to large accumulations of fuels in the understory.

The fire regime throughout the Snake River Basin has been modified greatly from prehistoric conditions. As a result of diligent fire suppression activities throughout the Snake River Basin over the last 100 years, higher fuel loads have developed than would exist if wildfires of the prehistoric period and early 1800s had continued (Idaho Power 2003). On lands administered by the USFS and BLM in the interior Columbia Basin, fire severity has generally increased, with lethal fires involving firefighter fatalities increasing by approximately 17 percent.

Figure 4-4. Changes in Fire Regimes in the Columbia Interior Basin



Source: Quigley et al. 1996

In the Great Basin, which adjoins the Snake River Basin to the south, expansion of cheatgrass into disturbed rangelands has resulted in an increase in the frequency and extent of wildfires (Pellant et al. 2004). The increased frequency of wildfires in cheatgrass dominated rangelands is attributed to the early maturation of cheatgrass compared to native species which provides easily ignited fuels that promote a rapid rate of spreading fire.

The primary cause of fire regime changes throughout the West are fire prevention and suppression strategies, selection and regeneration cutting, domestic livestock grazing, and the introduction of exotic plants (Quigley et al. 1996). Fire suppression has resulted in a decrease in the abundance of early-seral communities and an increase in mid-seral communities (Quigley et al. 1996). In addition, the decline in fire frequency has resulted in an expansion of western juniper woodlands during the last 100 years (Quigley et al. 1996). The change in fire regime from the historical period to the current period is shown in Figure 4-4. Fire frequency is categorized in 25-year frequency classes.

4.2 Selection of Priority Resources of Concern

4.2.1 Analysis of Priority Resources of Concerns

Wildlife and habitat goals and objectives were designed directly around the habitat requirements of species designated as *priority resources of concern*. (Resources of concern are called conservation targets or focal species in conservation planning methodologies used by other agencies and organizations.) As defined in the Service's Policy on Habitat Management Plans (620 FW 1), resources of concern are:

> all plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, state, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect "migrating waterfowl and shorebirds." Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts. (620 FW 1.4G)
>
> Habitats or plant communities are resources of concern when they are specifically identified in refuge purposes, when they support species or species groups identified in refuge purposes, when they support NWRS resources of concern, and/or when they are important in the maintenance or restoration of biological integrity, diversity, and environmental health.

Therefore, resources of concern for a refuge may be a species or species group, or the habitat/plant community that supports a priority species or species group. In the CCP process, the Service reviewed the Refuge's establishment history (Section 1.7.2 and Appendix I) and a variety of plans (Section 1.8) to compile an initial list of these resources. This initial list, known as the list of comprehensive resources of concern, is available in Appendix E.

This list was then pared down to develop a more targeted assemblage, which comprises the priority resources of concern. In developing its list of priority resources of concern, the planning team selected not only species mentioned in establishing documents for the Refuge, but also species that captured the ecological attributes of habitats required by larger suites of species.

The priority resources of concern are listed in Table 4-1 and consist of nine focal species that were selected as representatives or indicators for the overall condition of important Refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources. Several different conservation focal species may be identified for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species using the habitat will generally be expected to benefit as a result of management for the focal species.

The main criteria for selecting priority resources of concern included the following requirements:

- The resource must be reflective of the Refuge's establishing purposes and the Refuge System mission;
- The resource must include the main natural habitat types found at the Refuge;
- The resource must be recommended as a conservation priority in the wildlife and habitat management review; and/or
- The resource must be federally or state-listed as a candidate for listing, or a species of concern.

Other criteria that were considered in the selection of the resources of concern included the following:

- Species groups and/or Refuge features of special management concern;
- Species contributing to the BIDEH of the ecosystem; and
- Species where it is feasible to estimate population size (needed for future monitoring and adaptive management).

In developing objectives, the team followed the process outlined in the Service's draft *Identifying Resources of Concern and Management Priorities for a Refuge: A Handbook* (USFWS 2009b). This process designs objectives around the needs of priority resources of concern, and sets habitat attributes around the habitat structure, composition, and connectivity required by priority resources.

The comprehensive list of resources of concern in Appendix E includes species and species groups found on the Refuge, whether they nest on the Refuge, their Federal and State listing status, and whether species are covered by management plans prepared by Federal, State, or conservation organizations.

Table 4-1. Priority Resources of Concern at the Refuge

Priority Resources	Focal Species	Other Benefitting Species
Riparian Forests: Lake Lowell and River Islands	Yellow warbler	Bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, mule deer, red fox
	Song sparrow	White-crowned sparrow, California quail, western tanager, calliope hummingbird, black-throated sparrow, gray flycatcher, vesper sparrow, savannah sparrow, common yellowthroat, western terrestrial garter snake
Marsh wetlands	Mallard	Wood duck, great blue heron, American wigeon, black-crowned night heron, marsh wren, red-winged blackbird, yellow-headed blackbird, western meadowlark, mourning dove, barn owl, pied-billed grebe, sora, American kestrel, painted turtle
Emergent vegetation: Lake	Western grebe	Pied-billed grebe, Clark's grebe, eared grebe, canvasback, American coot
	Canada goose	Tundra swan, double-crested cormorant, Caspian tern, black tern,

Table 4-1. Priority Resources of Concern at the Refuge

Priority Resources	Focal Species	Other Benefitting Species
Lowell		Bonaparte's gull, glaucous gull, Franklin's gull, Sabine's gull
	Mallard	Blue-winged teal, canvasback, ruddy duck, American wigeon, gadwall, green-winged teal, northern shoveler, redhead, common merganser, northern pintail, northern leopard frog
Shoreline mudflats: Lake Lowell	Long-billed dowitcher	American avocet, Virginia rail, sora, Baird's sandpiper, American bittern, great blue heron, killdeer, common snipe, greater yellowlegs, lesser yellowlegs, willet, least bittern, western sandpiper, semi-palmated plover, black-bellied plover, cattle egret, white-faced ibis, great egret, solitary sandpiper, Wilson's phalarope
Open water: Lake Lowell	American white pelican	Osprey, bald eagle, common loon, Clark's grebe, common merganser, double-crested cormorant, Canada goose, mallard, California gull, Caspian tern, ring-billed gull, black tern, common tern, tundra swan
	Western grebe	
Shrub-steppe: Lake Lowell and River Islands	Sage thrasher	Swainson's hawk, northern harrier, ferruginous hawk, prairie falcon, long-billed curlew, killdeer, gray flycatcher, western meadowlark, sage sparrow, brewer's sparrow, green-tailed towhee, rock wren, vesper sparrow, horned lark, grasshopper sparrow, black-tailed jackrabbit, badger, yellow-bellied marmot, mountain cottontail
	Loggerhead shrike	
	Canada goose	Black rosy-finch, gray rosy-finch, green-tailed towhee, yellow-breasted chat, rock wren, canyon wren, vesper sparrow, cliff swallow, chukar, red-tailed hawk, golden eagle, bank swallow, white-throated swift, raccoon, mink
	Mallard	
Agricultural	Canada goose	Greater white-fronted goose, Ross's goose, common goldeneye, great blue heron, American wigeon, barn owl, short-eared owl, Swainson's hawk, red-tailed hawk, coyote, montane vole, mule deer, red fox, mountain cottontail
	Mallard	

4.3 Habitat Types

Habitat types on the Snake River Islands Unit of the Refuge consist of riparian forest, shrub-steppe, and seasonally flooded gravel bars. The Lake Lowell Unit contains emergent wetlands, shoreline mudflats, open water, riparian forest, shrub-steppe, and agricultural croplands and pastures. Acreages for each habitat type on the Refuge are summarized in Table 4-2. Map 9 shows habitats at the Lake Lowell Unit, and Maps 10a-10k show habitats at the Snake River Islands Unit. Habitat mapping was produced using heads up digitizing techniques on National Agriculture Imagery Program (NAIP) orthophotos that were taken on July 21, 2009. Seasonal flooding, rounding of numbers, and digitizing limitations can produce discrepancies in these estimated acreages. These numbers are considered "geographic information system (GIS) acreages" and are provided here for general reference. These acreages have not been formally surveyed.

Table 4-2. Acreages of Habitat Types at the Refuge

Habitat Types	Acres on Snake River Islands Unit	Acres on Lake Lowell Unit
Emergent wetlands (lacustrine)	0	850
Emergent wetlands (palustrine)	0	85
Shoreline mudflats	0	90
Open water	0	6,430
Riparian forest	630	1,910
Shrub-steppe	550	830
Agricultural crops and pastures	0	260
Seasonally flooded gravel bars	25	0

4.3.1 Emergent Wetlands

4.3.1.1 Overview

Emergent wetlands on the Refuge are found in lacustrine, palustrine, and riverine systems. Emergent wetlands are defined in the Cowardin classification system (Cowardin et al. 1979) as being characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Vegetation is present for most of the growing season in most years and can be either persistent or nonpersistent. Persistent emergent wetlands are dominated by species that normally remain standing at least until the beginning of the next growing season. In contrast, nonpersistent wetlands are dominated by plants that fall to the surface of the substrate or below the surface of the water at the end of the growing season, so that during certain seasons of the year there is no obvious sign of emergent vegetation. Extensive lacustrine emergent wetlands occur along the southern shoreline of Lake Lowell and varied expanses exist on the northern, western, and eastern shorelines. There are approximately 850 acres of lacustrine emergent wetlands surrounding the lake when the water level is low. There are approximately 85 acres of palustrine emergent wetlands adjacent to Lake Lowell. These emergent wetlands include Upper Dam Marsh (25 acres), Rambo Pond (3 acres), and Leavitt (57 acres). Riverine emergent wetlands occur on lower elevations of the islands in the Snake River.

Hydrology sources for emergent wetlands on the Refuge include Lake Lowell, natural springs, and surface water runoff. Most of the Refuge wetlands are seasonal or semipermanent and are variably flooded with cycles of seasonal inundation and drying each year. Seasonal inundation occurs in some wetlands from October through April, whereas semipermanent inundation occurs from October through August in other areas. The largest emergent wetland on the Refuge (Upper Dam Marsh) is inundated year-round.

A diverse assemblage of hydrophytic vegetation is present in the Refuge's emergent wetland communities. Emergent wetlands in the no-wake zone on the east end of Lake Lowell and on the south side of the lake are dominated by smartweed, which provides habitat for nesting grebes and foraging habitat for pelicans and cormorants. Emergent wetland communities also include sedges, rushes, reeds, mannagrass, rough bentgrass, stinging nettle, common cattail, water plantain, milkweed, yellowcress, and goldenrod. Some scrub-shrub cover may also occur in emergent wetlands, and shrub species include smooth sumac, Woods' rose, and peachleaf willow.

4.3.1.2 Regional Distribution, Conditions, and Trends

In Idaho, an estimated 386,000 acres of wetland habitat (56 percent) were lost from 1780 to 1980 (Dahl 1990). This statistic includes multiple habitat types (emergent, scrub-shrub, forested, aquatic bed). Emergent wetlands constitute 17 percent of the wetland habitats along the middle and western Snake River (Jankovsky-Jones 2001). The long-term trends in distribution of freshwater wetlands show that freshwater emergent wetlands have declined by the greatest percentage of all wetland types, with nearly 24 percent lost since the 1950s (Dahl 2000). This is due in large part to Euro-American settlement, which typically started along river channels and expanded outward. Wetlands were regarded as having little economic value, and government programs that encouraged the development of wetlands were enacted. Historically, most wetland losses were due to drainage, land clearing, and conversion to cropland. As populations continue to increase and economies switch from agricultural-based to service-based, losses due to development, including road construction, home building, and flood control, are likely to exceed losses to agriculture (Jankovsky-Jones 2001).

Many of the wetlands that remain today have been degraded due to hydrologic alteration, agricultural activities, and urbanization, which have reduced wetland functions. Human activities, including livestock grazing, ground disturbance, and recreational activities, may introduce exotic plant species, create suitable conditions for the increase of less-desirable native species, eliminate woody tree and shrub cover, and compact wetland soils (Jankovsky-Jones 2001).

Along the middle and western Snake River and the lower reaches of its major tributaries from Milner Dam to the confluence with the Payette River, approximately 34 percent of the wetland and deepwater habitat is within areas with special management such as wildlife management areas or national wildlife refuges (Jankovsky-Jones 2001). Palustrine emergent wetlands constitute only 13 percent of all wetland communities in the wetland habitat in the Middle Snake River hydrologic unit code. Most of these wetlands have been affected by past land use activities, and the Jankovsky-Jones report describing the wetland conservation strategy for the Middle and Western Snake River concluded that maintaining existing wetland functions should be a high priority throughout the survey area (2001).

According to the Refuge's BIDEH analysis, invasive species documented as occurring in riverine and palustrine emergent wetland habitats on the Refuge include purple loosestrife, poison hemlock, white bryony, Russian olive, and tamarisk. Invasive species are discussed further in Section 4.6.

4.3.1.3 Key Species Supported

Emergent wetlands provide nesting, foraging, and loafing habitat for dozens of species of waterfowl, shorebirds, and aquatic migratory birds. Focal species on the Refuge dependent upon emergent wetland habitat include western grebe, Canada goose, and mallard. Other species using emergent wetland habitat on the Refuge include cinnamon teal, northern pintail, lesser scaup, white pelican, tundra swan, red-necked phalarope, American bittern, long-billed curlew, violet-green swallow, marsh wren, and snowy egret. Emergent wetlands also provide habitat for a diverse assemblage of wetland-dependent wildlife (e.g., amphibians, such as the northern leopard frog) as well as important rearing habitat for fish.

Emergent wetland plants are a valuable food source for migrating waterfowl during fall and spring. The smartweed emergent community, in the no-wake zone on the east end and on the south side of the lake, provides habitat for nesting grebes and foraging habitat for pelicans and cormorants. Western and Clark's grebes have nested in emergent vegetation in years when water levels remained high enough to provide nesting conditions. Grebes have at least two nesting colonies on Lake Lowell and raise young on the lake.

4.3.1.4 Refuge Management Activities

The hydrology of existing lacustrine emergent plant beds surrounding Lake Lowell is controlled by water-level management that is under the jurisdiction of Reclamation and managed by the Board of Control. The acreages and extent of emergent plant beds vary seasonally and annually based upon the volume of water withdrawn from the reservoir for irrigation use. Reclamation and the Board of Control manage lake levels solely for irrigation and not for wildlife habitat, so there is no minimum pool level. However, the water levels in the lake have been sufficient to provide habitat for wildlife, including nesting and migrating waterbirds, for the majority of its history.

The hydrology of the palustrine emergent wetland marshes at Upper Dam Marsh, the Leavitt Tract, and Rambo Pond is artificial and is provided by a variety of human activities. Prior to 1991, the Upper Dam Marsh was supported by water seeping from the Upper Dam before a dam safety project conducted by Reclamation altered the hydrology. Currently, wetland hydrology is provided by Reclamation during the irrigation season, April through early October. The marsh was completely dry in the winter of 2007-2008, and Reclamation is currently evaluating options to provide year-round hydrology to the Upper Dam Marsh. Hydrology for the marsh at Leavitt Tract is provided by irrigation runoff and irrigation return, which occur during the irrigation season from April to early October. The marsh can also receive backwater hydrology from Lake Lowell; however, lake levels need to be high for this to occur. Rambo Pond was created in 2005 by installing a water-control structure and diverting water pumped from the adjacent gravel pit. Pumping from the gravel pit needs to be continuous to maintain hydrology to the wetland. It is unknown how long the gravel pit will remain in operation, and at some point this source of hydrology for Rambo Pond may not be available. It may be possible for backwater to reach the marsh when Lake Lowell is at full pool.

Management activities consist primarily of invasive vegetation species control. Over the past several years, biological controls have been used to control purple loosestrife, which has substantially reduced the infestation.

4.3.2 Shoreline Mudflats: Lake Lowell

4.3.2.1 Overview

Mudflats are exposed along the shoreline of Lake Lowell in low-water years when the water level drops below the emergent wetland zone. Water levels in the lake decline as irrigation demands increase through the growing season, with the lake reaching a low point in late August (Figure 3-4). Acreage of mudflats varies annually depending upon the volume of water withdrawn from the reservoir. Hydrology of mudflats ranges from soils that are saturated at the surface to dry soils.

4.3.2.2 Regional Distribution, Conditions, and Trends

Lacustrine and palustrine aquatic bed habitats, which include shoreline mudflat habitats, constitute only 2.6 percent of all wetland communities in the wetland habitat in the Middle Snake River hydrologic unit code (Jankovsky-Jones 2001). During high-water years on the Refuge, minimal mudflat habitat is available for shorebirds during fall migration. The drawdown zones of the Snake River reservoirs evaluated in the Jankovsky-Jones study frequently supported nonnative plant species such as lesser burdock, marshpepper knotweed, curlytop knotweed, and annual rabbitsfoot grass. On the Refuge, the main invasive species occurring on the shoreline mudflats of Lake Lowell is purple loosestrife.

4.3.2.3 Key Species Supported

Shoreline mudflat habitats with a gradual shoreline dropoff and water conditions conducive to large invertebrate populations attract moderate to substantial numbers of shorebirds. Lake Lowell is a notable example of a reservoir important for fall migrants (Oring et al. 2000). In the latter part of the summer, as the lake is drawn down for irrigation, shorebirds, including least sandpipers, godwits, yellowlegs, and plovers, come to feed on the exposed mudflats. A focal species on the Refuge that is dependent upon shoreline mudflat habitat is the long-billed dowitcher. Mudflats support

macroinvertebrates (e.g., chironomids) that provide forage for migratory birds. These exposed mudflats attract large numbers of shorebirds and resident flocks of ducks and Canada geese.

4.3.2.4 Refuge Management Activities

Management activities are similar to those conducted in emergent wetlands and consist primarily of purple loosestrife control.

4.3.3 Open Water: Lake Lowell

4.3.3.1 Overview

Open-water habitat at Lake Lowell is in the lacustrine wetland system. Water depth generally ranges from 2 to 40 feet. Acreage of open-water habitat at Lake Lowell is approximately 6,430 acres at full pool, the vast majority of all Refuge acres. This habitat type does not have vegetation extending above the water surface; however, it does include submergent plant beds (e.g., pondweeds), which occur in shallow water areas where light penetration supports the growth of these species.

4.3.3.2 Regional Distribution, Conditions, and Trends

The construction of dams and reservoirs along the Snake River has resulted in type changes of wetlands along the Snake River. Type changes occur when a wetland is converted from one vegetation type to another. Water development projects have increased water levels at reservoirs, in turn causing riverine and spring-fed wetlands to be replaced with open-water habitat (Jankovsky-Jones 2001). The national trend among all types of wetlands indicates that the open-water category has gained the most area since the 1950s. In 1997, there were 5.5 million acres of open water across the United States, which is more than twice the area of open water reported in the mid-1950s (Dahl 2000). Of the wetland and deepwater habitat within special management areas along the Middle and Western Snake River, the majority (65 percent) is deepwater habitat within lacustrine systems. Much of this is artificially created deepwater habitat, created by impoundments including Lake Lowell and the C.J. Strike Reservoir (Jankovsky-Jones 2001).

Water development projects on the Snake River have resulted in deeper water levels, and many riverine and spring-fed wetlands have been replaced with open-water habitat. In addition, open-water habitat has likely increased in the vicinity of Boise due to the numerous former gravel pits that are filled with water (Jankovsky-Jones 2001).

4.3.3.3 Key Species Supported

Open-water habitat at Lake Lowell provides loafing and foraging habitat for migratory birds (e.g., gulls, grebes, pelicans) during the spring and summer and provides loafing and foraging habitat for ducks and geese during the fall through spring, depending upon the extent of freeze-up. Focal species on the Refuge that depend upon open-water habitat include American white pelican and western grebe. As colder weather drives migrating ducks and geese south, some birds stop over temporarily and others remain for the winter. By mid-November, the goose population peaks at about 12,000. Duck populations peak in mid-December, with up to 120,000 on Lake Lowell (USFWS 2008). Their activity keeps patches of water open, delaying ice formation.

Aside from the abundance of invasive carp, game fish in Lake Lowell include largemouth bass, smallmouth bass, yellow perch, black crappie, bluegill, rainbow trout, Lahontan cutthroat trout, channel catfish, and brown bullhead.

4.3.3.4 Refuge Management Activities

A no-wake zone for boating on Lake Lowell was instituted at the east end of the lake in 1990 to reduce disturbance to nesting bald eagles. The no-wake zone also minimizes disturbance to breeding, migrating, and wintering waterfowl and waterbirds.

Carp removal has occurred intermittently for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell. Through a special use permit (SUP) from the Refuge, a commercial fisherman uses a beach seine to harvest carp and suckers. Seining is usually conducted during the fall and winter because the fish slow down and congregate in the cooler water, making them easier to catch. Current seining operations, which remove an estimated 50 to 125 tons of biomass annually (Cunningham 2012), likely do not remove enough carp (estimated at 4,800 tons of biomass) to result in significant water quality improvements or promote submergent plant growth. However, there have been no studies that have determined the appropriate threshold of biomass removal to achieve habitat improvements.

4.3.4 Riparian Forests: Lake Lowell and Snake River Islands

4.3.4.1 Overview

Construction of Lake Lowell resulted in hydrologic conditions that allowed the establishment of riparian/wetland forested habitat around the edges of the lake; such a habitat would not have been supported by site conditions present in this location prior to construction of the reservoir. The Refuge contains approximately 1,910 acres of riparian forest on the Lake Lowell Unit. Riparian forest is also present in a band around the perimeter of most islands on the Snake River Islands Unit.

The riparian forests on the Refuge are dominated by invasive and nonnative plants with little representation of species native to riparian habitats in the region (e.g., willows). Upper canopy is characterized by cottonwood with an understory dominated by Russian olive, false indigo bush, and some tamarisk, with a small native component of willows (e.g., coyote willow, peachleaf willow), wild rose, golden currant, elderberry, and skunkbush sumac. The herbaceous layer is dominated by invasive species such as reed canarygrass, Canada thistle, perennial pepperweed, and purple loosestrife.

The Refuge islands have a relatively higher quality riparian forest than that surrounding Lake Lowell, as indicated by fewer invasive species issues. Island riparian habitats are characterized by an overstory of native willows (e.g., coyote willow, peachleaf willow) and an understory of native shrubs (e.g., golden currant, skunkbush sumac). Some islands (Feral and Gosling) have cottonwood gallery forests with rookeries inhabited by colonial waterbirds (e.g., egrets, great blue herons, double-crested cormorants).

4.3.4.2 Regional Distribution, Conditions, and Trends

The operation of dams has a significant impact on riparian habitats in Idaho (Jankovsky-Jones 2001). Below Swan Falls Dam, located upstream of the Refuge, the area of riparian woodlands on the Snake

River has quadrupled since 1939 (Jankovsky-Jones 2001). Several factors may be responsible for the increase in riparian habitats from historical conditions. Decreased peak flows reduce tree mortality by altering historical hydrology patterns and eliminating scouring, a historical cause of tree mortality. Riparian plant recruitment is also facilitated by reduced minimum flows, which cause river margins to become exposed for longer periods during the growing season, allowing for riparian vegetation to become established on previously unvegetated surfaces in the channel. Over time, due to natural succession, these alterations in riverine hydrology have led to an expansion of the area of mature woodland (Dixon and Johnson 1999).

Despite the increase in riparian habitat from historical conditions, the abundance of riparian habitat is limited on the middle and western reaches of the Snake River. Riparian habitat is generally characterized as a narrow band of vegetation along the river channel and on islands due to steep canyons and rocky shores with minimal soil development, which limit the area available for colonization by riparian species (Jankovsky-Jones 2001). Impacts to the riparian corridor of the Snake River due to urbanization are mostly limited to lower reaches where valleys are wider. Human activities, including livestock grazing, ground disturbance, and recreational activities, introduce exotic plant species, create suitable conditions for the increase of less desirable native species, eliminate woody tree and shrub cover, and compact soils. Several invasive weeds are well established in riparian areas throughout the middle and western reaches of the Snake River, including musk thistle, Canada thistle, poison hemlock, common teasel, kochia, perennial pepperweed, broadleaved pepperweed, purple loosestrife, and Scotch thistle (Jankovsky-Jones 2001).

4.3.4.3 Key Species Supported

Riparian habitats constitute less than 1 percent of western landscapes but harbor the most species-rich avifaunas found in arid and semiarid portions of the western United States (Knopf et al. 1988). In Idaho, of the 242 naturally occurring bird species, 112 (46 percent) use riparian habitat as their primary nesting habitat. Many of the other 54 percent also use riparian habitat as a source of water, as migratory corridors, or for other purposes (Idaho Partners in Flight 1998).

Riparian forests benefit migratory birds (e.g., focal species such as yellow warbler and song sparrow) and a diverse assemblage of other riparian-dependent species by providing nesting, foraging, and migrating habitat for bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, a variety of songbirds, mule deer, red fox, and western terrestrial garter snake. Downed and standing dead trees provide nesting and foraging habitat for both resident and migratory birds (e.g., Lewis's woodpecker, wood duck). Riparian habitat also provides cover from predators for a variety of tree-dependent species. Riparian habitat on the Snake River Islands Unit supports Canada geese and ducks (mallards and teal), which nest in riparian shrubs along the interface of the riparian border and shrub-steppe habitat. Studies during the mid-1990s (Zoellick et al. 2004b) indicated that smaller islands that are isolated from the mainland had lower predation rates of waterfowl nests than larger islands, where isolation was a function of channel width, water depth, and water flow. The riparian habitat on Refuge islands provides habitat for nesting landbirds (e.g., yellow warblers, song sparrows, black-headed grosbeaks, willow flycatchers) and other riparian-dependent species. Nests on the Snake River islands are most frequently depredated by raccoons, coyotes, badgers, and mink (Zoellick et al. 2004b). Cowbird parasitism was also identified as a factor affecting nesting success of landbirds on islands (USFWS 2008).

4.3.4.4 Refuge Management Activities

The Refuge manages riparian forests for migratory landbirds and other riparian-dependent species including mammals and herptiles (i.e., inclusive of all reptiles and amphibians). For many years, fire breaks have been maintained along the boundary of the Lake Lowell Unit and extending into the riparian forest. These fire breaks were established to prevent the spread of a fire both within the Refuge and from the Refuge onto private land; they have had the unintended consequence of facilitating establishment of invasive species in these areas. Additionally, some mechanical removal of Russian olive has occurred to reduce ladder fuels that could lead to a running crown fire that would destroy the riparian habitat. These practices have fragmented the riparian forest, and some of the Russian olive removal has resulted in loss of subcanopy for forest landbirds.

The Refuge staff works closely with Canyon County Noxious Weed Control to address noxious weeds on the Refuge. Mechanical removal, application of herbicides, and biological controls are used to control invasive plants at the Lake Lowell Unit with varying degrees of success. Because of the logistical difficulties, limited control efforts have been conducted on the Snake River islands. When manual or chemical weed control has occurred, it has often resulted in the colonization of a different weedy species occurring where the initial weedy species was removed.

4.3.5 Shrub-steppe: Lake Lowell and Snake River Islands

4.3.5.1 Overview

The Refuge contains approximately 760 acres (GIS estimate) of shrub-steppe habitat on the Lake Lowell Unit. The existing upland shrub habitat at the Lake Lowell Unit is relatively isolated as a result of agricultural and urban development surrounding the Refuge. An extensive infestation of cheatgrass is present in the understory of the shrub-steppe habitat around the lake, which has led to an increased frequency and size of wildland fires around the lake compared to historical levels (USFWS 2008). This trend is consistent with the trend observed in cheatgrass dominated rangelands in the Great Basin (Pellant et al. 2004). The overstory canopy cover of sagebrush in this community is variable depending upon the fire history. Habitat is characteristic of Great Basin shrub-steppe habitat, and shrub species typically include sagebrush, bitterbrush, fourwing saltbush, gray/green rabbitbrush, greasewood, spiny horsebrush, and spiny hopsage.

The Snake River Islands Unit contains approximately 550 acres (GIS estimate) of shrub-steppe habitat. The upstream-most islands are predominantly shrub-steppe with little riparian forest. In contrast, downriver islands are bordered with a riparian band with interior uplands characterized by shrub-steppe habitat. Island shrub-steppe habitat is characterized by native bunchgrasses (Great Basin wildrye, beardless wildrye, saltgrass) interspersed with sagebrush and greasewood. As is the case with riparian forest, the Refuge islands have a relatively higher quality shrub-steppe, as indicated by fewer invasive species, than the surrounding mainland. Invasive species on Refuge islands include cheatgrass, Scotch thistle, teasel, Russian olive, and tamarisk.

4.3.5.2 Regional Distribution, Conditions, and Trends

Shrub-steppe habitat once covered approximately 156,000,000 acres of the western United States; however, very little now exists undisturbed or unaltered from its condition prior to Euro-American settlement (Knick et al. 2003). Shrub-steppe habitat has been lost or degraded as a result of a number of factors including agricultural conversion, overgrazing by livestock, invasive species (e.g.,

cheatgrass), expansion of pinyon and juniper woodlands, uncharacteristic wildfires, and fragmentation (Rich et al. 2005). This habitat loss has led to an increasing number of special-status species, including 630 plant and animal species of conservation concern (Rich et al. 2005). As shown in Figure 4-5, conversion of the Snake River Plain to agriculture has disconnected regions north of the Snake River from sagebrush habitat in southern Idaho and northern Nevada.

Virtually all sagebrush lands are managed principally for livestock grazing (Knick et al. 2003). In 2010, over 15,000 permits were issued for more than 8.7 million animal unit months of forage consumption on BLM lands (BLM 2010). Livestock grazing can change the habitat features that directly influence its suitability as habitat for birds by reducing plant species diversity and biomass.

Euro-American settlement changed the composition of many native plant communities in the Great Basin, most notably that of shrub-steppe habitat. Introduction of livestock in the late 1800s resulted in the loss of herbaceous understory species, and these areas were quickly colonized by cheatgrass. A significant impact of cheatgrass on shrub-steppe habitats is its role in increasing the frequency and extent of wildfires in the Great Basin (Hull and Pechanec 1947). In the Great Basin, wildfires and associated invasive plant species have caused ecological degradation on a large scale. Extensive wildfires in the summer of 1999 burned nearly 1,700,000 acres of public land. This record fire year was followed by another large fire year in 2000, with approximately 990,000 acres of public land burned (Pellant et al. 2004). The complex interaction of cheatgrass, wildfires, and invasive weeds is the greatest concern of the Great Basin's largest land manager, BLM (Pellant et al. 2004).

4.3.5.3 Key Species Supported

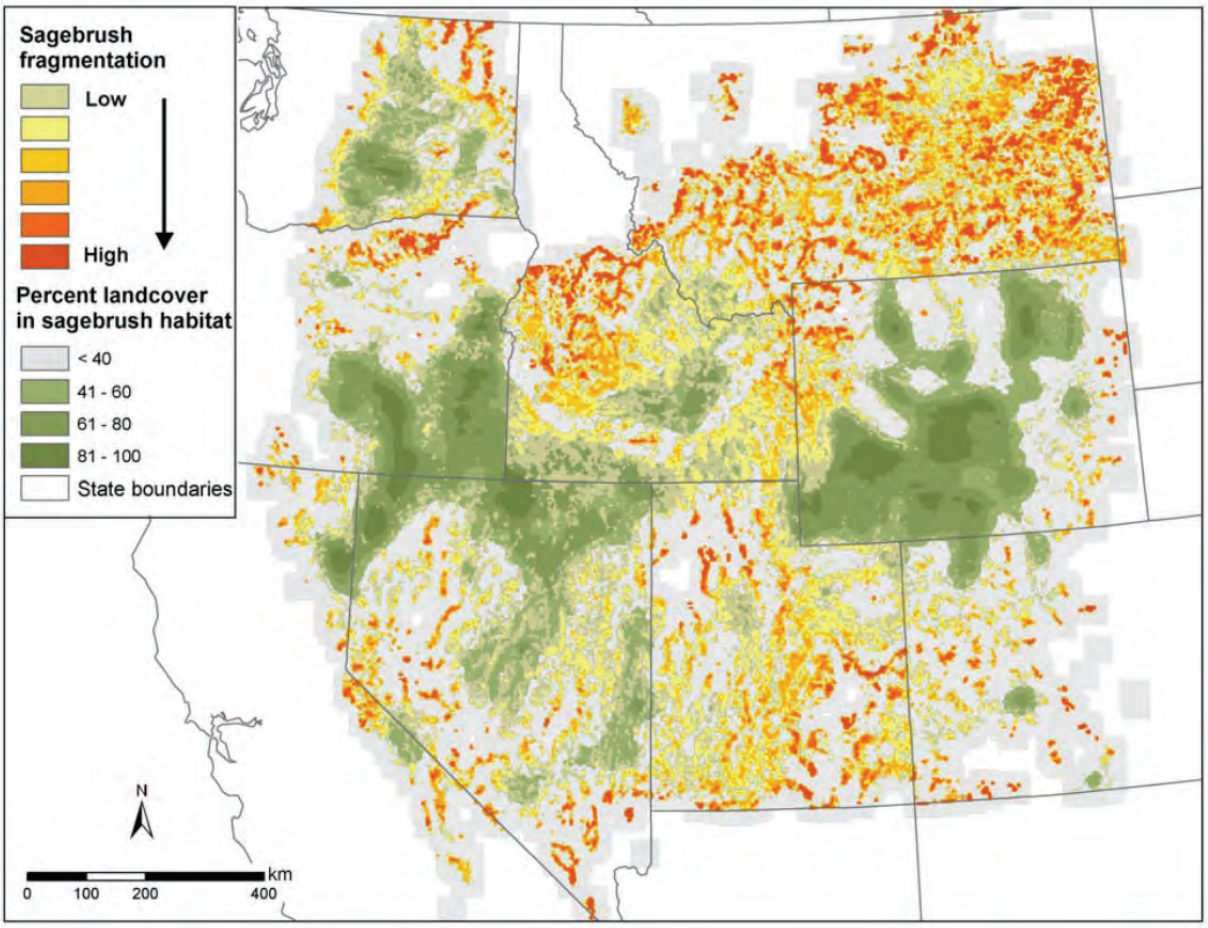
Shrubland and grassland bird populations are declining faster than any other group of species in North America (Dobkin 1994; Knopf 1994; Saab and Rich 1997; Vickery and Herkert 1999). These species represent an important component of the biodiversity of the western United States but have seen little conservation action until recently. Now, Brewer's sparrow, sage sparrow, and sage thrasher, the three primary passerine species of sagebrush habitats, receive special conservation status in one or more western states (Knick and Rotenberry 2002).

Focal species on the Refuge that depend upon shrub-steppe habitat include sage thrasher and loggerhead shrike on shrub-steppe habitat adjacent to Lake Lowell and Canada goose and mallard on shrub-steppe habitat on the Snake River Islands Unit. Other species dependent upon shrub-steppe habitat include a variety of raptors, sparrows, horned lark, and western meadowlark.

4.3.5.4 Refuge Management Activities

Control of invasive species and restoration of native bunchgrass and forb communities under a sagebrush-shrub canopy is a priority management activity at the Refuge. Chemical control of cheatgrass followed by reseeding of a mix of native shrubs and grasses has been successful on the Refuge. After recent fires, rehabilitation work has included chemical control and reseeding with native species. Although cheatgrass reinvades after several years, this approach has resulted in the

Figure 4-5. Sagebrush Fragmentation in the Western United States



Source: Knick et al. (2003).

establishment of a population of native shrubs and grasses in areas previously dominated by cheatgrass. There is a biological control agent for cheatgrass (the soil fungus *Pyrenophora semeniperda*) that may be considered for future management of cheatgrass in shrub-steppe habitat, should it be approved for use.

4.3.6 Agricultural Pastures and Croplands

4.3.6.1 Overview

For nearly 70 years, Refuge staff and cooperative farmers have planted agricultural crops to provide forage for migratory waterfowl and resident wildlife. On the Refuge, a rotation of five crops has been grown in recent times including corn, beans, peas, wheat (winter and spring), and alfalfa. At one time, approximately 400 acres were farmed on the Refuge. In 2011, two cooperators farmed approximately 260 acres, which comprised approximately 65 acres in alfalfa, 65 acres in corn, 40 acres in beans, and 90 acres in wheat.

4.3.6.2 Regional Distribution, Conditions, and Trends

The transformation of parts of the Snake River Plain from sagebrush desert to agricultural lands began in the mid-1800s and was made possible through irrigation (Dixon and Johnson 1999). As indicated in Figure 4-2, approximately 15 percent, or 1,298,189 acres, of the Middle Snake River Subbasin is used for agricultural purposes (Ecovista and IDFG 2004). Agricultural use in the subbasin is concentrated in areas of flat terrain adjacent to the Snake River, with irrigation water coming from the Snake River or its tributaries.

Substantial changes in agricultural practices in recent years have been noted on lands surrounding the Refuge. These changes include growing higher-valued specialty crops such as seed alfalfa, onions, and mint; using more efficient harvesting equipment so little waste grain remains in the field; and fall plowing and tilling often by mid-November, which is prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue in the future, on-refuge cropland management will be essential for waterfowl management in future years.

4.3.6.3 Key Species Supported

The key species supported at the Refuge by agricultural pastures and croplands are migratory birds (e.g., focal species such as Canada geese and mallard) and other resident wildlife (e.g., deer, pheasant, and quail).

4.3.6.4 Refuge Management Activities

Special conditions related to agricultural crop management include restrictions on pesticide use, limits to the types of crops grown, preventing alfalfa harvesting from May 1 through June 15 to reduce the risk of destroying nests of ground-nesting birds, and a requirement to have 6 inches of green browse by October 1.

4.4 Major Species Groups

4.4.1 Fish

Game fish in Lake Lowell include largemouth bass, smallmouth bass, yellow perch, black crappie, bluegill, rainbow trout, Lahontan cutthroat trout, channel catfish, and brown bullhead. The IDFG conducts fisheries management activities such as regulating harvest, fish population monitoring, and fish stocking at Lake Lowell. Lake Lowell is managed under general regulations, except for largemouth bass, which are managed under a no-harvest regulation from January 1 through June 30 and a two-fish limit, with none between 12 and 16 inches, from July 1 through December 31 (IDFG 2009b).

Due to its proximity to Idaho's population center, Lake Lowell receives substantial fishing pressure, with largemouth bass being of primary interest to recreational and tournament anglers (IDFG 2009b). The lake has been stocked by IDFG with species both nonnative (i.e., channel catfish) and native (i.e., Lahontan cutthroat from a hatchery source) to Idaho in recent years. The current practice of stocking nonnative fish is inconsistent with USFWS policies (7 RM 10 and 601 FW 3). Because Lake Lowell is an artificially created reservoir, there were no fish that were originally native to its waters. Fish native to Idaho and historically stocked (i.e., naturalized) species come as close to

meeting the policy as possible given the human-made quality of the lake. Since 2003, approximately 6,000 to 9,000 fingerling channel catfish have been planted annually. Additionally, recent plants of Lahontan cutthroat trout fingerlings have ranged from 40,000 to 103,000 annually (IDFG 2009b). Panfish (black crappie, bluegill, and yellow perch) are also popular despite widely fluctuating populations that have led to inconsistent use.

Fish population surveys conducted in 2008 (IDFG 2009b) indicate that the Lake Lowell fish community has become dominated by carp and sucker. Carp represented 58 percent of the catch by number, followed by channel catfish at 27 percent and black crappie at 6 percent. Yellow perch, bluegill, largemouth bass, smallmouth bass, largescale sucker, and northern pikeminnow, represented cumulatively 8 percent of the catch (IDFG 2009b). Results further indicated that Lake Lowell supports few prey-size fish. Younger age classes of panfish, especially black crappie and yellow perch, were nearly absent. In other systems, carp are known to degrade water quality, alter food webs, and negatively impact native or recreationally important fish populations (Jackson et al. 2010; Zambrano et al. 2001). Carp control has intermittently occurred for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell.

4.4.2 Birds

The Refuge provides habitat for over 215 bird species including waterfowl, waterbirds, shorebirds, raptors, and passerines. The Refuge is an important resting and wintering area for birds migrating along the Pacific Flyway. Because of its value to birds, the Refuge has been declared a State Important Bird Area by the National Audubon Society. The Lower Snake River, including the Refuge, has been identified as a bird habitat conservation area in the *Coordinated Implementation Plan for Bird Conservation in Idaho* (Intermountain West Joint Venture 2005). A complete list of all birds documented on the Refuge is included in Appendix E.

4.4.2.1 Waterbirds

The Intermountain West's dispersed lakes, marshes, playas, rivers, streams, riparian zones, and freshwater and brackish wetlands host about 40 waterbird species. The region supports approximately 500,000 breeding waterbirds and a few million migrants, including many or most of the world's California gulls, eared grebes, white-faced ibises, and American white pelicans (Ivey and Herziger 2006). Waterbirds are a diverse group of species and include cranes, rails, coots, gulls, terns, grebes, cormorants, herons, egrets, bitterns, ibises, pelicans, loons, and others—essentially, all aquatic bird species except waterfowl (i.e., ducks, geese, and swans) and shorebirds (e.g., sandpipers and plovers). To complete portions of their life cycles, waterbirds are dependent on aquatic habitats, which, in the arid Intermountain West, include wetlands that are susceptible to natural cycles of droughts and floods.

The competing demands for water in support of human uses such as agriculture, development, and recreation pose the greatest threats to regional waterbird populations (Ivey and Herziger 2006). Because of the erratic water regime in the arid Intermountain West, wetland habitats are often insufficient to support waterbirds during drought periods (Ivey and Herziger 2006). Human-made reservoirs have a primary purpose of water delivery for irrigation and/or power generation, but they also have a secondary benefit to waterbirds and waterfowl by providing nesting habitat. Water levels of reservoirs are not managed for waterbird habitat, and as a result water-level management activities can impact nesting areas. This management practice can cause productivity problems for waterbirds as a result of the loss or abandonment of eggs or young due to flooding or stranding. On the Refuge,

western and Clark's grebe nesting colonies have been surveyed in the smartweed emergent wetland community in the no-wake zone on the east end and on the south side of the lake. This area also provides foraging habitat for pelicans and cormorants. Wakes created by motorized boats can inundate grebe nests, contribute to shoreline erosion, and degrade smartweed and emergent vegetation, making these habitats less suitable for waterbird nesting and foraging. Invasive exotic plants also pose a threat to many waterbird habitats in the region by replacing native vegetation and reducing wetland habitat quality for waterbirds.

4.4.2.2 Waterfowl

Numbers of wintering waterfowl on the Refuge peaked in the early 1960s between 500,000 and 750,000 birds (USFWS 2008). Refuge estimates of current wintering waterfowl populations at Lake Lowell are approximately 15,000 geese in mid-November and up to 150,000 ducks in mid-December. The Snake River also provides wintering waterfowl habitat for a variety of species including goldeneyes, scaup, mergansers, buffleheads, wood ducks, green-winged teal, and a large number of mallards. The conversion of large areas of local grasslands and wetlands to intensive farming, which has occurred since the 1960s, and changes in agricultural practices (as described in Section 4.3.6) have reduced the amount of local habitat available for waterfowl and may explain the reduction in waterfowl populations using the Refuge.

Waterfowl breeding population surveys of the Snake River are conducted annually by IDFG from Guffey Bridge to Farewell Bend, Oregon, and on the Payette River from its mouth to Emmett, Idaho. The three-year average from 2007 through 2009 of 692 breeding pairs of all species of geese is below the minimum goal of 900 breeding pairs identified in the IDFG 1991-1995 waterfowl management plan (IDFG 2009a). A total of 1,584 Canada geese and 664 breeding pairs were observed in 2009, in addition to large flocks of white-fronted geese (14,154 birds), snow geese (13,395), and Sandhill cranes (1,100) (IDFG 2009a).

The population index for the Pacific population of Canada goose in 2011 was 166,300, 15 percent higher than in 2010 (USFWS 2011c). These indices increased by 4 percent per year over the past 10 years. The index for the western Central Flyway population of snow and Ross's geese was a count of 196,100, 18 percent fewer than in 2010. These populations have increased 10 percent per year from 2002 through 2011. For the second year in a row, major swan areas could not be surveyed during the Service's waterfowl population survey, which likely accounts for the low counts of the past few years. Despite variation in survey coverage, population estimates have shown no trend over the last 10 years (USFWS 2011c). Numbers of tundra swans on breeding grounds increased in 2011 from 2010, and the nest index was 40 percent greater than the 10-year average. However, the total bird index for tundra swans was 28 percent lower than in 2010 (USFWS 2011c). The total population estimate for all duck species was approximately 45.6 million birds, which represents an 11 percent increase over the 2010 estimate and was 35 percent above the long-term average from 1955 through 2010 (USFWS 2011c).

4.4.2.3 Shorebirds

The Intermountain West provides breeding habitat for 11 species of shorebirds and stopover habitat for an additional 23 species during their annual migration (Oring et al. 2000). Perhaps a million shorebirds breed in the Intermountain West, and millions of additional shorebirds migrate annually through the area (Oring et al. 2000). The Great Basin is one of six bird conservation regions in the

Intermountain West, and it stands out as enormously important for both breeding and migrating shorebirds (Oring et al. 2000).

The Refuge is included on the list of managed shorebird sites in the *Intermountain West Shorebird Plan*. Shorebirds that breed on the Refuge include American avocet, black-necked stilt, killdeer, spotted sandpiper, and Wilson's snipe. Shorebirds that stop over at the Refuge include Wilson's phalarope, red-necked phalarope, long-billed dowitcher, marbled godwit, western sandpiper, and least sandpiper. Lake Lowell is documented as having peak shorebird numbers ranging from 10,000 to 20,000 (Oring et al. 2000).

4.4.2.4 Raptors

The Morley Nelson Snake River Birds of Prey National Conservation Area, encompassing 485,000 acres along 81 miles of the Snake River, contains the highest concentration of noncolonial-nesting raptors of any location in the world (Kochert and Pellant 1986). This area provides habitat for approximately 800 pairs of falcons, eagles, hawks, and owls to breed and raise their young from mid-March through June (Visit Idaho 2011).

Raptors documented as breeding on the Refuge include osprey, bald eagle, northern harrier, Cooper's hawk, Swainson's hawk, red-tailed hawk, and American kestrel. Results from autumn raptor migration counts conducted at Boise Ridge, Idaho, from 1993 through 2005 suggest an increasing trend in the numbers of turkey vulture, osprey, Cooper's hawk, red-tailed hawk, and merlin. A decreasing trend in the numbers of northern goshawk, Swainson's hawk, and American kestrel was observed, and counts of northern harrier, sharp-shinned hawk, and golden eagle were relatively stable (Smith et al. 2008).

4.4.2.5 Passerines

Passerine populations have declined throughout the Intermountain West due to conversion of shrub and grassland habitats to agriculture, habitat fragmentation, and degradation of riparian habitats due to grazing. In a recent study of the distribution and abundance of bird populations dependent upon shrub-steppe habitats in the Intermountain West, significant declining population trends were found for 16 of the 25 upland bird species examined (Dobkin and Sauder 2004). Many of the species with declining populations were passerines including horned lark, green-tailed towhee, chipping sparrow, Brewer's sparrow, lark sparrow, black-throated sparrow, sage sparrow, grasshopper sparrow, white-crowned sparrow, western meadowlark, and Brewer's blackbird.

Many neotropical migratory landbirds that occur on the Refuge are dependent upon riparian habitat as their primary nesting habitat. Dobkin and Sauder (2004) found populations of many riparian-dependent species to be in decline in the Intermountain West, including willow flycatcher, orange-crowned warbler, Wilson's warbler, song sparrow, and Bullock's oriole.

4.4.3 Mammals

Over 25 species of mammals have been observed on the Refuge. The Refuge supports a population of mule deer; however, the herd size is unknown. White-tailed deer and elk also occur on the Refuge but are far less common. As deer habitat adjacent to the Lake Lowell Unit has been lost to urbanization, deer have become more concentrated on the Refuge and remaining adjacent rural lands. This concentration has resulted in conflicts with the surrounding community, due to depredation on

agricultural lands (including orchards) and increases in collisions with vehicles. Deer cross major roads (e.g., Lake Shore Drive, Orchard Avenue) as they travel from the cover and shelter on the Refuge to forage areas in adjacent agricultural fields and orchards.

Statewide, mule deer populations have declined since the 1950s and 1960s, and the long-term outlook for mule deer is that of slowly diminishing habitat quantity and quality over time (IDFG 2010b). The Refuge is located in the IDFG Snake River Population Management Unit (PMU). According to the IDFG report, the deer population has probably changed very little since historical times in this PMU, and accounts of trappers through this area in the mid-1800s indicated that buffalo, elk, pronghorn, and bighorn sheep were far more common than mule deer. Given the low densities of deer and low priority for deer in this PMU, little data are available to indicate what population trends have occurred over time (IDFG 2010b).

Other commonly occurring species on the Refuge include North American river otter, coyote, red fox, striped skunk, raccoon, long-tailed weasel, mink, yellow-bellied marmot, fox squirrel, northern pocket gopher, North American beaver, mountain cottontail, and various mice.

A complete list of all mammals documented on the Refuge is included in Appendix E.

4.4.4 Reptiles and Amphibians

Reptiles documented on the Refuge include western terrestrial garter snake, gopher snake, racer, striped whipsnake, western rattlesnake, and painted turtle. Amphibians documented on the Refuge include bullfrog, Pacific tree frog, and Great Basin spadefoot toad. A complete list of all reptiles and amphibians documented or potentially occurring on the Refuge is included in Appendix E.

4.4.5 Invertebrates

Invertebrate surveys conducted on the Refuge in 2010 and 2011 documented 13 scientific orders, consisting of the following: beetles (Coleoptera); earwigs (Dermaptera); flies (Diptera); true bugs (Hemiptera); aphids and relatives (Homoptera); bees, wasps, and ants (Hymenoptera); butterflies and moths (Lepidoptera); nerve-winged insects (Neuroptera); grasshoppers and relatives (Orthoptera); springtails (Collembola); dragonflies and damselflies (Odonata); thrips (Thysanoptera); and caddisflies (Trichoptera) (Castrovillo 2010). Other orders have been found on the Refuge and are listed in Table E-5 in Appendix E.

Mosquito control using aerial application of the larvicide *Bacillus thuringiensis israelensis* (Bti) was begun in 2004. Applications begin in the spring as soon as the identified thresholds of six larvae per dip are found. Applications are site specific to areas with high larval levels. Areas treated with Bti have been primarily along the south edge of Lake Lowell, Upper Dam Marsh, and a few other wetland areas. Most treatments occur in water less than 18 inches deep. In some years, more than 250 acres have been treated at one time, with several applications over the course of spring and summer.

4.5 Threatened, Endangered, and Sensitive Species

One goal of the Refuge System is “to conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.” In the policy clarifying the mission of the Refuge System (601 FW 1), it is stated that “we protect and manage

candidate and proposed species to enhance their status and help preclude the need for listing." In accordance with this policy, the CCP planning team considered species with Federal or State status and other special-status species in the planning process.

Table 4-3 includes special-status species that are known to occur or are likely to occur at the Refuge. "Special status" in this discussion includes species that are federally or state-listed, candidates for Federal listing, or species of concern at the State or Federal level.

Table 4-3. Federally and State-listed Species Potentially Occurring on the Refuge

Species	Federal Status[a]	Idaho Status[b]	Breeds on Refuge[c]
Birds			
American avocet		G5/S5B	X
American white pelican		G3/S1B	
Bald eagle		G4/S3B,S4N	X
Black-crowned night heron		G5/S2B	X
Black rosy-finch		G4/S3	
Black tern		G4/S1B	X
Black-necked stilt		G5/S3B	X
Brewer's sparrow		G5/S3B	
Burrowing owl	SOC	G4/S2B	
California gull		G5/S2B, S3N	X
Caspian tern		G5/S2B	X
Cattle egret		G5/S2B	
Clark's grebe		G5/S2B	X
Common loon		G5/S1B, S2N	X
Ferrugionous hawk		G4/S3B	
Flammulated owl		G4/S3B	
Forester's tern		G5/S1B	
Franklin's gull		G4G5/S2B	
Grasshopper sparrow		G5/S2B	
Great egret		G5/S1B	X
Greater sage-grouse	Candidate	G4/S2	
Harlequin duck		G4/S1B	
Hooded merganser		G5/S2B, S3N	
Lesser scaup		G5/S3	
Lewis's woodpecker		G4/S3B	
Loggerhead shrike	SOC		X
Long-billed curlew	SOC	G5/S2B	
Merlin		G5/S2B, S2N	
Northern goshawk	SOC		
Northern pintail		G5/S5B, S2N	X
Peregrine falcon		G4T3/S2B	
Sandhill crane		G5/S3B	
Short-eared owl		G5/S4	
Snowy egret		G5/S2B	X
Swainson's hawk		G5/S3B	X
Trumpeter swan	SOC	G4/S1B,S2N	
Western grebe		G5/S2B	X
White-faced ibis	SOC	G5/S2B	
Wilson's phalarope		G5/S3B	
Yellow-billed cuckoo	Candidate	G5/S2B	
Fish			
Bull trout	T (CH)	G3/S3	

Table 4-3. Federally and State-listed Species Potentially Occurring on the Refuge

Species	Federal Status[a]	Idaho Status[b]	Breeds on Refuge[c]
Lahontan cutthroat trout	T		
Herptiles			
Columbia spotted frog	Candidate	G4,T2,T3/S2	
Northern leopard frog	SOC	G5/S2	
Western toad	SOC		
Mammals			
Gray wolf	Recovery	G4/S3	
North American wolverine	Candidate	G4,T4/S2	
Northern Idaho ground squirrel	T	G2,T2/S1	
Southern Idaho ground squirrel	Candidate	G2,T2/S1	
Mollusks			
Bruneau hot springsnail	E	G1/S1	
Snake River physa snail	E	G1/S1	
Plants			
Howell's spectacular thelypody	T	G5,T4Q/S2	
Packard's milkvetch	Candidate	G5,T1/S1	
Slickspot peppergrass	T (PCH)	G2/S2	
Whitebark pine	Candidate	G3,G4/S3	

[a] Federal Status: T = Threatened; E = Endangered; Candidate = Candidate; SOC = Species of Concern; (CH) = Designated critical habitat; (PCH) = Proposed critical habitat.
[b] Idaho Status: G1 or S1 = Critically imperiled: at high risk because of extreme rarity (often five or fewer occurrences), rapidly declining numbers, or other factors that make it particularly vulnerable to rangewide extinction or extirpation; G2 or S2 = Imperiled: at risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to rangewide extinction or extirpation; G3 or S3 = Vulnerable: at moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to rangewide extinction or extirpation; G4 or S4 = Apparently secure: uncommon but not rare; some cause for long-term concern due to declines or other factors; G5 or S5 = Secure: common, widespread, and abundant; Q = Questionable taxonomy: taxonomic distinctiveness of this entity at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower conservation priority.
[c] Nests on Refuge: X = Known to nest on Refuge on either Lake Lowell or Snake River Islands Units.

Some of the species in the table above are listed as special status species that occur in counties that contain or are adjacent to Deer Flat NWR. Those species are discussed in further detail below.

Yellow-billed Cuckoo (*Coccyzus americanus*): Taylor (2000) published the following "Status of the Yellow-Billed Cuckoo in Idaho":

> In southwestern Idaho the Yellow-billed Cuckoo has historically been considered a "rare summer visitor and breeder, perhaps erratic, in the western part of the Snake River Valley" (Larrison et al. 1967). Sites of records in the last quarter century include Battle Creek and Crane Creek Reservoir, Owyhee Co. (Svingen 1996, T. Rich pers. comm.), an island in the Snake River, Fort Boise Wildlife Management Area (W.M.A.), and Lake Lowell, Canyon Co. (Rogers 1978, Taylor and Trost 1987, J. Gatchette pers. comm., G. Kaltenecker pers. comm.), Prairie, Elmore Co. (Rogers 1979), Swan Falls Dam, Ada Co. (Rogers 1985), Hayspur Fish Hatchery, Blaine Co. (Svingen 1997), and the Twin Falls area, Twin Falls Co. (Rogers 1984). Yellow-billed Cuckoos have not been recorded more than once at any of these locations, except for the single records from the 1970s, 1980s, and 1990s at Lake Lowell.

> There are probably not more than a few dozen pairs breeding annually in the state, and quite possibly fewer than ten pairs. The Yellow-billed Cuckoo should be considered one of the most endangered bird species in Idaho. It could easily become extirpated from the state in the near future. In Idaho, Yellow-billed Cuckoo occupy riparian areas with a well-developed understory. Little ecological research has been conducted on the riparian vegetation of the Snake and other rivers in Idaho, but much of this vegetation has undergone modification and deterioration (Dixon and Johnson 1999). Restoration of large areas of riparian cottonwood with a thick understory, particularly willow (Marshall et al. 1996), would probably benefit the Yellow-billed Cuckoo in Idaho greatly.

Bull trout (*Salvelinus confluentus*): Historically, bull trout used the Snake River for foraging, migration, and overwintering habitat; the Snake River currently plays an important role in providing a corridor for exchange of bull trout among populations in its tributaries (USFWS 2010a). Critical habitat for bull trout in the Snake River is located from the mouth upstream to Brownlee Dam (50 C.F.R. 17), approximately 55 miles downstream from the lower end of the Refuge. In sampling conducted between 1998 and 2001, no bull trout were documented in the mainstem Snake River above Brownlee Dam (Chandler et al. 2003). Bull trout do not occur in Lake Lowell.

Bull trout can exhibit either a resident or migratory life history strategy. Resident bull trout complete their entire life cycle in the streams and tributaries where they spawn and rear. Migratory bull trout spawn and rear in streams for one to four years before migrating to a lake (adfluvial) or river (fluvial) seasonally, and then returning to the stream to spawn. Bull trout are found primarily in colder streams, although individual fish are found in larger river systems throughout the Columbia River Basin (USFWS 2007a). All life history stages are associated with complex forms of cover, including large woody debris, undercut banks, boulders, and pools (USFWS 2007a).

On the mainstem Snake River, the downstream-most islands in the Refuge (Fenzl Island and Darrows Islands/Rapids #1 and #2) are within the upstream-most end of Brownlee Reservoir. The Powder River Basin, which contains designated critical habitat for bull trout, flows into Brownlee Reservoir approximately 45 miles downstream of the Refuge. Brownlee Reservoir contains potential foraging, migration, and overwintering habitat for fluvial populations of bull trout in the Powder River Basin (USFWS 2010a), although most bull trout in the Powder River are currently believed to exhibit resident life histories (USFWS 2002b). It is also likely that bull trout will use the reservoir if migratory individuals become re-established in the drainage of the Weiser River (USFWS 2005), which enters the Snake River at RM 352. This is within the Refuge, but the extent and nature of use and quality of habitat provided are not well understood (USFWS 2005). To function as migratory and overwintering habitat, the mainstem Snake River and reservoirs must provide holding water with adequate temperature, depth, and cover to ensure successful bull trout movement, as well as provide sufficient foraging opportunity (USFWS 2005).

Other tributaries that flow into the Snake River either within, downstream, or upstream of the Refuge also contain or have the potential to support bull trout (e.g., Indian Creek, Payette River, Malheur River, and Boise River). However, bull trout populations in most of these basins are extremely low and/or isolated in headwater areas due to impassable barriers and poor water quality in lower reaches. As bull trout populations increase and restoration actions continue in these basins, the mainstem Snake River will provide an important migratory corridor between upstream and downstream populations of bull trout.

Lahontan cutthroat trout: Although native Lahontan cutthroat trout occur within Malheur County in southeastern Oregon, they are not known to occur in the Snake River or Lake Lowell (USFWS 1995). IDFG has historically stocked Lahontan cutthroat trout in Lake Lowell; however, these fish are of hatchery origin and not considered part of the federally protected species.

Columbia spotted frog (*Rana luteiventris*): Spotted frogs inhabit spring seeps, meadows, marshes, ponds, streams, and other areas where there is abundant vegetation. They often migrate along riparian corridors between habitats used for spring breeding, summer foraging and winter hibernation. The largest known threat to spotted frogs is habitat alteration and loss, specifically loss of wetlands used for feeding, breeding, hibernating, and migrating. Other threats to this species include development, disease, and predation by nonnative species (USFWS 2011f).

Columbia spotted frogs range from extreme southeast Alaska south through British Columbia and Alberta, Canada, western Montana and Wyoming, Idaho, northeastern Oregon, and eastern Washington. Under the Endangered Species Act, there are currently four recognized Distinct Population Segments (DPS) of Columbia spotted frogs: Northern, Great Basin, Wasatch, and West Desert. Columbia spotted frogs in the Nevada, southwestern Idaho, and southeastern Oregon portion of the Great Basin are geographically separate from the remainder of the species and are considered to be the Great Basin DPS. Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and southeastern Oregon (Malheur and Harney counties) but local populations tend to be small (USFWS 2011f). Occupied habitat for the Great Basin population is characterized by sagebrush with stream and pond environments. Columbia spotted frogs in Nevada have been reported from elevations between 5,600 and 8,700 feet, but elevations vary between populations (USFWS 2011f).

Although there is suitable Refuge habitat for this species, there are no known populations here, and it was not documented during amphibian surveys conducted in 2005 and 2006. Additionally, the Refuge is at a lower elevation than nearby populations.

Southern Idaho ground squirrel (*Urocitellus brunneus endemicus*): The southern Idaho ground squirrel occurs in native shrub-steppe habitat containing big sagebrush, bitterbrush, and a variety of native forbs and grasses. Areas of localized abundance are typically associated with human-altered landscapes such as golf courses and row crop or farmed fields (particularly alfalfa and clover). Adult ground squirrels are active from late January or early February to late June or early July when they return to their burrows for hibernation. Threats to the southern Idaho ground squirrel include exotic grasses and weeds, altered fire regime resulting from nonnative grass invasions, habitat fragmentation, competition with the Columbian ground squirrel (*Spermophilus columbianus*), direct killing from shooting, trapping or poisoning, and predation (USFWS 2011d).

Idaho ground squirrels occur in a 38-square-mile area in Idaho that extends from Emmett northwest to Weiser and the surrounding area of Squaw Butte, Midvale Hill, and over to the Henley Basin in Gem, Payette, and Washington counties (USFWS 2013). The range of the southern Idaho ground squirrel is bounded on the south by the Payette River, on the west by the Snake River and on the northeast by lava flows with little soil. Within the Refuge, the northern portion of the Snake River Unit lies along the western boundary of its range. The Lake Lowell Unit is located to south of the known range of this species.

Snake River physa snail (*Haitia [Physa] natricina*): This species occurs on the underside of large cobble- to boulder-sized substrate in swift currents in the mainstem Snake River, generally in the

deepest parts of the river at the margins of rapids (USFWS 2005). Historically, this species has been known to occur from RM 487 to 673.5, but currently it is only known to be present from RM 666 (tailwaters of the Milner Pool) to 673.5 (Minidoka Dam) (USFWS 2005). There is potential for the species to be present downstream to RM 553, but no live specimens have been collected in this area since 1981 (USFWS 2005). The Refuge extends upstream to approximately RM 448.5; therefore, it is not within the known range of Snake River physa snail distribution. It is not known if the Snake River portions within the Refuge historically supported populations of the Snake River physa snail.

Bruneau hot springsnail (*Pyrgulopsis bruneauensis*): This species is endemic to thermal springs and seeps that occur along 5 miles of the Bruneau River in southwest Idaho (USFWS 2007b), located entirely outside of the Refuge. The Bruneau River enters the Snake River at RM 495, approximately 46.5 miles upstream of the Refuge.

Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*): Howell's spectacular thelypody occurs in wet alkaline meadows in valley bottoms, usually in and around woody shrubs that dominate the habitat on the knolls and along the edge of the wet meadow habitat between the knolls (Federal Register 1998). Associated species include greasewood, saltgrass, basin wildrye, and alkali bluegrass (ORBIC 2010). All known remaining populations occur within or directly adjacent to agricultural fields or urban areas. The plants are threatened by habitat modification such as grazing during spring and early summer, trampling, urban development, and competition from nonnative plants (Federal Register 1998).

Howell's spectacular thelypody is known to occur on fewer than 12 small sites located within 100 acres of private lands near North Powder and Haines in eastern Oregon (Baker and Union counties). It formerly also occurred in the Willow Creek Valley in Malheur County (Federal Register 1998). The Refuge is not located within the known range of this species.

Packard's milkvetch (*Astragalus cusickii* var. *packardiae*): Packard's milkvetch is a narrow endemic plant that occurs in habitat characterized by rolling uplands and steep slopes that descend to terraced at elevations ranging from 2,600 to 3,000 feet. This species occurs on sedimentary outcrops which are largely devoid of other native shrubs, grasses, and forbs (Mancuso 1999). It is associated with vegetation dominated by Wyoming sagebrush and native bunchgrasses including bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. However, due to habitat impacts from a century of wildfires, livestock use, and invasive nonnative plant species, much of its historical habitat has been converted to annual grassland dominated by cheatgrass and medusahead (USFWS 2011e). Primary threats to this species and its associated habitat include off-road recreational vehicle use, invasive nonnative grasses, wildfire, and livestock.

This species is only known to occur in the northeastern corner of Payette County, about 15 miles north of the town of Emmett and approximately 15 miles east of the town of Payette, in southwestern Idaho. Its entire known range, which lies between Big Willow Creek to the south and Little Willow Creek to the north, is only approximately 10 square miles (USFWS 2011e). The Refuge is not located within the known range of this species.

Slickspot peppergrass (*Lepidium papilliferum*): Slickspot peppergrass is associated with slickspots, distinct small habitat patches with a clay subsurface soil horizon within the sagebrush-steppe ecosystem. Slickspots are visually distinct openings in the sagebrush-steppe community characterized by soils with high sodium content and distinct clay layers that appear to have formed during the Pleistocene epoch (USFWS 2011g). It occurs in relatively intact habitat dominated by

Wyoming sagebrush and native bunchgrasses including bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. Threats to this species in southwest Idaho include the invasion of nonnative annual grasses including cheatgrass, increased fire frequency, development or destruction of slickspot microsites, habitat fragmentation, and livestock (Federal Register 2009).

Slickspot peppergrass is known to occur only in the Snake River Plain and its adjacent northern foothills in Ada, Canyon, Elmore, Gem, Owyhee, and Payette counties in Idaho (USFWS 2011g); critical habitat has been designated to protect known populations (Federal Register 2011). The Refuge is not located within the known range of this species.

Whitebark pine (*Pinus albicaulis*): Whitebark pine is typically found in cold, windy, high-elevation or high-latitude sites found at or slightly lower than alpine timberline in the upper montane zone in western North America (Tomback et al. 2001). Whitebark pine is ecologically very significant in maintaining snowpack and regulating runoff, initiating succession after fire or other disturbance events, and providing seeds that are a high-energy food source for many species of wildlife. Threats to this species include climate change, white pine blister rust, and mountain pine beetles, or the combination of effects from some or all of these threats.

The species is distributed in Coastal Mountain Ranges (from British Columbia, Washington, Oregon, down to east-central California) and Rocky Mountain Ranges (from northern British Columbia and Alberta to Idaho, Montana, Wyoming, and Nevada) (Tomback et al. 2001). Subalpine habitats likely to support this species do not occur on the Refuge.

4.6 Invasive and Nuisance Species

Both the Lake Lowell and Snake River Islands Units of the Refuge have been colonized by invasive plants and animals. Invasive plant species displace native vegetation, altering the composition and structure of vegetation communities, affecting food webs, and modifying ecosystem processes, thus resulting in considerable impacts to native wildlife.

4.6.1 Plants

Refuge habitats have been colonized by a variety of noxious weeds and invasive plant species, including cheatgrass, Canada thistle, Scotch thistle, rush skeletonweed, perennial pepperweed, purple loosestrife, puncturevine, tamarisk, and Russian olive. Invasive plant species occurring on the Refuge are included in Table E-5 as part of the current wildlife and plants occurring on the Refuge (Appendix E). Currently, a combination of hand removal, mechanical removal, herbicide application, and biological controls are used to help control invasive plants at the Lake Lowell Unit with varying degrees of success. Efforts around the lake have focused on Russian olive, perennial pepperweed, Scotch thistle, Canada thistle, white bryony, and poison hemlock. False indigo bush is the predominant understory species in riparian areas. Its dense growth form and vigorous resprouting prevent any other understory species from establishing. Little work has been done specifically to reduce this species. In upland area, cheatgrass chokes out native and desirable species and is so prevalent that only broad application of a control method (e.g., herbicide, biological control, prescribed fire) will work to reduce this species.

The lake edges in some locations and the Upper Dam Marsh have been invaded by purple loosestrife. Over the past several years, biological controls have substantially reduced the infestation. A

biological control agent for Canada thistle was released many years ago with unknown results. A biological control agent is being considered for tamarisk. There also is a potential biological control agent, a soil fungus (*Pyrenophora semeniperda*), for cheatgrass that is being considered for shrub-steppe habitat on the Refuge, should it be approved for use.

Because of the logistical difficulties, limited control efforts have been conducted on the Snake River Islands Unit. When manual or chemical weed control has occurred, it has often resulted in the removed weedy species being replaced by another weedy species. Many weeds are best controlled by injection, spot spraying, or painted application of herbicide. These applications are time consuming and are most effective when several people work together. Despite the Refuge's application of considerable resources to controlling invasive species, existing budgets and staffing levels do not allow as many acres to be treated for weeds as would be desirable. As a result, weeds are kept in check on areas of the Refuge that receive treatment, but they are spreading elsewhere.

4.6.2 Animals

Several species of nonnative mammals, fish, amphibians, and invertebrates are present within the Lake Lowell and Snake River Islands Units of the Refuge. IDFG has historically stocked Lake Lowell with nonnative channel catfish, black crappie, and Lahontan cutthroat trout, among other species. Carp populations are described in Section 4.4.1. Invasive species present on the Refuge include bullfrog, New Zealand mudsnail, common carp, oriental weatherfish, and feral cats and dogs. Zebra and quagga mussels have not established in the Snake River or Lake Lowell to date; however, these species have been found in neighboring states (Utah and California) and are at risk of becoming established on the Refuge in the future.

Bullfrog: This species is an invasive amphibian that occurs in very warm and sunny ponds, marshes, slow-moving streams and rivers, and ponds (Corkran and Thoms 1996). The range of this species in North America is east of the Rocky Mountains. It was introduced into the West in the 1900s as a source of food (frog legs) and has since spread to other continents. It has also been introduced for sport, for pest control, and accidentally through trout stocking. This species tolerates a wide range of water temperatures and consequently has become invasive across a wide range of aquatic habitats. Control measures include the removal of individuals, introduction of predator species (e.g., largemouth bass), and egg collection. The removal of bullfrogs is unlikely to be a viable management option due to the difficulty of removing all bullfrog eggs, tadpoles, and adults, and preventing surrounding bullfrogs from invading a water body. However, this may be feasible in smaller water bodies isolated from other sources of bullfrog invasions.

Many factors have contributed to the successful invasion of bullfrogs and their negative impacts to native wildlife in North America and elsewhere. In a single season, bullfrogs lay up to 20,000 eggs, while native species lay far fewer eggs. This has led to direct competition with native species for food and habitat. Bullfrogs are opportunistic predators, and prey on any animal smaller than themselves. Their diet consists of fish, reptiles, small mammals, birds, amphibians, and insects. They are also cannibalistic. Bullfrog tadpoles mostly graze on aquatic plants (Bruening 2002). Bullfrogs and Columbia spotted frogs rarely co-occur, but these findings could be the result of competitive exclusion or predation, and it is suspected that bullfrogs likely have contributed to the decline of this species (USFWS 2011f). Additionally, bullfrogs are thought to be carriers of the pathogenic fungus *Batrachochytrium dendrobatidis* (chytrid), which causes the lethal disease chytridiomycosis. This is a fungal disease that has caused mass mortalities and population declines in North America and Europe, and as the cause of at least one, and possibly several, species extinctions (Daszak et al.

2004). Large numbers of bullfrogs were collected at Lake Lowell during amphibian monitoring in 2005 and 2006 (Burch and Koch 2006; Smithers 2006).

New Zealand mudsnail: This species was first found in the Snake River in 1987 and within two years became the dominant snail in the area (EPA 2011). The mudsnail flourishes in degraded water and reproduces quickly, impacting native invertebrate populations by competing for food and habitat. The mudsnail is detrimental to fish populations, vegetation, and other native biota (ODFW 2010). They are established in most large river systems, and educating the public on proper equipment decontamination after use in infested waterways will help prevent the spread into new habitats.

Common carp: This species has been present in the United States since 1877 and in Lake Lowell since at least the 1950s (Kozfkay 2011; USFWS 2010b). Unlike the Asian carps that have been introduced in Oregon and Idaho to control aquatic vegetation in lakes and ponds, common carp are naturally reproducing in most waterways of the northwest.

Common carp directly compete with other species for food (aquatic invertebrates and plankton), while their feeding behavior can cause significant changes in the composition of macrophyte, phytoplankton, and invertebrate communities, altering the food web and trophic structure of aquatic systems (USFWS 2010b). As carp root around in muddy substrates while feeding, they stir up the sediment and damage roots, causing otherwise clear waters to become muddy (Kozfkay 2011). Sediment and organic material suspended in the water column causes subsurface sunlight needed for plant growth to be reduced or eliminated, and photosynthetic plant production and oxygen levels decrease. This results in a decrease of aquatic vegetation and plankton that serve as food and habitat for migratory birds, aquatic invertebrates, and other fish species (Kozfkay 2011; USFWS 2010b).

Fishery managers realized the negative impact carp were having on other fish populations and the aquatic ecosystem of Lake Lowell and began trying to remove the carp, ultimately treating the lake with rotenone in the 1960s (Kozfkay 2011). Carp populations remained low enough for other game and panfish numbers to rebuild, until the 1990s, when a severe drought caused a decline in panfish numbers and an explosion in the carp population (Kozfkay 2011). After several years of poor fishing, IDFG studied ways to improve the lake's fishery, and by 2010 concluded that the carp population was so high that the only way to remove them was to treat the lake with rotenone (Kozfkay 2011). Due to the large size of Lake Lowell, treating with rotenone would be expensive and would kill all of the fish in the lake, not just the unwanted carp. To reduce the amount of rotenone needed and to increase the efficiency of the treatment, the lake would need to be drawn down to extremely low levels, either by extended drought or planned drawdowns (Kozfkay 2011). This could result in temporary negative impacts to birds and wildlife, recreational users, and irrigation districts. Rotenone has been historically used at the Malheur Refuge to control carp populations with varying success, because the treatments have failed to completely eradicate the entire carp population due to the complex network of waterways (USFWS 2010b). If successful at removing carp from Lake Lowell, the rotenone treatment would have a positive long-term benefit to birds and wildlife, game and panfish species, and recreational users of the lake. IDFG, Refuge personnel, and other groups are in the initial stages of determining whether a rotenone treatment is desirable or achievable (Kozfkay 2011). Refuge managers continue to work with Malheur Refuge personnel who are experienced in carp management to develop and implement a carp management strategy for Lake Lowell. Currently, carp are being removed through commercial fishing activities. The amount of carp being removed by these activities is not enough to create any appreciable decrease to the carp population. IDFG is working with other commercial fisherman to increase the number of carp being removed, but as of yet IDFG has not been able to begin a larger removal effort.

Oriental weatherfish: This species is common and widespread in the Snake River Basin. Large numbers of Oriental weatherfish were collected at Lake Lowell during amphibian monitoring in 2006 (Smithers 2006). This species competes with native species for food and habitat, has the potential to transmit disease to other organisms, and preys on native benthic invertebrates (ODFW 2011). Educating the public on proper identification and potential impacts to the ecosystem will help prevent the spread of these fish into new habitats.

Feral cats and dogs: Feral populations of domestic dogs and cats form when people either release their animals or they run away. Feral cats and dogs survive and breed in the wild without any support from humans and depend on native wildlife as their primary food source. Feral animals are not uncommon in rural or urbanized areas and are of conservation concern because of their effects on native prey (Crooks and Soule 1999). Exact numbers are unknown, but scientists estimate that, nationwide, cats kill millions of birds and over a billion small mammals, such as rabbits, squirrels, and chipmunks, each year (Coleman et al. 1997). Feral dogs have also been witnessed chasing large mammals (deer) and feeding on small mammals (Causey and Cude 1980). In addition to preying on wildlife, feral animal populations may also disturb wildlife that may be feeding or nesting nearby.

The occurrence of feral animals on the Refuge has not been studied and is not known at this time; however, it is anticipated that the numbers are high. Feral animals, such as cats and dogs, are regularly seen within the Refuge boundaries. Staff and visitors frequently pick up and/or call in stray dogs and cats that have been dumped on the Refuge by people who presumably cannot care for the animals any longer and assume that they will be cared for there. The Refuge's proximity to the urban interface makes it vulnerable not only to feral animals seeking resources but pets that are uncontrolled and allowed to wander freely. It is also a popular place for locals to exercise with dogs, and, even though there are regulations requiring visitors to keep pets on leash, the incidence of this rule being violated is very high. Dogs allowed to roam at large, even within an owner's voice command range, can kill or injure wildlife.

4.7 Wildlife and Habitat Research, Inventory, and Monitoring

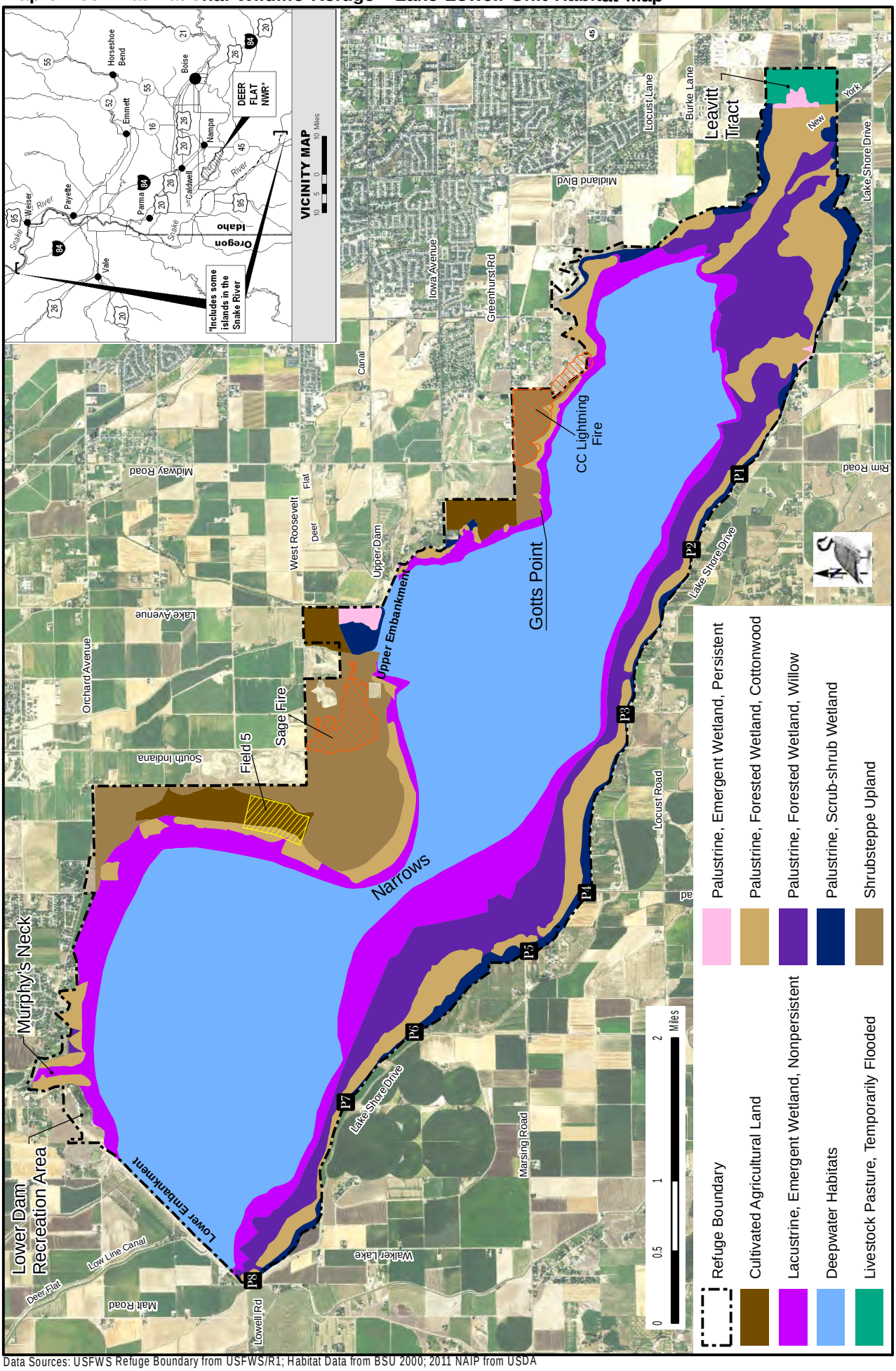
The Refuge lacked an on-staff biologist from 1996 through 2009. Thus, compared with other refuges, there has been little inventory and monitoring data collected. Data that do exist are focused on waterfowl. For wintering waterfowl, there are long-term data from the mid-winter waterfowl survey and weekly ground counts. Refuge staff and volunteers survey waterfowl populations throughout the year to monitor the health of the regional population and help IDFG set hunting limits. Each winter, waterfowl are surveyed weekly at Lake Lowell. Each spring, goose nests are surveyed on the Snake River islands. Each fall, migratory ducks are caught and banded.

A pilot grebe nesting survey was initiated in 2010 to capture the characteristics of nesting grebe population on the Lake Lowell Unit of Deer Flat NWR. The survey includes a pre-nesting inventory, a nesting survey, and a brood count.

In order to inventory the deer population on the Lake Lowell Unit, a deer spotlight survey has been implemented to capture population dynamics.

The Refuge conducted amphibian monitoring at Lake Lowell in 2005 and 2006 as part of the nationwide malformed amphibian survey project. The objective of the survey project was to learn more about declining amphibian populations and determine the prevalence of malformed amphibians in frog populations on national wildlife refuges.

Map 9 Deer Flat National Wildlife Refuge - Lake Lowell Unit Habitat Map



Data Sources: USFWS Refuge Boundary from USFWS/R1; Habitat Data from BSU 2000; 2011 NAIP from USDA
File: 12-005-6 Map Date: 05/14/2012

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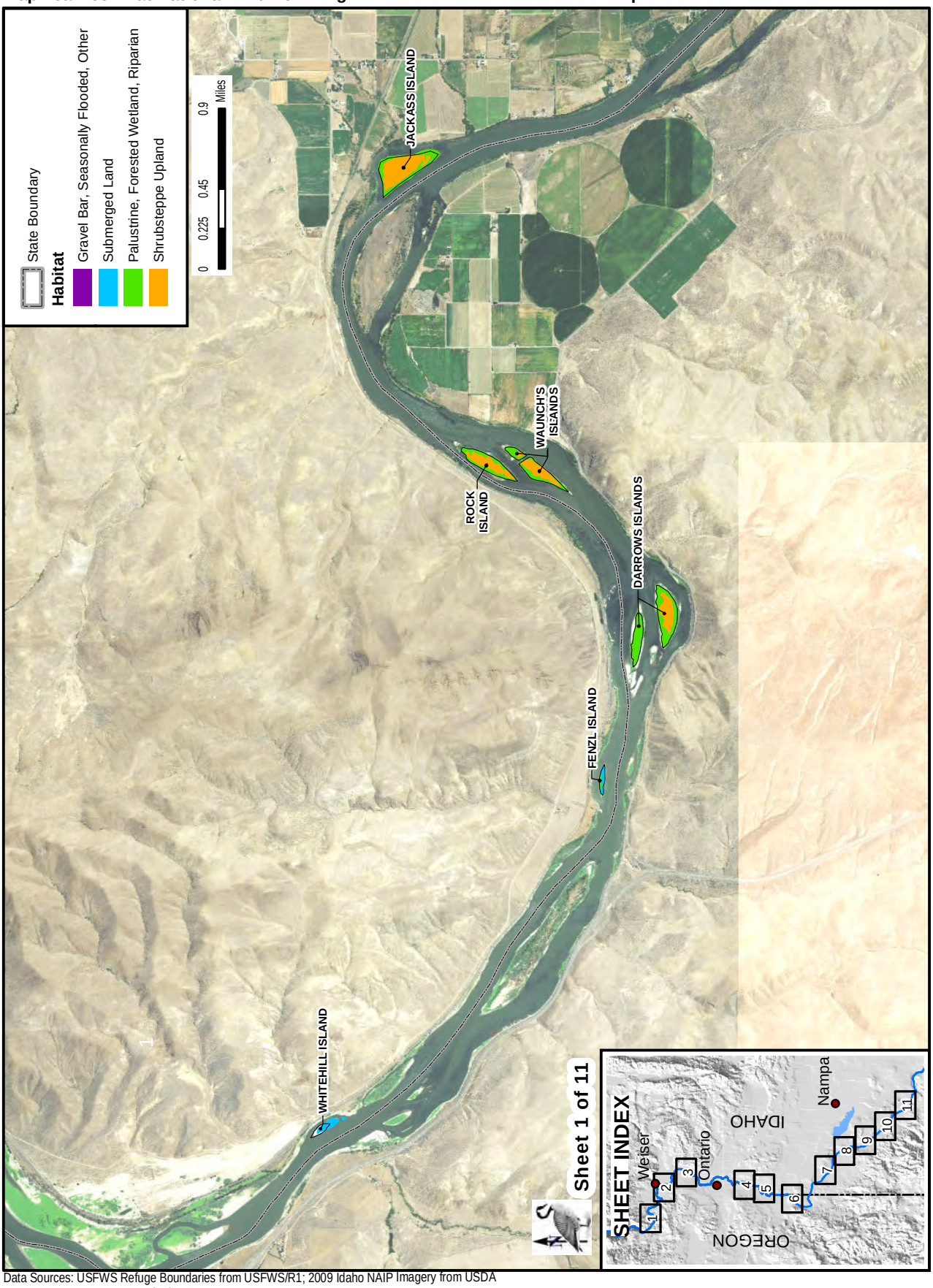
Map 10a Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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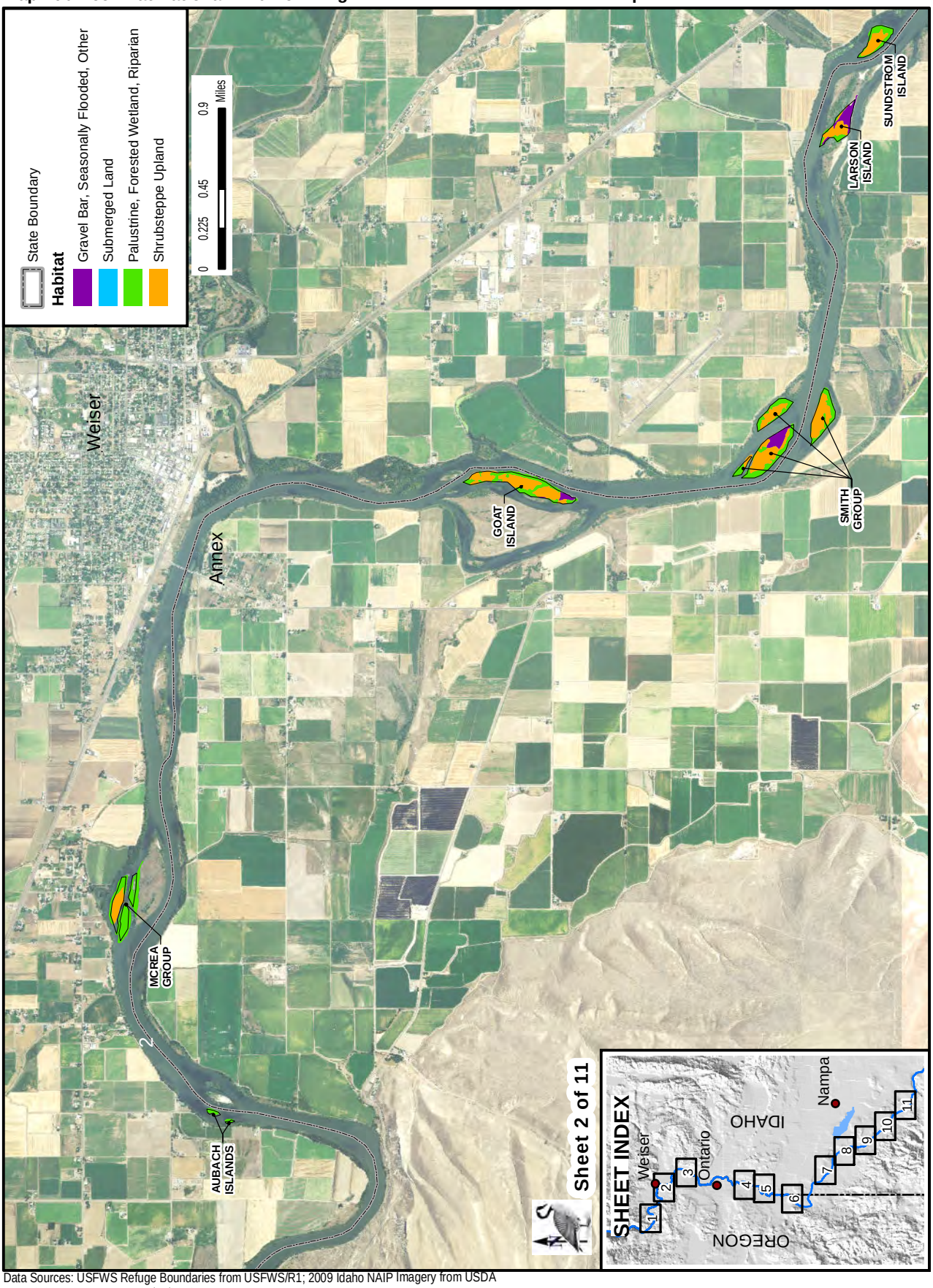
Map 10b Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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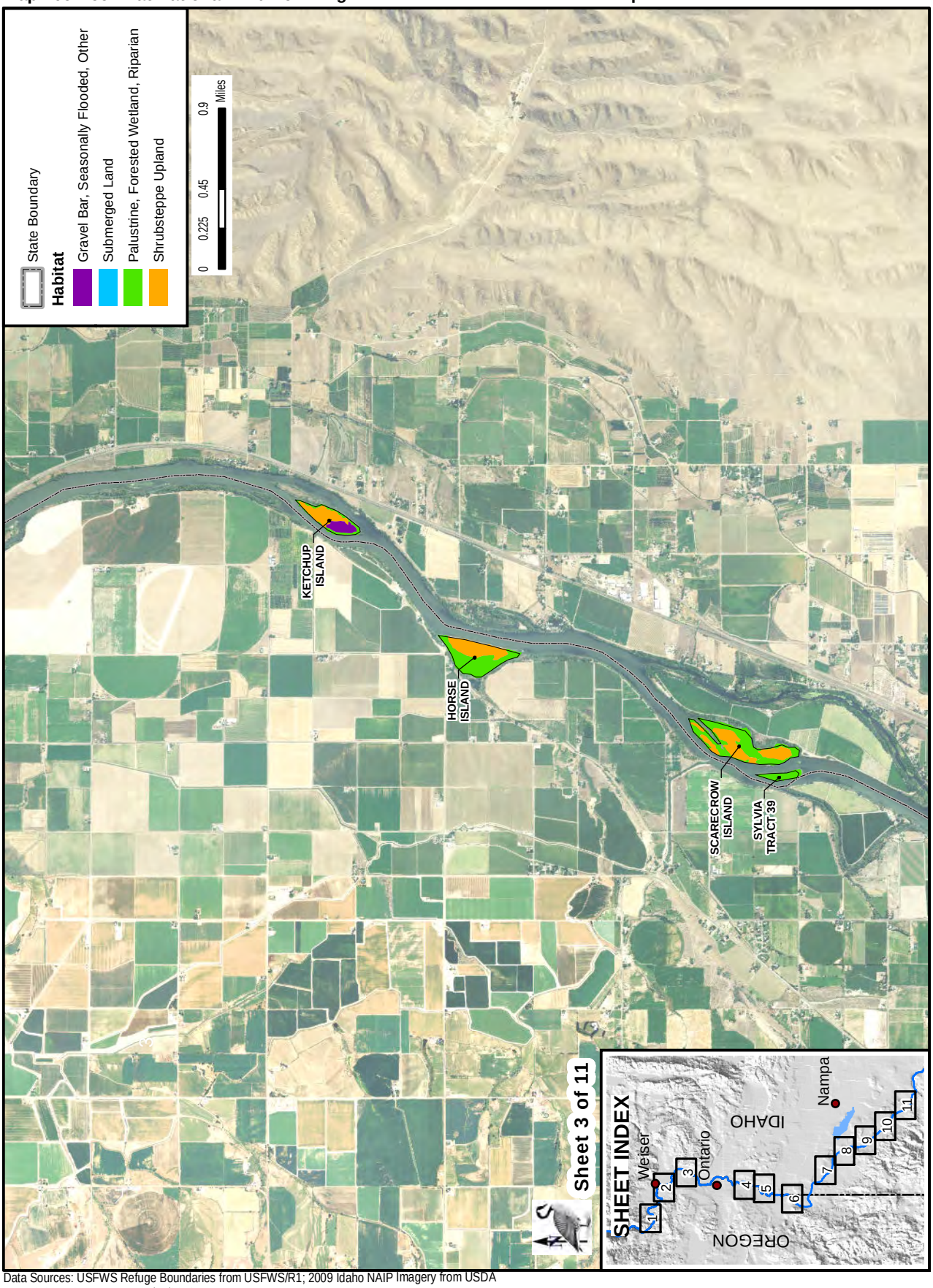
Map 10c Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



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File: 12-005-10 Map Date: 05/17/2012

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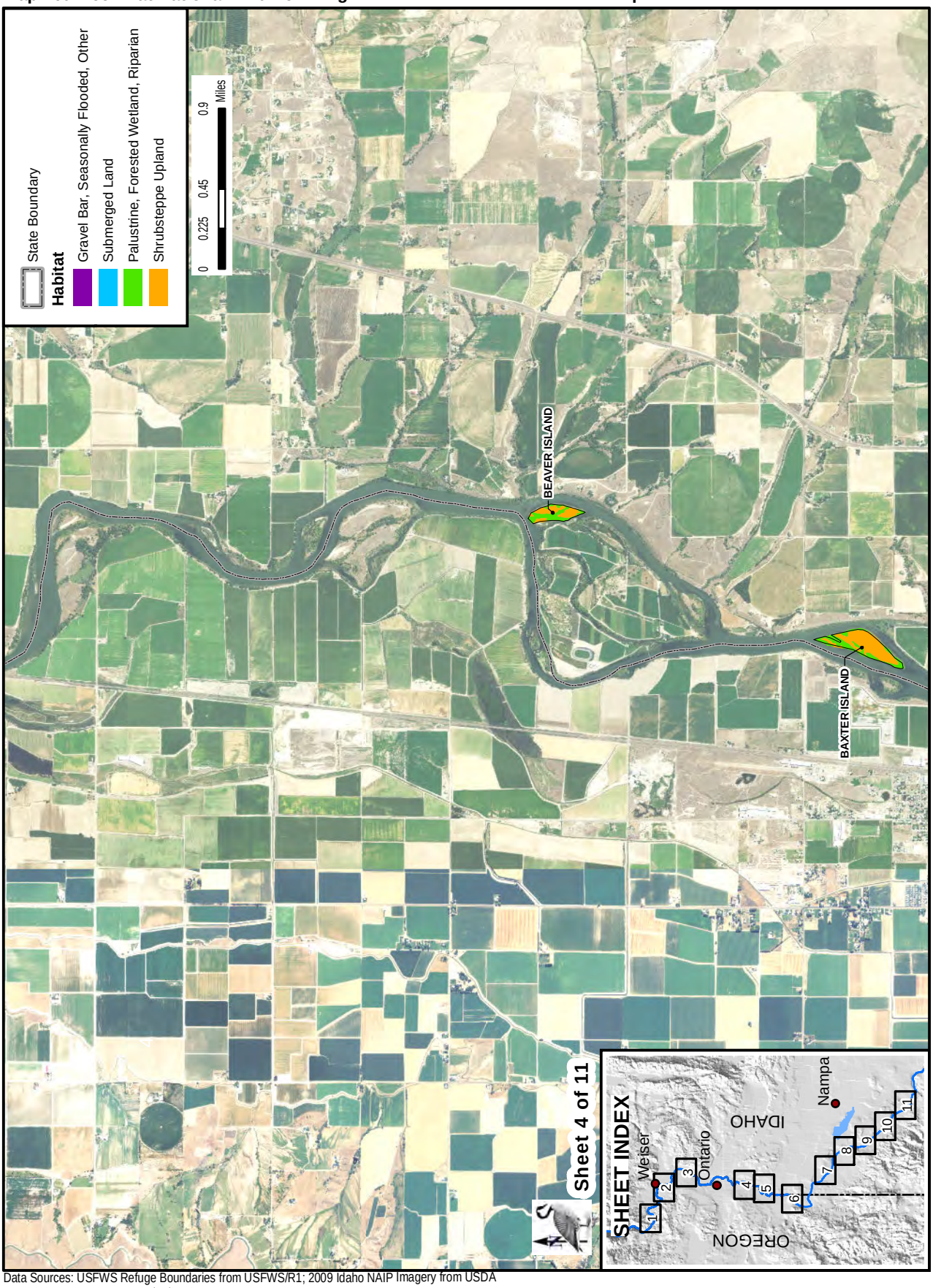
Map 10d Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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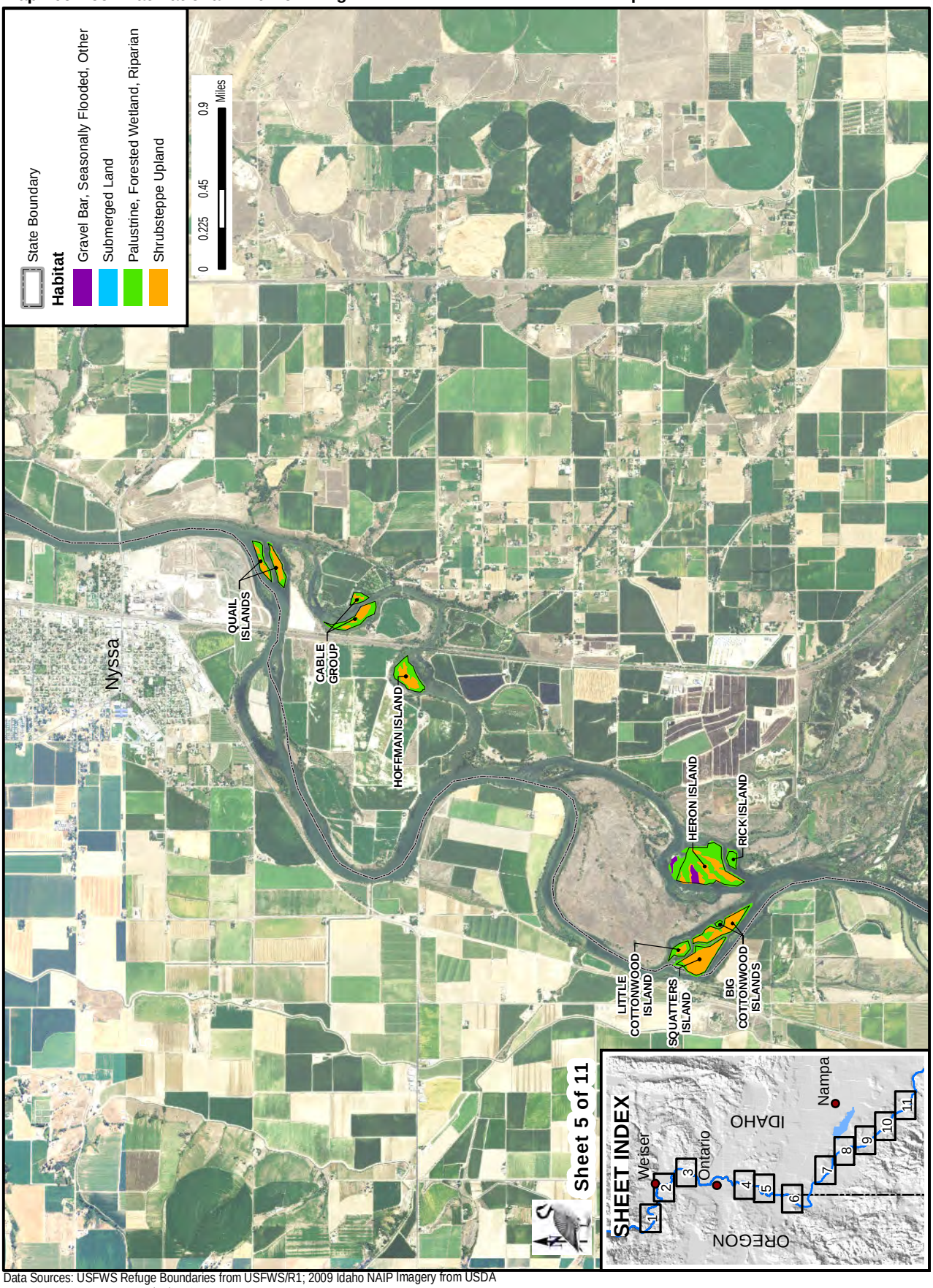
Map 10e Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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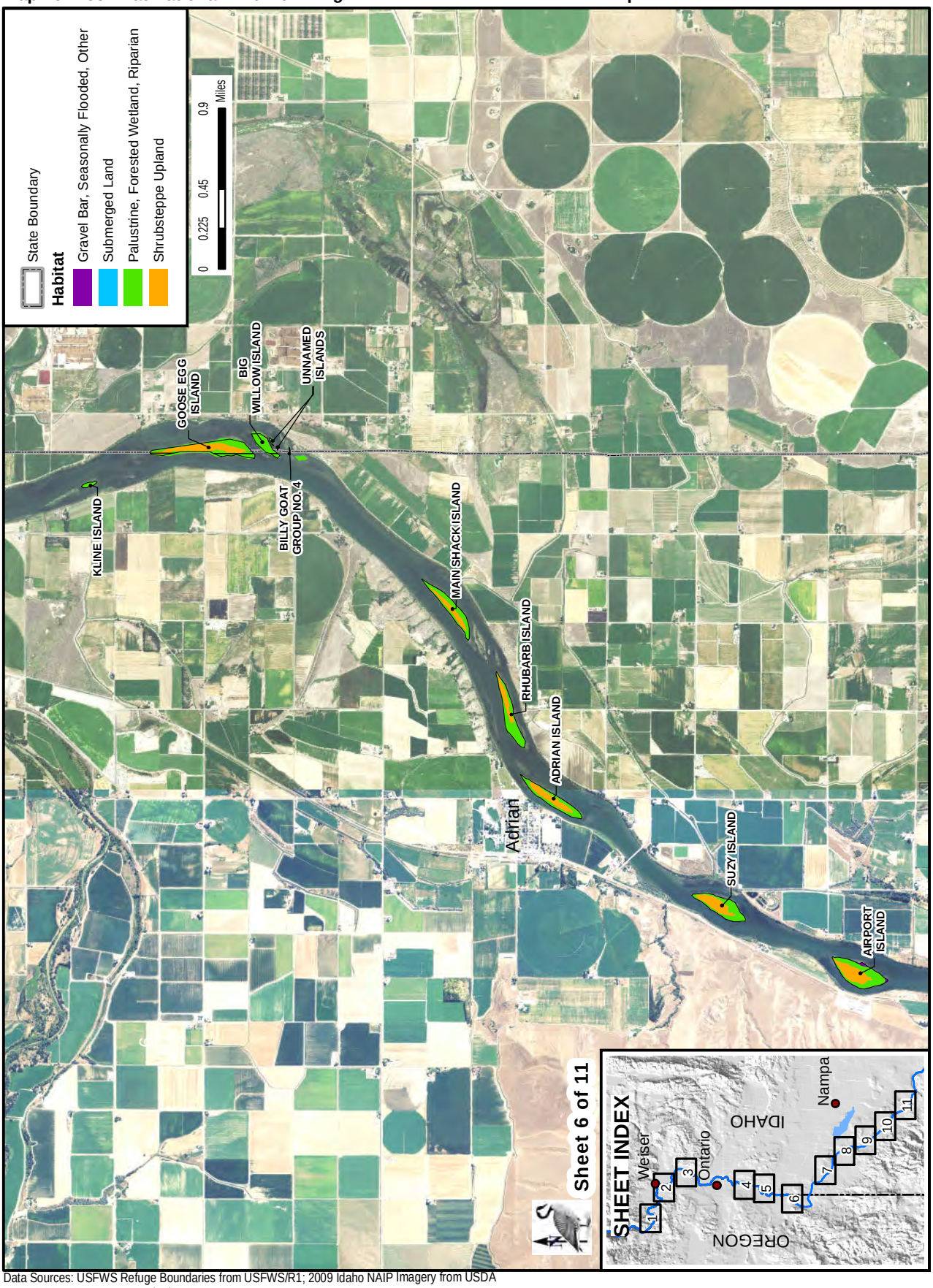
Map 10f Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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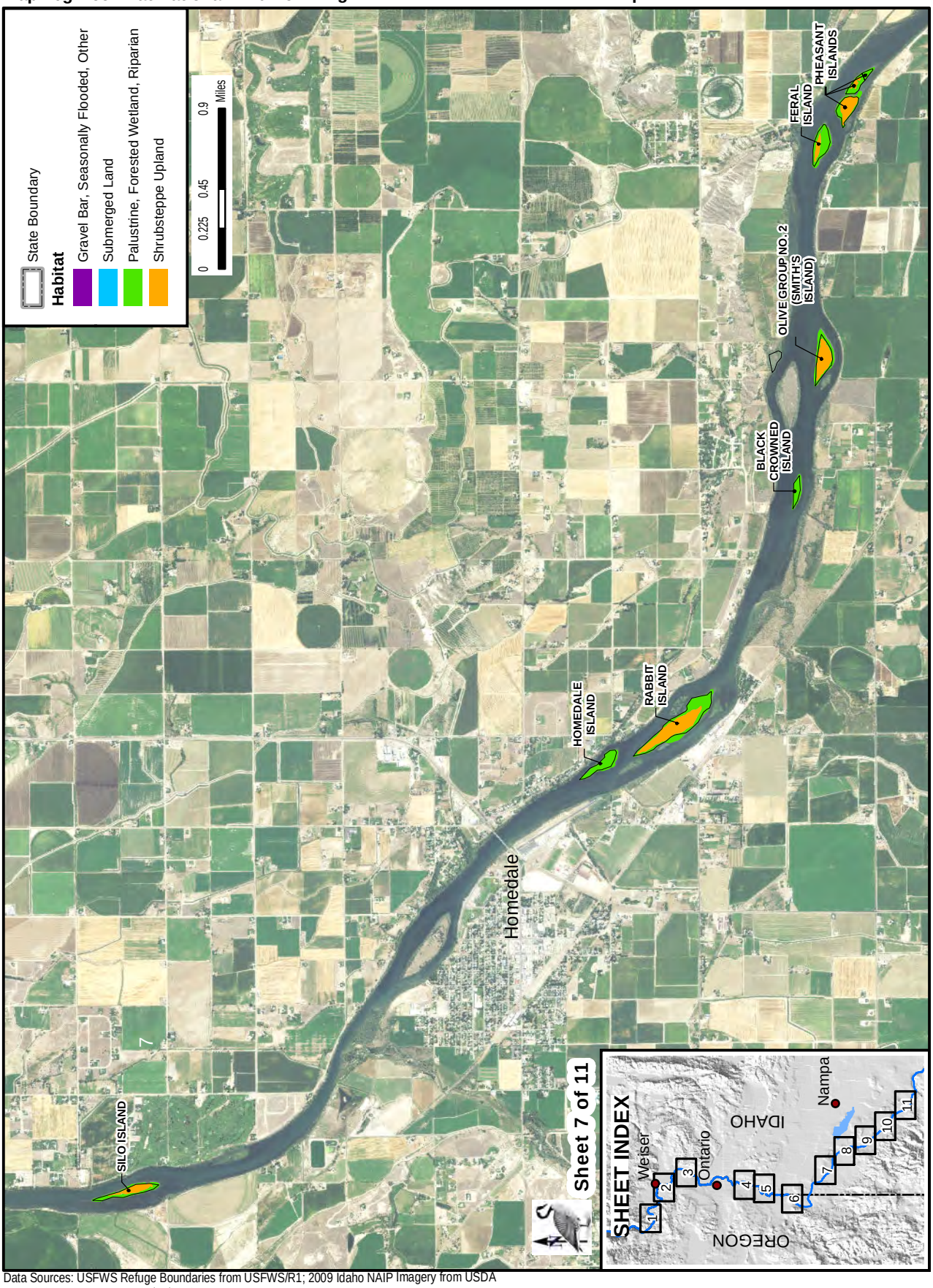
Map 10g Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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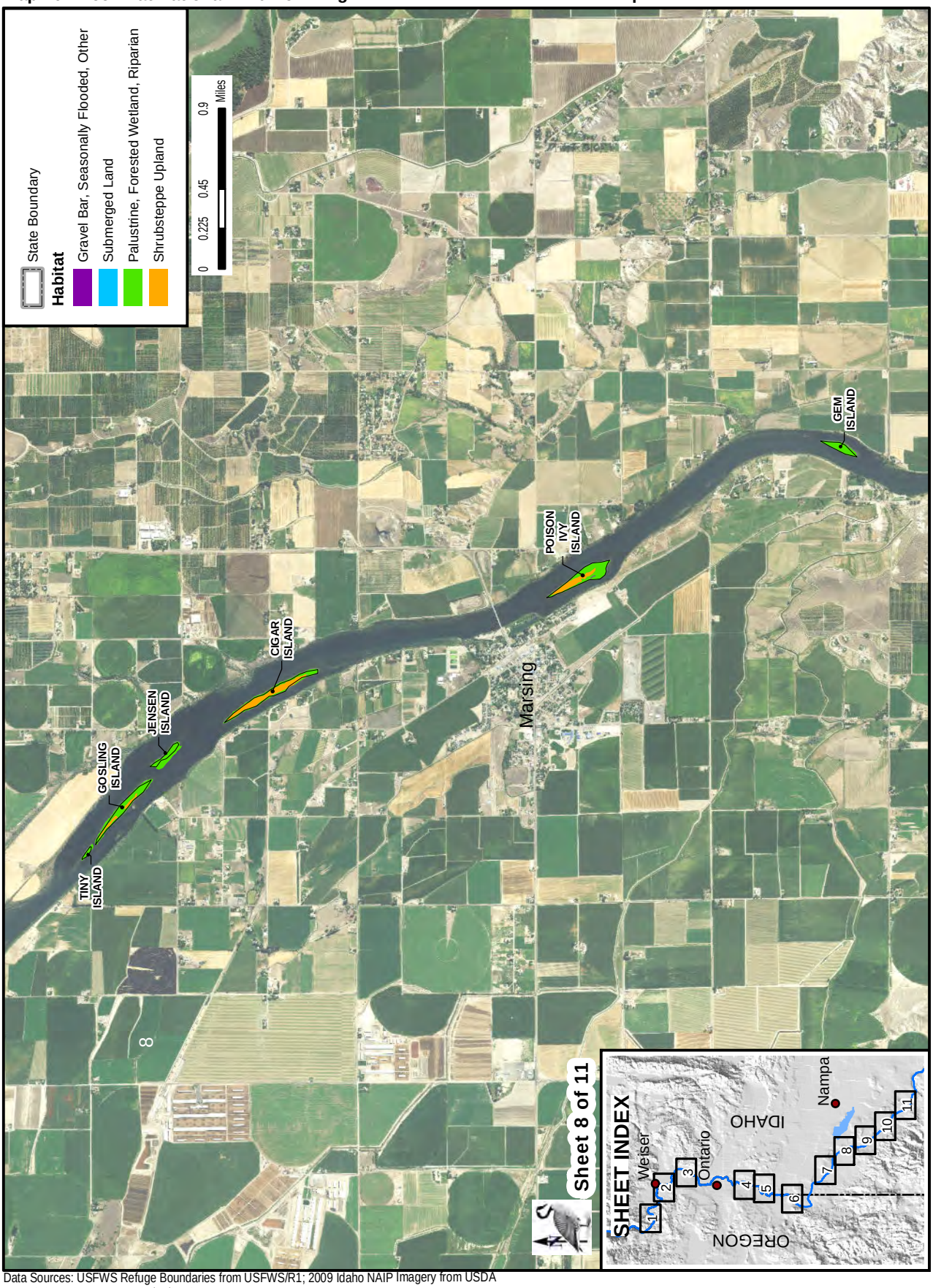
Map 10h Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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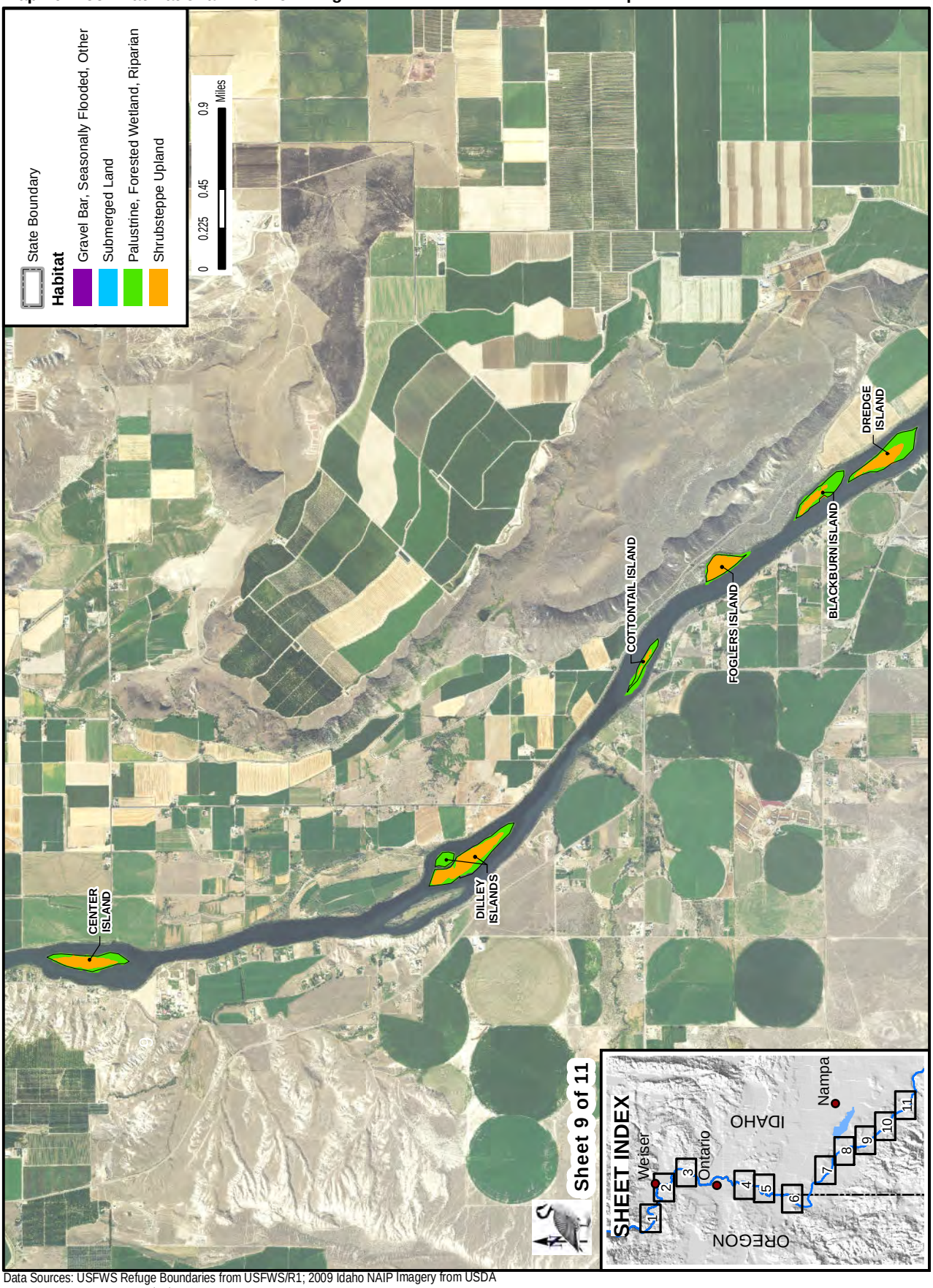
Map 10i Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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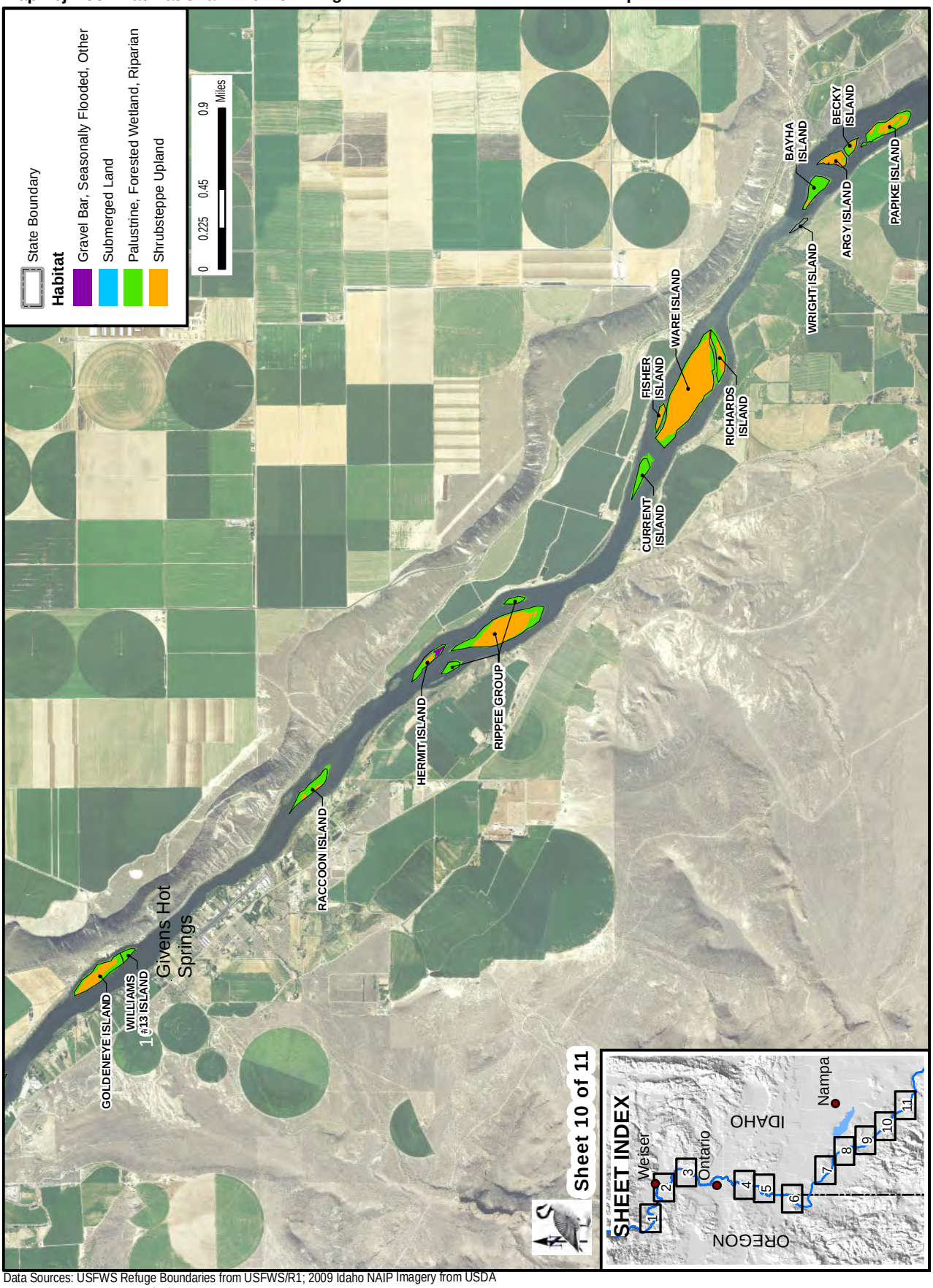
Map 10j Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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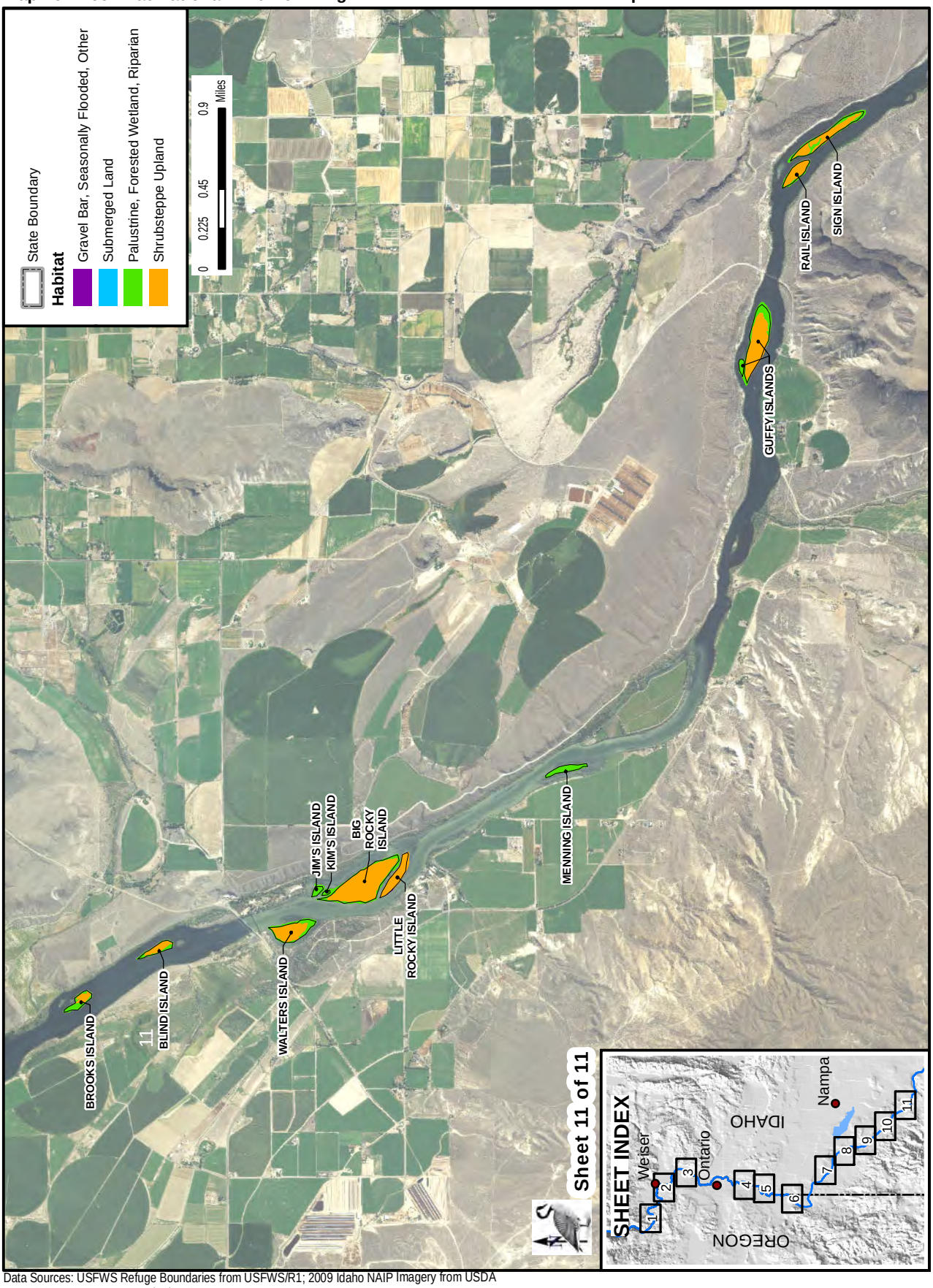
Map 10k Deer Flat National Wildlife Refuge - Snake River Islands Habitat Map



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-10 Map Date: 05/17/2012

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Chapter 5 Human Environment

Mule deer fawn
Addison Mohler/USFWS

Chapter 5 Human Environment

5.1 Cultural Resources

Archaeological and other cultural resources are important components of our nation's heritage. The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment.

Protection of cultural resources is legally mandated under numerous Federal laws and regulations. Foremost among these are the National Historic Preservation Act, as amended (16 U.S.C. 470 et seq.); the American Antiquities Act (16 U.S.C. 431-433); the Historic Sites Act (16 U.S.C. 461-467); the Archaeological Resources Protection Act, as amended (16 U.S.C. 470aa-mm); and the Native American Graves Protection and Repatriation Act (104 Stat. 3048, Public Law 101-601). The Service's Native American Policy (USFWS 1994) articulates the general principles guiding the Service's relationships with Tribal governments in the conservation of fish and wildlife resources. Additionally, the Refuge seeks to maintain a working relationship and consults on a regular basis with the Tribes that are or were traditionally tied to lands and waters within the Refuge.

5.1.1 Native American Cultural Landscape

The ethnographic and historical record is abundant with references to the Shoshone Tribes of western Idaho living in small and widely scattered groups in southwestern Idaho. The archaeological record documents a long tradition of residential use (Green 1982) and intensive harvest of plant and animal resources focused on the river environment (Plew 2000). Each year, the population would reach its greatest annual concentration along the Lower Snake River, including the islands. In 1843, Theodore Talbot, who accompanied John C. Fremont's mapping expedition, described numerous islands in the Snake River occupied by small huts "surrounded by high platforms covered with drying salmon" (Talbot 1931:54).

Fish, especially the anadromous type, were a primary food source for the Shoshone. Runs of salmon during the late spring and fall brought larger groups together to efficiently harvest and process this staple. Other principal resources found along the river include mussels, small game, waterfowl, and various vegetable materials. The riverine villages, consisting of several extended families, would disperse during warmer months as smaller groups sought resources from higher elevations (Steward 1938), such as camas bulbs and biscuit root gathered from the foothills of the mountains. By late summer, berries and pinenuts would also be procured. Land fowl, such as sage hen, were hunted off the river and in the desert areas. Big game, such as deer or antelope, might be hunted but was not a major food source. For the cold winter months, people returned to the river and subsisted mostly on the stored foods gathered throughout the year. Caches for food storage have been found along the cliffs and crags of the Snake River.

5.1.2 Historic Landscape

The arrival of European explorers and fur traders to the area started in the first decades of the nineteenth century, bringing the seeds of dramatic landscape changes evident today.

5.1.2.1 Hudson's Bay Company

The fur trade in this area was conducted, in part, by the North West Company and dominated by Hudson's Bay Company. The first Fort Boise was built of adobe in 1834 at a spot just downstream of the confluence of the Snake and Boise Rivers. This is the same location as John Reid's fur-trapping camp during the winter of 1813. Fort Boise originally served Hudson's Bay Company as a fur-trading post. Within a few years, emphasis switched to salmon fishing (Idaho State Historical Society [ISHS] 1970). At the same time, company policy declared each post should be as self-sufficient as possible, including agricultural production. In 1846, Fort Boise reported 2 tilled acres, 27 head of cattle, and 17 horses (Beckham 1995:13). Floods in 1853 and 1862 obliterated visible evidence of the fort's location (ISHS n.d). With the advent of Idaho's gold rush of the 1860s, a second Fort Boise was built by the U.S. Army near the modern city of Boise.

5.1.2.2 Oregon Trail

By the mid-1840s what had been a trickle of fur trappers, missionaries, and a few pioneers became a flood of settlers emigrating on the Oregon Trail. Seeking the fertile lands of the Pacific Northwest, most hurried through the seemingly inhospitable desert of the Snake River Plain (Beckham 1995:32-33). Save for a few choke points, the trail is not a singular track, rather a network of routes. One southern alternative route follows the west bank of the Snake River portion of the Refuge from Guffey Butte to the town of Homedale. The main Oregon Trail passed to the north of Lake Lowell to cross the Snake River at the original Fort Boise. As the fur trade declined, Fort Boise transformed into a convenient point on the Oregon Trail for emigrants to replenish supplies and cross the Snake River. Ferry boat operations began in earnest by 1852 (ISHS 1982:2). The site remained an important ferry crossing during the last half of the nineteenth century.

5.1.2.3 Farming and Ranching

As demonstrated by the modest livestock of the Hudson's Bay Company forts and the large herds of horses cultivated by the Shoshone, the area was eventually seen to sustain some productivity. Promoting settlement were the various Federal land acquisition laws, such as the Donation Land Claim Act, Homestead Act, and the increasing presence of the U.S. military. Discovery of gold in the 1860s brought miners to the region, providing a ready local market for livestock and produce.

5.1.2.4 Reclamation

As the first waves of emigrants had noted, and later farmers discovered, the area had limited agricultural potential unless an abundant and steady water supply could be applied to the parched landscape. Initial attempts at irrigation had been undertaken by private parties, but economic forces and lack of coordination kept the cultivated acreage in the low thousands of acres. Recognizing a problem and seizing upon a solution, Senator Francis G. Newlands (Nevada) proposed legislation in 1902 that became known as the Newlands Reclamation Act. This Congressional act set up a public-private partnership through which the Federal government would design and build large-scale irrigation projects that would eventually be turned over to local control.

The Boise-Payette Project, one of the earliest projects under the Newlands Reclamation Act, assisted or subsumed the various private irrigation plans to provide a steady and coherent irrigation source. Deer Flat Reservoir, renamed Lake Lowell in 1948, was the first reservoir completed for the Boise

Project. The Boise Project's successful completion brought tens of thousands of acres into agricultural production.

Lake Lowell was created by impounding water from the New York Canal behind the Upper and Lower embankments. Two minor structures were also constructed at the same time to control overflow events. The Middle (or Forest) embankment was to act as a spillway. It now serves as a road bed. The purpose of the fourth structure, the East Dike, is not known. The lake water level has never risen to the East Dike's elevation. The structures are listed on the National Register of Historic Places (NRHP) for their role in early federal reclamation activity, and also as an example of the work done by the Civilian Conservation Corps (CCC) and the Works Projects Administration (WPA) during the Great Depression.

5.1.3 Archaeological Sites and Surveys

5.1.3.1 Sites within the Refuge Boundaries

Seven cultural resource sites have been recorded within the authorized boundary of Deer Flat Refuge (Table 5-1) and are described below.

Table 5-1. Previously Recorded Cultural Resources Sites within Deer Flat Refuge

Site Number	Era	Site Name	Description
10CN11	Prehistoric and historic	*Name withheld	Island in river with lithic scatter and historic features and scatter; ceramic, retouched flake, biface, cobble tools, fire-cracked rock, shell, flakes; dugout-like feature, earth depressions, metal, can, wire
10CN97	Historic		historic landfill; glass, metal, ceramic, leather
10CN98	Historic		Historic scatter; cans, glass
27-17688	Historic	Deer Flat Embankments (4)	Historic American Engineering Record entry
27-782	Historic	Fort Boise	Four-sided concrete structure (cistern), foundations
10CN122	Historic	Oregon Trail	A linear feature with no visible expression in this location
27-802	Historic	Deer Flat Nat'l Wildlife Refuge [*sic*]	"An early Idaho conservation site"

*Site location information is confidential and not for public distribution. In this document, where the site name may reveal its location, the name has been withheld.

Site 10CN11 in the Snake River at the southern end of the Refuge's approved boundary is a prehistoric occupation site that also has a historic component. Artifacts of both eras appear concentrated in the island's center; items are seen throughout the island.

In the northwest quarter of the Refuge surrounding Lake Lowell are two sites composed of disposed historic detritus. One of these (10CN97) is described as a formal landfill covering about 10 acres. One-third of this site is located north of the Refuge boundary; the rest is within the Refuge.

On Lake Lowell, there are four structures listed together on the NRHP (27-17688): the Upper and Lower Embankments, Forest (Middle) Embankment, and East Dike. Included in the NRHP nomination, but outside the Refuge, are the Boise Diversion Dam on the Snake River and the rubble-lined structure on the New York Canal where it discharges into Lake Lowell. The Upper and Lower Embankments were thoroughly documented through the Historic American Engineering Record

(HAER) process. The HAER documentation was undertaken by Reclamation to facilitate needed modifications to those two structures. These early twentieth century structures are emblematic of large irrigation projects that propelled agricultural development in the region. During the Great Depression, workers with the WPA and the CCC modified the dams.

The Fort Boise site (27-782), as recorded, covers private, State, and Service land. This is the location of the early Hudson's Bay Company factory situated near the confluence of the Boise and Snake Rivers. The trading post was destroyed during the 1853 flood, but the location remained a convenient ford for travelers on the Oregon Trail (10CN122).

Information provided by the ISHS identifies a point of interest (27-802) within the Fort Boise historic site as "Deer Flat Nat'l Wildlife Refuge" for its role in early twentieth century conservation efforts. No further information was provided about this designation. We surmise that this point is a reminder to record the Refuge landscape for its historic importance for Idaho conservation activities.

There are other CCC/WPA-era structures such as the entrance pillars and some of the original headquarters compound (located in the current maintenance area) for which formal site forms have not been completed.

5.1.3.2 Linear Features

There are 11 linear features recorded partially in or within one mile of the Refuge's authorized boundaries (Table 5-2). Linear features are those cultural resources of long length but relatively narrow width. All 11 of these linear features date to the historic era and include water delivery systems, two routes of the Oregon Trail, and a wagon or stagecoach road.

Table 5-2. Linear Features Recorded within 1-mile Radius of Deer Flat Refuge

Site Number	Era	Site Name	Description
10CN120	20th century	Mora Canal	
27-18962	20th century	Ridenbaugh Canal	
73-17954	20th century	B Line Canal	
73-17955	20th century	C Line Canal	
27-19224	20th century	Deer Flat Low Line Canal	
87-17353	20th century	Galloway Canal	
27-956	20th century	New York Canal	
75-14853	20th century	Washoe Canal	
10CN125	19th century	Boise City-Silver City Road	Wagon and stage road
10CN122	19th century	Oregon Trail	
10OE6025	19th century	South Alternate Oregon Trail	

Two of the recorded linear features are within the Refuge's authorized boundary, but extend beyond it. The Deer Flat Low Line Canal starts in the Lower Embankment and heads in a westerly direction. Feeding the reservoir at the east side of Lake Lowell, the New York Canal traverses at least 1.5 miles into the Refuge.

5.1.3.3 Sites within One Mile of the Refuge's Authorized Boundaries

A review of cultural resource site records for sites that occur within one mile of the Refuge boundary was conducted to help characterize the types that may be found on the Refuge, and to better evaluate the effects activities may have on resources outside its current boundary. There are 195 sites and

isolates found within one mile of the Refuge (Table 5-3). Of these, 112 are prehistoric. Of the prehistoric sites, there are two burial locations, 11 rock art areas, five rockshelters, four isolates, 89 open-type sites (e.g., campsite, lithic scatter), and one unknown.

Of the 73 historic sites and isolates, 12 are buildings, three are isolates, 24 are identified only as general locations (known to be significant but with no physical evidence; mostly ferry locations), 23 are open-type sites, 10 are structures (mostly bridges), and one is unknown.

Ten sites have both prehistoric and historic components. All are of the open type.

Table 5-3. Sites within One Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
10AA2/3	Prehistoric		Open
10AA169/2	Both		Open
10AA175/3	Prehistoric		Open
10AA176/4	Both		Open
10AA306	Both	Midden Site	Open
10AA445	Historic		Isolate
10CN1	Both		Open
10CN2	Prehistoric		Open
10CN3	Both		Open
10CN4	Both		Open
10CN5	Prehistoric		Open
10CN6	Prehistoric		Open
10CN9	Prehistoric		Rock art
10CN10	Prehistoric		Open
10CN12	Prehistoric	*Name withheld	Rock art
10CN13	Prehistoric	*Name withheld	Rock art
10CN14	Prehistoric	*Name withheld	Rock art
10CN15	Prehistoric	*Name withheld	Rock art
10CN16	Prehistoric	*Name withheld	Rock art
10CN17	Prehistoric	*Name withheld	Rock art
10CN20	Prehistoric		Open
10CN21	Prehistoric		Open
10CN41	Prehistoric		Open
10CN42	Prehistoric		Open
10CN43	Prehistoric		Open
10CN44	Historic	Guffey Bridge	Location
10CN45	Prehistoric		Open
10CN46	Prehistoric		Open
10CN47	Prehistoric		Open
10CN48	Prehistoric		Open
10CN49	Prehistoric		Open
10CN50	Prehistoric		Open
10CN51	Prehistoric		Open
10CN52	Historic	Walters Ferry	Location
10CN53	Prehistoric		Open
10CN55	Prehistoric		Open
10CN56	Historic		Open
10CN57	Prehistoric		Rock art
10CN58	Prehistoric		Open
10CN59	Prehistoric		Open
10CN60	Prehistoric		Rock art

Table 5-3. Sites within One Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
10CN61	Prehistoric		Open
10CN62	Prehistoric		Open
10CN63	Prehistoric		Open
10CN64	Prehistoric		Open
10CN65	Prehistoric		Isolate
10CN70	Prehistoric		Open
10CN71	Historic	Old Fort Boise	Location
10CN80	Prehistoric		Open
10CN83	Prehistoric	Kill/Butcher	Open
10CN87	Historic		Isolate
10CN88	Historic		Open
10CN89	Prehistoric		Open
10CN95	Prehistoric		Open
10CN126	Prehistoric		Open
10CN135	Historic		Isolate
10OE1	Prehistoric		Open
10OE2	Prehistoric		Open
10OE5	Prehistoric		Open
10OE15	Prehistoric		Open
10OE16	Prehistoric		Isolate
10OE20	Prehistoric		Open
10OE48	Prehistoric		Open
10OE49	Prehistoric		Open
10OE58	Prehistoric		Open
10OE59	Prehistoric		Open
10OE60	Prehistoric		Open
10OE66	Prehistoric		Open
10OE72	Prehistoric		Open
10OE128	Prehistoric		Burial
10OE129	Prehistoric		Open
10OE241	Prehistoric		Open
10OE242	Prehistoric		Rockshelter
10OE243	Prehistoric		Open
10OE244	Both	*Name withheld	Open
10OE245	Prehistoric		Open
10OE521	Prehistoric		Open
10OE522	Prehistoric		Open
10OE524	Prehistoric		Rockshelter
10OE526	Prehistoric		Rockshelter
10OE536	Prehistoric		Open
10OE542	Prehistoric		Open
10OE559	Prehistoric		Rockshelter
10OE563	Prehistoric	*Name withheld (petroglyphs)	Open
10OE865	Prehistoric		Open
10OE1169	Prehistoric		Open
10OE1690	Prehistoric		Open
10OE1692	Historic	Warm Springs Ferry, Enterprise Post Office	Open
10OE1990	Prehistoric		Open
10OE1991	Prehistoric		Open
10OE1992	Prehistoric		Open
10OE1993	Both		Open

Table 5-3. Sites within One Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
10OE1994	Historic	Guffey Bridge	Structure
10OE1995	Prehistoric		Open
10OE1996	Both		Open
10OE1997	Prehistoric		Rock art
10OE2031	Prehistoric		Open
10OE2032	Historic		Open
10OE2792	Prehistoric		Open
10OE2793	Prehistoric		Open
10OE2794	Prehistoric		Open
10OE2795	Prehistoric		Open
10OE2796	Prehistoric		Open
10OE2798	Prehistoric		Open
10OE2889	Prehistoric		Open
10OE3802	Prehistoric		Open
10OE6759	Historic	Boise, Nampa, and Owyhee Railroad	Open
10OE9445	Prehistoric	*Name withheld	Open
10OE9646	Historic		Open
10OE9647	Prehistoric		Rock art
10OE10371	Historic		Building
10PE3	Prehistoric		Open
10PE4	Prehistoric		Open
10PE8	Prehistoric		Open
10PE10	Prehistoric		Open
10PE20	Prehistoric		Burial
10PE21	Prehistoric		Isolate
10PE22	Prehistoric		Open
10PE30	Prehistoric		Open
10WN97	Prehistoric		Open
10WN452	Prehistoric		Open
10WN456	Prehistoric		Open
10WN559	Historic		Open
10WN560	Historic		Open
10WN792	Prehistoric		Isolate
10WN798	Historic		Open
10WN799	Prehistoric		Open
10WN800	Both		Open
10WN801	Prehistoric		Open
10WN802	Prehistoric		Open
10WN817	Prehistoric		Isolate
27-28	Historic	Unknown Ferry	Open
27-5037	Historic	Riverside Ferry	Open
27-9648	Historic	Ross Camp	Location
27-9649	Historic	Ross Camp	Location
27-13487	Historic		Open
27-16967	Historic		Location
27-18060	Historic	Henderson Ferry	Structure
27-18061	Historic	Hot Springs Ferry	Location
27-18062	Historic	Bernard's Ferry	Location
27-18064	Historic	Monahan's Ferry	Location
27-18952	Historic	Locker Ave. House	Building
27-19022	Historic	Wilder Armory	Location

Table 5-3. Sites within One Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
35ML00000	Historic	03-08397-01	Open
35ML00006	Prehistoric		Open
35ML01380	Prehistoric		Open
35ML01381	Prehistoric		Open
35ML01383	Prehistoric		Open
35ML01384	Prehistoric		Open
35ML01519	Prehistoric		Open
35ML01520	Prehistoric		Open
35ML01522	Prehistoric		Open
73-4908	Historic	Guffey RR Bridge	Open
73-652	Historic	Walters Ferry	Location
73-659	Historic	Bernard's Ferry	Open
73-4911	Historic	Walter's Ferry Bridge	Structure
73-5027	Historic	Monahan' Ferry	Open
73-5031	Historic	Warm Springs Ferry	Open
73-5032	Historic	Walker's Ferry	Open
73-5033	Historic	Henderson Ferry	Location
73-5034	Historic	Froman Ferry	Location
73-5035	Historic	Mussell Ferry	Location
73-6074	Historic	Cattle pen	Open
73-6075	Historic	Cattle pen	Location
73-6101	Historic	Pasture fence	Open
73-6103	Historic	Cattle pen	Open
73-6119	Historic	Cattle and sheep pen	Open
73-6151	Historic	Sheep camp fence	Location
73-6172	Historic	Hay Backstop	Open
75-131	Historic	Gray's Ferry	Location
75-596	Historic	Emison Brothers Ferry	Location
75-5038	Historic		Structure
75-5039	Historic		Structure
75-5040	Historic	Washoe Ferry	Location
87-264	Historic	Gaylord and Hunt Ferry	Location
87-4336	Historic	Arch Larsen House	Structure
87-5041	Historic	Weiser Ferry	Location
87-13759	Historic	Porters Ferry	Location
87-13769	Historic	Al Keil House	Structure
87-13770	Historic	Larsen Ranch Hand House	Structure
87-13771	Historic	Robert's House	Structure
87-13781	Historic	West Ridge Irrigation	Building
87-13783	Historic	Japanese Labor Camp	Location
87-16074	Historic	Weiser-Oregon RR	Building
87-17066	Historic	George Davis House	Structure
87-17137	Historic	Charlie Webb Place	Building
87-17138	Historic		Building
87-17139	Historic		Building
87-17140	Historic	WWII Relocation Center	Building
87-17141	Historic	Weiser-Oregon RR	Building
87-17142	Historic	Nash House	Building
87-17143	Historic	Unknown	Building
87-17144	Historic	Unknown	Building
87-17313	Historic	Brad Laird House	Building

Table 5-3. Sites within One Mile of Deer Flat Refuge

Site Number	Era	Site Name	Description
87-17344	Historic	Snake River Bridge	Location

*Site location information is confidential and not for public distribution. In this document, where the site name may reveal its location, the name has been withheld.

5.1.3.4 Observations

In part due to Federal undertakings for the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA), several cultural resource surveys have occurred on both sides of the Snake River in the Refuge's southern end. There are many recorded prehistoric occupation and rock art sites, historic structures, and historic debris. This plethora of surveys creates a bias as to site density in that stretch when compared to the rest of the river. With that noted, the landscape does provide numerous locations ideal for rock art. The density of sites along the river banks is genuinely high.

Few of the islands in the Snake River have been systematically surveyed. One that has been surveyed is Sand Island in the NCA. No formal archaeological surveys have been conducted on the islands adjacent to Sand Island (i.e., Guffey and Rail Islands). These islands are highly likely to contain significant cultural resources.

5.1.3.5 Early and Named Islands

Few islands appear on the General Land Office (GLO) maps from the mid- to late nineteenth century (Table 5-4). Of those that do, some were created or enlarged through accretion of silt derived from gold mining of the period. Some islands are ephemeral in nature, appearing and disappearing over the decades. For the purposes of cultural resource management, consideration of any site or structure greater than 50 years of age is needed. An island with enough longevity, market value, or other significance would likely have obtained a name.

Table 5-4. Early Islands Shown on General Land Office Maps

Name	Date of Map Island First Appears On (GLO/BLM)	Comment*
Noble	1870	
Foglers	2010; island formed prior to 1890	
Rippee	1920	
Ware	1937	
Patch	1874 (pencil note in margin)	May have been originally mainland
Unnamed	1874	
Duncan	1874	
Morton	1874 (?) pencil lines	
Gamble	1874 (?) pencil lines	
Prati	1874	
Unnamed	1875	T11N R6W Sec. 36 BM and T11N R5W Sec. 31 BM
Unnamed	1875	T9N R5W Sec. 2 BM
Unnamed	1875	T6N R6W Sec. 26 BM
Williams	2010 consent decree	

* BM: Boise Meridian.

5.1.4 Threats to Cultural Resources

A variety of natural and human-caused activities can threaten cultural resources, including:

- Fire, both naturally occurring and prescribed for habitat restoration, can cause significant damage to historic structures and archaeological sites, as can the activities to suppress and manage fire (e.g., creating fuel breaks);
- Erosion, whether the byproduct of fire, wind, waves, or another natural or human-made agent;
- Habitat restoration and other land management activities; and
- Vandalism or "pot" hunting.

Any activity identified in the management direction, including wetland restoration, construction of new facilities, or changes in public use could have a potential impact to cultural resources. The greatest threats may be posed by earthmoving, removal of structures or alteration of the current erosion patterns occurring during habitat restoration, construction, or other land management activities.

The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. As discussed in Section 5.1, Federal laws and Service policy guide all Refuge actions regarding cultural resources, along with the Refuge's relationships with relevant Tribes.

5.2 Refuge Facilities

5.2.1 Fences and Signs

5.2.1.1 Lake Lowell Unit

The Refuge's boundary for this unit is fenced and posted with boundary signs. It is surrounded primarily by private lands. Signs reading "Area Closed," "Hunting Area," and "Nontoxic Shot" are also posted around the boundary as appropriate.

There are standard Refuge entrance signs at the Visitor Center entrance road, the Lower Dam Recreation Area, and between Parking Lot 8 and the Lower Dam. There are nonstandard entrance signs at the Visitor Center, near the east Upper Dam boat launch, at the Lower Dam Recreation Area, and east of Parking Lot 1 in the South Side Recreation Area. There are "Welcome to Your NWRS" signs at the east Upper Dam boat launch and at the entrance to Gotts Point. There are signs about regulations at the Visitor Center entrance road and at all parking areas except the two along the curves of Iowa Avenue.

5.2.1.2 Snake River Islands Unit

All of the Snake River islands are posted with boundary signs. Kiosks at the eight primary boat launches that access Refuge islands (Walter's Ferry, Marsing, Homedale, Fort Boise Wildlife

Management Area, Nyssa, Centennial Park in Payette, Roberts Landing, and Farewell Bend State Park) provide interpretive, regulatory, and orientation information. The maps on the kiosks indicate Refuge and Refuge islands along that particular stretch of river.

5.2.2 Roads, Parking Areas, and Access Points

5.2.2.1 Lake Lowell Unit Roads

There are five roads on the Refuge. The North Side Recreation Area is accessed via a half-mile paved entrance road that opened in December 2007 and provides access to the Visitor Center. The road is opened by an automatic gate during public use hours (dawn to dusk). A small parking lot outside the gate can be accessed at all times.

The entrance road provides access to a 3.25-mile loop of unpaved road west of the Visitor Center that is used primarily as a trail (Observation Hill Trail). This road is closed to vehicles, with the exception of occasional permitted access to the ABA-accessible wildlife viewing platform and administrative access. (The road accesses Refuge agricultural fields that are closed to the public.) A firebreak that leads from this trail system to the parking lot at the top of the entrance road is often used as a trail by visitors.

There is a one-mile, unpaved road east of the Tio Lane entrance that is closed to vehicles, with the exception of administrative access. This road serves as a trail (East Dike Trail) for visitors.

There is a 3.75-mile unpaved road from the Tio Lane entrance northwest to the Greenhurst Road entrance. It is closed to vehicles, with the exception of administrative access, but serves as a trail for visitors (Kingfisher Trail).

The Kingfisher Trail road travels to the west from the Greenhurst Road entrance and terminates at a gate just past Gotts Point that separates the public area from Refuge maintenance areas and farm fields. This 0.5-mile section of the road is also closed to vehicles, with the exception of administrative access, and serves as a trail for visitors (Gotts Point Trail). Gotts Point Trail is closed from October 1 through January 31 to provide an undisturbed wintering wildlife area. It is gated but open for foot, bicycle, and horse travel from February 1 through September 30.

Parallel to the Gotts Point Trail is a 0.5-mile, unpaved road leading to Gotts Point from the Greenhurst Road public entrance. This road is currently gated at a parking lot after about 0.2 mile. The road from the parking area to Gotts Point (0.3 mile) is gated but open for foot, bicycle, and horse travel from February 1 through September 30. It is closed October 1 through January 31 to provide an undisturbed wintering wildlife area. The closure of this area to vehicles was enacted in late summer of 2006 due to extreme vandalism and concerns for public safety (see Section 5.6.6). There are two small parking lots adjacent to the lake on the closed portion and an outhouse at the end of the road.

Kingfisher Trail, Gotts Point Trail, and Gotts Point Road were all graded in anticipation of graveling in summer 2011. Due to unforeseen budget issues, the project was postponed. Graveling of Kingfisher Trail was completed in fall 2011, with graveling of the Gotts Point Trail and Road to occur later.

A major county road (with traffic of 2,817 vehicles per day, according to the Canyon County Highway District [2009]) runs across the Lower Dam. Paved County roads encircle the Refuge and provide public access to most Refuge parking lots and access points.

5.2.2.2 Lake Lowell Unit Parking Areas and Access Points

There are 19 parking areas around the lake. All are paved except the picnic and swimming beach lots at the Lower Dam Recreation Area and the parking lot at Gotts Point. Parking lots at the Visitor Center entrance road, Visitor Center, east and west ends of the Upper Dam, curves along Iowa Avenue, Tio Lane entrance, and Parking Lot 8 are open all year. The lots at Gotts Point and the Lower Dam Recreation Area are open during the boating season (April 15 to September 30). Parking Lots 1, 2, 3, 7, and 8 are usually open April 15 through the end of waterfowl hunting season (middle or late January). Parking Lots 4, 5, and 6 are open only during hunting season (September to middle or late January).

There are two walk-through access areas at the Lake Lowell Unit that do not have parking facilities associated with them. One walk-through is located at Murphy's Neck, and the other is located several hundred yards east of the west end of Greenhurst Road. The Murphy's Neck access is used mostly by anglers, while the access on Greenhurst Road is used mostly by upland game hunters. Users of these access points must park on the shoulders of County roads (Orchard Avenue and Greenhurst Road, respectively).

5.2.2.3 Snake River Islands Unit

There are no roads or parking areas on Refuge islands. Refuge islands are accessed from eight major and five minor boat launches owned and managed by various City, County, State, and Federal agencies.

5.2.3 Trails

5.2.3.1 Lake Lowell Unit

There are six trails open to pedestrians, bicyclists, and equestrians. Dogs must be kept on leashes at all times. In winter, the trails are occasionally used for cross-country skiing and snowshoeing. Refuge trails include:

- Nature Trail, a 0.5-mile, unpaved, self-guided loop near the Visitor Center. There is an adjacent wildlife-viewing blind.
- Observation Hill Trail, a 3.25-mile loop, internal Refuge road that serves as a trail west of the Visitor Center. There is an adjacent wildlife-viewing platform.
- East Dike Trail, a 1.0-mile internal Refuge road that serves as a trail east of the Tio Lane entrance.
- Kingfisher Trail, a 3.75-mile internal Refuge road that serves as a trail from Tio Lane entrance to Greenhurst Road entrance.
- Gotts Point Trail, a 0.75-mile internal Refuge road that serves as a trail from Greenhurst Road entrance to a gate just north of Gotts Point.
- Centennial Trail, a 1.2-mile ABA-accessible historical interpretive trail from the Visitor Center to the viewing platform at the west end of the Upper Dam and then across the historic Upper Dam.

5.2.3.2 Snake River Islands Unit

There are no trails on Refuge islands.

5.2.4 Other Facilities Listed by Refuge Area

There are no facilities on the Snake River Islands Unit. Facilities at the Lake Lowell Unit are discussed below by location. Map 11 shows Lake Lowell Unit public use facilities.

5.2.4.1 North Side Recreation Area

The Visitor Center includes the Refuge administrative offices and over 2,600 square feet of public exhibit space, including a KidSpace activity area, small wildlife-viewing room, 900-square-foot auditorium with a seating capacity of around 75, and public restrooms. The Visitor Center is open year-round, except for Federal holidays, from 8 AM to 4 PM weekdays and 10 AM to 4 PM Saturdays. According to a recent survey, 36 percent of visitors indicated that they had gone to the Visitor Center during their visit (Sexton et al. 2012). However, only 22 percent were actually contacted at the Visitor Center during the survey effort. Of those visitors who were contacted at other locations during the survey (n=162), only 23 percent indicated that they did "go to a Visitor Center at the Refuge" (Dietsch 2011).

In 2011, due to overcrowded Refuge offices and the desire to find additional room for Service employees working in leased space, more administrative space was added, and the parking area was repaved and enlarged. The Visitor Center parking lot provides 42 spaces (including two ABA-accessible spaces), but provides none for buses, recreational vehicles, or vehicles with trailers.

Other facilities in the North Side Recreation Area include ABA-accessible wildlife-viewing platforms near the west Upper Dam boat ramp and on the Observation Hill Trail west of the Visitor Center, wildlife-viewing blind along the Nature Trail, ABA-accessible fishing dock at the west end of the Upper Dam (available mid-April to early October), paved boat ramp with two docks, and an outhouse at the boat launch parking area. The parking lot has 88 designated spaces (36 trailer spaces, 44 car spaces, two ABA-accessible trailer spaces, and six ABA-accessible car spaces). The launch closes at relatively high water levels (i.e., a water level elevation of 2,519 feet or more) when it becomes unsafe to launch boats. All facilities are in good condition.

5.2.4.2 East Upper Dam Boat Launch

Facilities at the east Upper Dam boat ramp include a paved boat ramp with two docks, swimming beach designated by docks and a buoy line, and two picnic tables. The Refuge parking lot has 38 spaces (23 trailer, 13 car, and two ABA-accessible ones).

The Canyon County Park across the street provides 56 parking spaces (12 trailer, 42 car, and two ABA-accessible spaces), bathrooms with flush toilets, picnic tables, and grills. Several hundred yards east of the boat ramp, in the curves of Iowa Avenue, there are two paved Refuge parking lots with approximately seven and nine undesignated parking spots. There are no walkways or crosswalks providing pedestrian access to the Refuge, so visitors parking in these lots must walk on the road surface. There are also no Refuge access points immediately across from these parking areas. It is around a 0.25-mile walk from the farthest parking area to the boat launch on the east side of the

Upper Dam. Several hundred yards west of the boat ramp, there is a de facto overflow parking lot in a graveled area along the road. The lake side of this graveled area is part of the Reclamation Zone, and the north side is private property, including a small personal watercraft rental kiosk that has operated since 2007. Since 2010, a refreshment stand is also operated on the private property. Refuge users park on both the Reclamation property and the private property.

In recent years, this area has been increasingly crowded. On busy summer days, vehicles waiting to launch can cause gridlock on the public road leading into the area, creating potential safety issues if emergency vehicles need to pass or drivers decide to pass the gridlocked vehicles by driving into the oncoming traffic lane.

5.2.4.3 Lower Dam Recreation Area

Facilities at the Lower Dam Recreation Area include a paved boat ramp with three docks (one ABA-accessible), park-like, sprinkler-irrigated picnic area with a covered picnic shelter, scattered picnic tables, and three outhouses. The boat ramp closes at relatively high water levels (i.e., when water level elevation is 2,519 feet or more) when it becomes unsafe to launch boats.

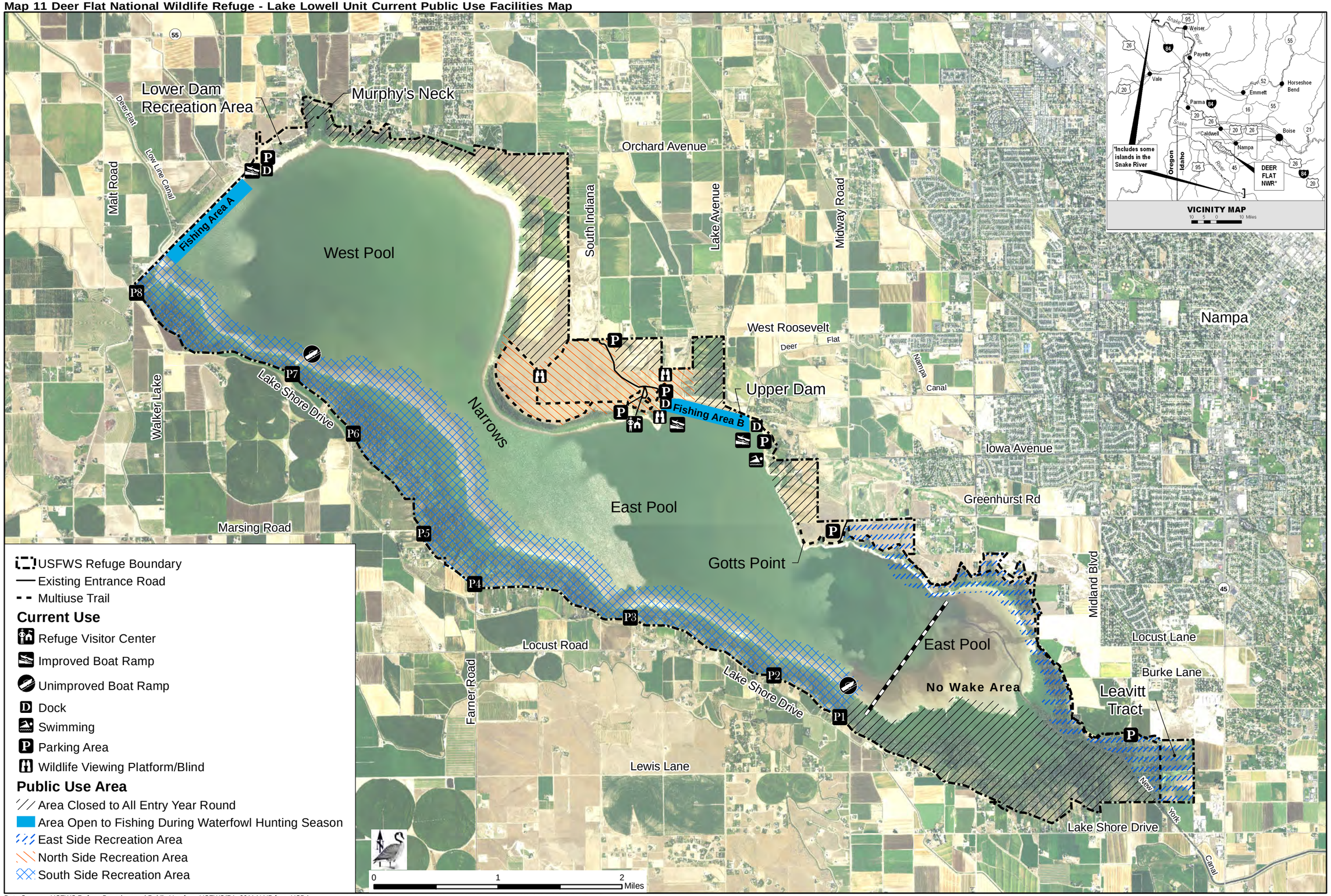
Parking spots near the boat launch are not designated. On a June 2008 Sunday afternoon, there were 161 vehicles parked in this area, 107 with boat trailers. There are 143 parking spaces (including two ABA-accessible spaces) near the undesignated swimming beach. Near the picnic area is one outhouse and a dumpster. Parking spots in this area are not designated because the area is a gravel road. On a June 2008 Sunday afternoon, there were 134 vehicles parked in this area, well beyond capacity and nearly blocking the road in some areas. Overcrowding during the summer has reached a point where, on occasion, it has been extremely difficult for emergency responders to reach patients.

In a fenced portion, at the north end of the Lower Dam Recreation Area, is the Environmental Education Building, which provides opportunities for self-service environmental education activities for groups, mostly scouts. The EE Building can be rented from April 15 to September 30. It includes two restrooms, large meeting space, kitchen, and covered, screened patio. The grounds include a tended lawn with several picnic tables and four grills. Water is supplied by a well that pumps 65 gallons per minute; the Service has a water right for this well. The building does not have heat or air conditioning.

5.2.4.4 South Side Recreation Area

Parking Lot 1 has a small, paved boat launch. Parking Lot 7 has water access for small boats via a gravel boat launch. Both launches close at relatively high water levels (approximately 2,518-2,519 feet) when it becomes unsafe to launch. Most users of these launches have small watercraft—primarily johnboats, canoes, kayaks, and float tubes. Both launches are used during spring and summer boating seasons as well as during the waterfowl hunting season. Due to a lack of signage, nonboating users sometimes park on the boat launch at Parking Lot 7, making launching more difficult. Parking Lot 3 is used as a launch site by wind-sports enthusiasts even though the unmaintained path from the parking area to the water is blocked by a cable.

Map 11 Deer Flat National Wildlife Refuge - Lake Lowell Unit Current Public Use Facilities Map



Data Sources: USFWS Refuge Boundary and Public Use from USFWS/R1; 2011 NAIP from USDA
File: 12-005-7 Map Date: 05/16/2012

Document continues on next page.

5.2.4.5 East Side Recreation Area

There are no facilities in the East Side Recreation Area.

5.2.4.6 Gotts Point

An outhouse is provided at the end of the 0.3-mile road/trail and is accessible by foot, bike, and horse.

5.2.4.7 Maintenance Area

The maintenance area includes the main shop, boat house, oil house, and a few other outbuildings. There is also the original Refuge administration building, two residences (including one listed on the NRHP), one detached garage, and a historic boat house. An additional equipment storage facility was built in 2011 to accommodate equipment for Service employees using the administrative addition.

5.3 Public Use Overview

5.3.1 Legal Mandates Involving Public Uses on Refuges

All public activities on a refuge are considered closed unless officially open. To officially open a use or extend an existing use, a refuge must first complete a compatibility determination. The following summary of Congressional acts gives a brief explanation of how and when public uses are legally allowed on Refuges.

In 1962, the Refuge Recreation Act (76 Stat. 653; 16 U.S.C. 460k-460k-4) was passed. Refuges were tasked with ensuring "that any present or future recreational use will be compatible with and will not prevent accomplishment of, the primary purposes for which the said conservation areas were acquired or established." It also says that recreational activities can be appropriate as long as they are not inconsistent with the primary objective of each refuge. If uses do not fit this description the Refuge Recreation Act further states that the refuge will "curtail public recreation use generally or certain types of public recreation use" whenever necessary.

The National Wildlife Refuge System Administration Act of 1966 (Public Law 90-404; 16 U.S.C. 668dd-668ee, et seq.) states that the public could not "enter, use, or otherwise occupy any such area for any purpose" unless such activities were compatible with the major purposes for which the area was established. The Administration Act was further amended by the Refuge System Improvement Act in 1997.

The Refuge System Improvement Act of 1997 (Public Law 105-57) reasserts the need for refuge uses to be compatible and said that compatible wildlife-dependent recreational uses "receive enhanced consideration over other general public uses in planning and management." It also stated that refuges could not "initiate or permit a new use, or expand, renew, or extend an existing use," unless the use has been determined to be compatible and consistent with public safety.

Under the Refuge Improvement Act, each refuge is required to complete a compatibility determination for existing uses, which estimate the timeframe, location, manner, and purpose of each

use. Refuges are also required to identify the effects of each use on refuge resources and purposes of each refuge. Any use that is found not to be compatible is required to be eliminated or modified to make it compatible. New compatibility determinations are required every 10 to 15 years and with the preparation of the refuge comprehensive conservation plan. The few compatibility determinations that have been previously completed for this Refuge were last approved in 1999. There was little or no mention of possible impacts to Refuge habitat or purpose, and no scientific literature was cited.

5.3.2 General Visitation Information

The Refuge provides opportunities for all wildlife-dependent priority public uses (the "Big Six," i.e., hunting, fishing, wildlife observation, photography, environmental education, and interpretation) listed in the Refuge System Improvement Act of 1997, as amended. In addition to providing the Big Six activities, many nonwildlife-dependent public uses also currently occur, especially at the Lake Lowell Unit. Some of these uses include high-speed boating, windsurfing, jogging, swimming, sunbathing, horseback riding, and special events such as weddings.

Estimating current visitor numbers at the Refuge is challenging because of the dispersed nature of access points. The Lake Lowell Unit includes 15 individual access points distributed around the 27 miles of county road surrounding the lake. The Snake River Islands Unit includes 14 improved and unimproved boat launches that provide access to Refuge islands, but also provide access to nonrefuge sites and activities. Visitation data for the Snake River Islands Unit, and for some low-participation activities at the Lake Lowell Unit (e.g., mourning dove hunting) are still based on best professional judgment.

Until July 2005, visitor counts were based on best professional judgment and may not accurately reflect visitation at the 16 public access points. Formal visitor counts began at Lake Lowell in July 2005, but sufficient evening and weekend surveys were not completed until December 2006, so we do not have good data to reflect visitation trends.

The Refuge uses two complementary sampling methods to estimate visitation at the Lake Lowell Unit. The number of vehicles at dispersed access points is counted on at least two weekdays and one weekend day per month in each of three time slots (morning, afternoon, and evening). Load factors to correct data from the vehicle count for number of people per vehicle and visitor activities are determined through direct observations of visitor use at Refuge access points. The access points are designated as one of five location types (improved ramp, unimproved ramp, parking lots, fishing spots, and parks), and each location type is observed on at least two weekdays and one weekend day in each of three time slots (morning, afternoon, and evening).

Visitation estimates at the Visitor Center are based on data from a door counter on the front door. Because the total on the counter does not directly correspond with the total number of visitors for a variety of reasons (e.g., visitors are separately counted as they enter and as they depart, and when they leave and re-enter during a single visit), counter data are corrected with a factor developed from direct observations of the number of visitors relative to the counts recorded on the door counter. Participants in environmental education programs and special events are based on direct counts of participants.

Refuge visitation over the past four years has fluctuated between approximately 167,000 and 225,000. For a more detailed breakdown of visitation, please see Table 5-5.

Table 5-5. Visitor Counts during Fiscal Years (FY) 2010 and 2011 (note: visitors may engage in more than one activity per visit)

Activity	FY10 Visitation	FY11 Visitation
Waterfowl hunting	4,100	5,100
Upland game hunting	1,000	1,100
Mourning dove hunting	100	100
Big game hunting	75	75
Shoreline or dock fishing	13,400	18,300
Boat fishing	26,600	27,000
Wildlife watching and photography	17,400	23,900
Environmental education	9,200	11,000
Interpretation (including Visitor Center)	6,100	21,000
Nonwildlife-dependent boating	33,500	49,400
Swimming and other beach activities	28,950	38,700
Walking and Jogging	13,800	16,500
Other Activities (e.g., picnicking)	17,950	11,300
Total	**185,375**	**223,475**

In July 2010, Refuge visitors participated in a national visitor survey conducted by the U.S. Geological Survey (USGS; Sexton et al. 2012). There were three activities in which more than 10 percent of those surveyed had participated during the surveyed visit in July 2010: fishing (22 percent), boating (21 percent), and hiking (15 percent). There were five activities in which more than 25 percent of those surveyed had participated during the previous year: fishing (41 percent), wildlife observation (40 percent), hiking (39 percent), motorized boating (36 percent), and bird watching (35 percent). Visitors that participated in only wildlife-dependent recreation (priority-use visitors) were significantly more likely to participate in wildlife observation, bird watching, and hiking than those who participated in both wildlife-dependent and nonwildlife-dependent activities (mixed-use visitors). Priority-use and mixed-use visitors reported similar levels of participation in other wildlife-dependent activities.

The regional population and Refuge visitation are both increasing. According to the 2010 census (U.S. Census Bureau 2010), the population increased 43.7 percent between 2000 and 2010, increasing to 188,923 (U.S. Census Bureau 2010). The population within the city limits of Nampa increased 57 percent since 2000, with a population of over 81,500. The population of Caldwell increased 78 percent since 2000, with a population of over 46,200. Both Nampa and Caldwell have also expanded their city limits to extend immediately adjacent to or closer to the Refuge boundary. The Refuge is within a one-hour drive for the more than 600,000 people who live in the Treasure Valley.

Refuge visitors are primarily local. In FY11, 95 percent of surveyed vehicles at Refuge access points had Idaho license plates. Of those, 76 percent had plates issued in Canyon County and 17 percent in neighboring Ada County (Boise). According to Sexton et al. (2012), most (96 percent) of the visitors participating in the survey live within 50 miles of the Refuge and travel an average of 11 miles to get to the Refuge. Although most visitors were local, a significantly higher proportion of Priority Use Visitors were from outside the local area than Mixed Use Visitors.

According to Sexton et al. (2012), most visitors (89 percent) had visited the Refuge multiple times in the previous year, visiting on average 21 times. Most visitors also visited during multiple seasons (43 percent) or year-round (27 percent), but some visited during only one season (29 percent). Visitors reported spending an average of four hours at the Refuge during their visit and more than half (58

percent) were part of a group during their visit. Priority Use Visitors spent significantly less time (average of three hours) during their visit than Mixed Use Visitors. Surveyed visitors were generally satisfied with the Refuge (Appendix L):

- 90 percent were satisfied with the recreational activities and opportunities.
- 85 percent were satisfied with the Refuge's information and education, and its resources.
- 87 percent were satisfied with the services provided by employees or volunteers.
- 89 percent were satisfied with the Refuge's conservation of fish, wildlife, and their habitats.

5.3.3 General Access

Visitor access to the Refuge is allowed between sunrise and sunset (i.e., day use only). There are no entrance fees for accessing the Refuge. At the Lake Lowell Unit, 63 percent of the land base is open year-round. Of the remaining 36 percent that constitutes closed areas, 21 percent is closed year-round, 10 percent is closed year-round but used for administrative purposes (e.g., farming, maintenance area, and residences), and 6 percent is closed seasonally (October 1 to January 31) to minimize disturbance to wintering waterfowl. Closed areas, no-wake zones, and seasonal closures that are in place are listed below for each unit.

5.3.3.1 Lake Lowell Unit Closures and Access Points

There are permanent closures in six areas of the Lake Lowell Unit:

- The upland area to the northwest of the North Side Recreation Area and to the east of Murphy's Neck;
- The riparian and upland areas between Parking Lot 1 and the New York Canal;
- Around the osprey-nesting structure that is closest to the Visitor Center;
- Maintenance Area and farm fields to the west of Gotts Point;
- Upper Dam Marsh and farm field on Lake Avenue; and
- Areas surrounding the water control outlets on the Upper and Lower Dams.

There are seasonal closures in five areas of the Lake Lowell Unit:

- Wintering wildlife closure at Gotts Point from October 1 to January 31;
- Wintering wildlife closure at Murphy's Neck from October 1 to January 31;
- Winter closure of the Lower Dam Recreation Area from October 1 to April 15;
- Winter closure of the surface of Lake Lowell from October 1 to April 15, with the exception of a 200-yard fishing area in front of the Upper and Lower Dams and 200-yard hunting area along the south shoreline between Parking Lots 1 and 8; and
- Eagle-nesting closure around the eagle's nest in the North Side Recreation Area.

There are three no-wake zones currently on Lake Lowell:

- The southeast end of Lake Lowell starting at Parking Lot 1;
- The area surrounding Gotts Point; and
- Areas surrounding the boat ramps at the Upper and Lower Dams.

Visitor access to the Lake Lowell Unit is provided through 15 individual access points. These access points are as follows:

- Main Refuge entrance at the corner of Roosevelt and Indiana Avenues;
- Upper Dam East Parking Area on Lake Avenue;
- Gotts Point entrance and parking area at the west end of Greenhurst Road;
- Tio Lane entrance at the south end of Tio Lane;
- Parking Lots 1 to 8 on Lake Shore Drive;
- Lower Dam Recreation Area on Riverside Road;
- Murphy's Neck walk-through on the west end of Orchard Avenue; and
- Hunting access walk-through on the west end of Greenhurst Road.

5.3.3.2 Snake River Islands Unit Closures and Access Points

There is one seasonal closure for the Snake River Islands Unit: the waterfowl nesting closure on all islands between February 1 and May 31. Access to the Snake River Islands Unit is by boat only from several boat launches along the Snake River. These public boat launches are maintained by agencies at different levels of government: City, County, State, and Federal.

5.4 Wildlife-dependent Public Uses

The Refuge System Improvement Act of 1997, as amended, identifies hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation as wildlife-dependent, priority public uses for national wildlife refuges. The Refuge provides opportunities to enjoy each of these priority public uses. More details on individual wildlife-dependent recreation opportunities are outlined below.

5.4.1 Hunting

Almost one-quarter (21 percent) of the Lake Lowell Unit is open to bird hunting. Bird hunting is allowed on the East Side and South Side Recreation Areas for mourning dove, upland game birds, ducks, and coots. The entire Lake Lowell Unit is inside a goose hunting closure area designated by IDFG. General state seasons and limits apply; no special Refuge permits are required. In past years, SUPs have been issued to disabled bird hunters allowing ATV use for lake access through the gate east of Parking Lot 8.

The South Side Recreation Area and the area east of Parking Lot 1 to the New York Canal are open to a controlled deer hunt, which includes up to 21 percent of the Lake Lowell Unit (depending on water levels). Hunters must have a controlled deer hunt tag issued by IDFG as well as a Refuge Deer Hunt Permit.

Mourning dove season is during the month of September. Upland game bird seasons are usually mid-October until mid- to late January. While the habitat is not optimal for upland game, hunters seem to appreciate the opportunity, and the area receives steady use.

Waterfowl hunting runs from mid-October until mid- to late January, with a late September or early October youth hunt. In the South Side Recreation Area, human- or electric-powered boats can be used up to 200 yards from the shore. In the East Side Recreation Area, waterfowl hunting is walk-in only. A youth waterfowl hunt is allowed in all designated waterfowl hunt zones in accordance with IDFG regulations. There are no blinds or designated hunting spots. Portable blinds are allowed if

they are removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis.

Concerns have been raised about the quality of the waterfowl hunt, with comments about overcrowding and pass shooting. The closest public hunt area for walk-in hunters is at Fort Boise Wildlife Management Area, about 30 miles west, so there is high demand for good hunting closer to population centers. Many hunters with boats go to the Snake River Islands Unit or elsewhere along the Snake River.

All Refuge islands are open to hunting for mourning dove, upland game, waterfowl, coots, and deer. There are no blinds or designated hunting spots. Portable blinds are allowed if removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis. General state seasons and limits apply (see typical seasons above), although spring hunts are not allowed during the nesting closure between February 1 and May 31. In recent years, there have been occasional complaints from neighbors on the shoreline about noise from waterfowl hunting. Complaints may increase as development of shoreline homes continues in certain stretches of the river. There have been occasional requests for guided waterfowl hunts on Refuge islands. Guided waterfowl hunting is illegal in Idaho but allowed in Oregon.

5.4.2 Fishing

The entire lake is open to boat fishing between April 15 and September 30. Between October 1 and April 14, fishing is allowed from human-powered boats 200 yards in front of the Upper and Lower Dams (Fishing Areas A and B). Boat fishing is popular throughout the boating season, and peaks from April through June.

Shoreline fishing is allowed from open shoreline, with the exception of waterfowl-hunting season, when fishing is allowed only in Fishing Areas A and B, 200 yards in front of the Upper and Lower Dams (about 120 acres). Shoreline fishing is common from April through September and is usually highest in June.

Table 5-6. Lake Lowell Fishing Access by Season

Timeframe	All Open Shoreline Areas	Shoreline in Front of Dams	On Open Areas of Lake Lowell	In Front of Dams from Human-powered Vessels
April 15 to September 30	X	X	X	X
From October 1 to start of waterfowl hunting season	X	X		X
During waterfowl hunting season		X		X
From end of waterfowl hunting season to April 14	X	X		X

During the boating season, there is an ABA-accessible fishing dock at the west Upper Dam boat ramp. This is the only ABA-accessible fishing opportunity at the Refuge and the only designated fishing dock. Anglers frequently request to fish from boat launching and swimming docks, which are posted with signs reading “No fishing from docks.” Currently, rules against fishing from boat docks are not enforced when there is minimal boating traffic and anglers do not interfere with launching boats.

The lake has been stocked with channel catfish and Lahontan cutthroat trout in recent years. In the future, IDFG plans to continue stocking channel catfish as funding is available and stocking is necessary (Kozfkay 2012). General State seasons and limits apply, with the exception that bass fishing is catch-and-release from January 1 through June 30. A 12- to 16-inch slot limit for bass is in place for the rest of the year.

SUPs (with a $100 fee each) are issued to three to five groups each year for bass tournaments. Tournaments can be launched only from the Lower Dam Recreation Area, which offers the most parking. To provide access for a variety of lake users, fishing tournaments cannot be scheduled on consecutive weekends. Fishing tournaments are also not allowed between May 14 and July 9 to minimize disturbance to breeding and nesting birds.

Tournaments are currently limited to 100 boats. Larger-sized bass tournaments limit access of other lake users to the boat launch. In addition, the Refuge has received complaints from other anglers stating tournament participants crowd them out of prime fishing areas. Because bass tournaments at Lake Lowell collect data for IDFG on bass populations, they are considered "conservation tournaments," which allows them to hold and weigh in bass outside of the normal public regulation. Bass caught during tournaments are placed in an IDFG holding tank after being weighed and measured and are returned to the lake at the tournament's end.

To increase the number of youth anglers and family fishing opportunities at the Refuge, Kids Fishing Day was introduced at the west Upper Dam boat launch in 2009. It moved to Gotts Point in 2010. Youth anglers attending Kids Fishing Day has increased each year and reached 190 in 2011. Volunteers and partners from Canyon County Parks and Recreation, Canyon County Sheriff's Office, and local fly-fishing and bass clubs help make this event a success.

Currently, some ice fishing occurs when the lake freezes. Low temperatures for extended periods are unusual, and it is uncommon for the entire lake to freeze over. Therefore, anglers are responsible for confirming that ice conditions are safe.

Shoreline fishing is allowed on all islands in the Snake River Islands Unit from June 1 to January 31. Anglers occasionally fish from Refuge islands, but fishing is more common near Refuge islands from boats.

IDEQ has collected fish tissue samples that show high mercury concentrations (Section 3.9.1). Subsequently, the Idaho Department of Health and Welfare issued a fish consumption advisory for Lake Lowell in 2003. These advisories are posted at fishing access points around the lake. A statewide fish consumption advisory has been issued for bass. No information about this advisory for Refuge islands is currently posted on Refuge river kiosks, but information is provided on the Refuge website.

5.4.3 Wildlife Observation and Photography

There are currently no signs directing visitors to prime viewing areas, but wildlife observation and photography do occur throughout the Refuge. Some of the best locations are in the North Side Recreation Area west of the Visitor Center and at the Tio Lane entrance. From the Tio Lane entrance, the East Dike Trail gives access to wetlands; Kingfisher Trail allows access to riparian forests and the lakeshore. Gotts Point is a popular place for photographing sunsets.

Most wildlife-watching and photography facilities are located in the North Side Recreation Area and include the Visitor Center viewing room and spotting scope, an osprey-nesting webcam, trails, two ABA-accessible wildlife-viewing platforms, and a wildlife-viewing blind.

The most recent compatibility determinations allow walking and jogging (with the exception of competitive jogging) on roads, trails, and firebreaks. Currently, the requirement to remain on roads, trails, and firebreaks is not being communicated to the public, and people frequently leave trails for wildlife observation and photography as well as for other recreational activities.

Informal pamphlets describing a 29.5-mile Lake Lowell Unit Bird Tour, 47-mile Snake River Islands Unit Bird Tour (that guides visitors past 10 Refuge islands), and 0.5-mile Habitat Hike along the Nature Trail are available in the Visitor Center. The best season for viewing a wide variety of wildlife at the Lake Lowell Unit is from September through December, when there are large concentrations of waterfowl and the raptors they attract. The best season for viewing at the Refuge islands is spring, when there are large concentrations of migrating waterfowl. The islands themselves are closed to public entry from February 1 through May 31 (to provide sanctuary to nesting birds), but wildlife observers and photographers can enjoy wildlife from boats.

Only one SUP has been issued for wildlife photography, to a Refuge volunteer who makes his photos available for Refuge use. The same volunteer partnered with the Friends of Deer Flat National Wildlife Refuge (Friends) to offer an on-refuge photography workshop in June 2008. There are currently no designated photography blinds.

5.4.4 Environmental Education

The Refuge offers EE programs both on- and off-site to help promote an understanding of wildlife and the natural environment, as well as Deer Flat NWR and the NWRS. In 2010, a new EE program was developed and implemented in partnership with Canyon County Department of Parks, Recreation, and Waterways; Northwest Nazarene University; and the Friends. The new program, Discover Wildlife Journeys, provides more opportunities for children to explore Refuge lands and focuses on experiential learning.

Both on- and off-site programs have been correlated with state educational standards. Requests for on-site programs usually peak in May, while demand for off-site programs is fairly steady between October and May. Other on-site educational offerings include Reading at the Refuge (a preschool reading program) and Scout Day (a popular monthly program for Boy and Girl Scouts begun in January 2008). The Refuge also hosts occasional hunters' education courses each year put on by IDFG, and has hosted teacher workshops as part of Project WILD and Project Learning Tree.

During FY11, approximately 11,000 people participated in EE programs led by Refuge staff (see Table 5-5); participation was split almost equally between on-site and off-site programming. Considering recent efforts to more directly connect children with nature, it would be beneficial to increase the proportion of programs offered on-site. Teachers often request classroom programs because their ability to participate in field trips is limited by transportation funds and time. In spring 2011, to increase the amount of on-refuge EE, the Friends began providing full and partial bus scholarships to local schools that had more than 50 percent of their students receiving free and reduced lunches.

Participation in both on- and off-site EE programs has been steadily increasing since hiring a full-time, 11-month AmeriCorps volunteer or Friends EE Intern each year since fall 2004. However, some requests for EE programs have been turned down each year since 2008 because demand cannot be met with current staffing levels. Educators whose requests cannot be accommodated are referred to the 10 Refuge Traveling Trunks loaned to educators.

The Environmental Education Building at the Lower Dam Recreation Area is available for rent between April 15 and September 30 by teachers and youth group leaders conducting EE programs. The current rental fee is $20 for the first seven days and $20 for every additional seven-day period. In 2011, the building was rented by seven Boy Scout groups and used by over 3,600 people, 3,300 of whom attended either a two-week day camp in June or a two-day day camp in July. This is the only Refuge location where camping is allowed; camping is only allowed in conjunction with EE activities. Half of the groups that rented the building in 2011 camped, with a total of about 150 people. The Refuge has had occasional requests for other on-site camping and occasional requests for non-EE uses of this facility.

5.4.5 Environmental Interpretation

The Visitor Center includes interpretive displays about local natural history (including wildlife and habitats), Refuge history and management activities, the reservoir's role in irrigation and recreation, and the missions of the NWRS and Reclamation. Movies are also provided, upon request, on topics relating to wildlife biology, the Refuge, NWRS, and Service. No movie currently focuses on the history and importance of the Refuge.

There is a self-guided Nature Trail brochure about habitat that corresponds with numbered posts along the 0.5-mile Nature Trail. In addition, several interpretive signs, purchased and installed by the Friends as part of a Preserve America grant, can be found along the 1.2-mile Centennial Trail from the Visitor Center to the east end of the historic Upper Dam.

Despite requests from the general public and Friends members, regularly scheduled, staff-led interpretive walks and talks are not currently offered, due to limited staff. Volunteer-guided walks have been offered in conjunction with special events in recent years and are usually well attended. The Wild About Life monthly lecture series, begun in January 2007, presents interpretive/educational programs for adults by invited speakers. This popular program is coordinated by the full-time EE Intern.

Many visitors do not realize they are at a national wildlife refuge or, if they do, they don't understand the mission of Deer Flat and the NWRS. Although brochures are provided in boxes on regulatory signs at all major access points, there are no interpretive signs or maps at the Lake Lowell Unit, with the exception of those along the Centennial Trail. Except for the Visitor Center, high-use Refuge areas do not have staff or volunteers present. Visitors to the Snake River Islands Unit can find informational signs and maps displayed in kiosks at many of the most-used Snake River boat launches along the 113 river miles of the Unit.

5.5 Other Refuge Uses

Although not considered priority uses of the NWRS, as defined by the Refuge System Administration Act, as amended, there are currently several types of nonwildlife-dependent recreation activities occurring on the Refuge.

5.5.1 History of Nonwildlife-dependent Uses

In 1909, Reclamation completed construction of Lake Lowell, a reservoir designed to serve as an off-stream irrigation water storage facility as part of the Boise Project. Recognizing that a reservoir located in an arid environment would attract wildlife, President Theodore Roosevelt established the Refuge in 1909, reserving the reservoir for the purpose of providing a "refuge and breeding grounds for migratory birds and other wildlife."

From 1909 to 1937, there was no assigned Refuge manager, and public use activities went unchecked. In 1911, a Service representative noted 30 rowboats and three gasoline-powered launches on the lake. By the time the first manager arrived, the Refuge was mostly used for picnicking, swimming, fishing, and boating. Starting in the 1940s, many new uses began to occur, including motorboat regattas, waterskiing, ice skating, waterski jumping, retriever meets, water shows, movie filming, and refreshment and motorboat concessions. By 1950, the amount of public use activity caused the Refuge manager to state in the annual narrative that "it can be forcibly brought to one's attention here that wildlife and the general public just don't mix well." The number of visitor days in May 1951 through August 1951 was estimated at 25,000, excluding fishermen. Managers continued to voice concerns over the amount of public use in the Refuge's annual narratives for 1955, 1956, 1957, and 1959.

There are several mentions in the 1960s and 1980s of conflicts arising between fishermen and water-skiers/motor boaters. In 1969, the Refuge manager wrote that recreation is a 24-hour-per-day job at Deer Flat. Lifeguards were hired for the swimming areas, and the Upper and Lower Dams were closed at night to reduce vandalism and littering.

By 1974, refuge managers were attempting to deemphasize nonwildlife-dependent recreation, but since the Refuge had been long-used for picnicking, swimming, boating, and waterskiing, they doubted these activities could ever be phased out. A "non-program use evaluation" stated that none of the current types of boating were essential for any programs and that all activities described were in conflict with the Refuge's purposes.

Upland uses such as jogging, cross-country practice, running meets, horseback riding, cross-country skiing/snowshoeing, and picnicking have taken place on the Refuge. In 1994, compatibility determinations allowing bicycling and jogging were completed with the stipulation that no competitive events would be allowed. At the same time, compatibility determinations also allowed horseback riding, picnicking, and cross-country skiing, with few or no stipulations. The compatibility determinations for upland uses were extended in 1999.

Based on an erroneous assumption that administrative responsibility for on-water uses rested with Reclamation, no compatibility determinations were developed for on-water recreation at the time. Both the Service and Reclamation have since confirmed that the Service has administrative responsibility for on-water uses at Lake Lowell (as described on page 1-1). This is because the

management of on-water uses would not conflict with Reclamation's off-stream storage of water in Lake Lowell for irrigation purposes; in addition, legal authorities provide that the Service needs to manage Lake Lowell for wildlife refuge purposes too.

Between 1980 and present day, more uses have occurred, including jetskiing, wakeboarding, windsurfing, tubing, and kiteboarding. The Lower Dam Recreation Area is now a popular area for swimming, reunions, weddings, birthday parties, and barbeques. From 2000 to 2007, the average annual visitation has been over 162,000 visitors.

5.5.2 Authorization of Nonwildlife-dependent Recreation

There are no compatibility determinations on file for on-water nonwildlife-dependent recreational uses. These uses have occurred without Refuge authorization and, therefore, are contrary to the Refuge Recreation Act of 1962, as amended, and the National Wildlife Refuge Administration Act of 1966, as amended. None of the current on-water Refuge uses can be extended without first completing a compatibility determination.

Some nonwildlife-dependent upland uses (i.e., jogging, walking, horseback riding, picnicking, bicycling, and cross-country skiing) have extremely brief compatibility determinations, completed in 1994 and extended by signature in 1999. These compatibility determinations do not consider the use's timeframe or budget and staffing needed to manage it, nor do they adequately address potential impacts to wildlife, habitats, and wildlife-dependent users, as required by Service policy (603 FW 2). No scientific research was cited in the determinations, so it is difficult to know what information was used to make the decisions.

As part of the CCP process, the compatibility determinations for all Refuge uses have been reassessed using the best science currently available to consider impacts to wildlife and habitat, as well as wildlife-dependent users (Appendix B).

5.5.3 Boating and Other Water Sports

Between April 15 and September 30, motorized and nonmotorized boats are allowed on the entire lake. Nonwildlife-dependent boating (including use of personal watercraft) is highest in June and July. Between October 1 and April 14, human-powered boats or boats with electric motors are allowed for waterfowl hunting only in the South Side Recreation Area within 200 yards of the water's edge and human-powered boats are allowed in Fishing Areas A and B.

Improved boat ramps are located at the Lower Dam Recreation Area and the east and west ends of the Upper Dam. Unimproved ramps are available at Parking Lots 1 and 7. Current launching facilities are inadequate for current demand, as indicated by long launch lines and inadequate parking. All ramps are subject to closure from low water levels. Nonwildlife-dependent boaters conflict with anglers and wildlife watchers/photographers. Currently, many nonmotorized boaters launch at Parking Lot 1, inside the no-wake zone, to avoid the high-speed motorized traffic. Unfortunately, Parking Lot 1 often closes before the boating season's end due to low water levels, and has been seasonally blocked by a beaver dam in recent years. Windsurfers and kiteboarders have commented that Gotts Point and Parking Lot 3 are their most highly used launching sites.

On the east side is a no-wake zone that encompasses about 12 percent of the lake (based on a water level elevation of 2,518 feet). The no-wake zone was instituted in 1990 to reduce disturbance to

nesting bald eagles. Marine deputies with the Canyon County Sheriff's Office patrol the lake and conduct boat safety inspections, but they are currently unable to enforce Refuge-specific regulations like the no-wake zone at the lake's southeast end. Canyon County Marine Patrol deputies currently maintain the boating and swimming docks. According to the USGS lake use study (Appendix L), 88 percent of vessels observed in this zone were in compliance with the no-wake regulation.

Power boats, personal watercraft, sailboats, rowboats, canoes, kayaks, windsurfing boards, and kiteboards are all used on the lake. However, according to an observational survey of visitor use on Lake Lowell conducted in summer 2011 (Appendix L), most (88 percent) are motorboats, and 86 percent of those are 16 to 25 feet long.

The survey divided the lake into three areas: West Pool (west of the Narrows), Headquarters section of the East Pool (east of the narrows to the line from Gotts Point south to the south shore), and East section of the East Pool (east of the Headquarters Pool). Boating activities varied slightly between pools. Fishing was the most popular activity on both the West Pool (40 percent of observed boats) and the East section of the East Pool (53 percent) and second-most popular on the Headquarters section of the East Pool (27 percent). Skiing and tubing was the second-most popular activity overall and was most popular on the Headquarters section of the East Pool (29 percent) and second-most popular on the West Pool (22 percent) and East section of the East Pool (21 percent).

The USGS lake use study (Appendix L) also found that, consistent with the observation that the most popular activity was fishing, the most common vessel speed (among 47 percent of boats observed) throughout the lake was idling (i.e., the minimum speed that maintains steerage of a vessel or the speed at which a vessel is normally docked). In addition, consistent with the second-most popular activity being skiing, tubing, and other tow-behind activities, the second-most common vessel speed (36 percent) was planing (i.e., traveling at sufficient speed to partially raise the bow out of the water).

Most boats at Lake Lowell (74 percent) were observed in open water, and their locations varied by pool. In the West Pool and east section of the East Pool, where fishing was the most popular activity, boats were less likely to be observed on open water (east section of the East Pool, 64 percent; West Pool, 72 percent) than in the Headquarters section of the East Pool (83 percent), where skiing and tubing was the most popular activity. As might be expected from fishing activities, boats in the West Pool and east section of the East Pool were more likely to be observed in emergent beds (east section of the East Pool, 15 percent; West Pool, 12 percent) or on the edge of emergent beds (east section of the East Pool, 18 percent; West Pool, 8 percent) than in the Headquarters section of the East Pool (emergent beds, 3 percent; edge of emergent beds, 6 percent).

The study also estimated low and peak vessel numbers at one time (VAOT) in each pool. The peak number of VAOT in the East Section of the East Pool was 23 during the Fourth of July weekend. In the Headquarters section of the East Pool, peak number of VAOT was 51 on July 10, but this was not consistent with other counts. The next highest number of VAOT, on Labor Day weekend, was 14. The peak number of VAOT in the West Pool was 23 on August 20. The number of boats per acre calculated for these three areas, using the study's peak VAOT results, does not exceed published optimum boating densities summarized by the Lake Ripley Management District (2003).

SUPs have been issued in recent years to the Southern Idaho Sailing Association (SISA) to hold regattas at the lake, launching from the Lower Dam Recreation Area. These are reasonably small events, with 17 registered participants in the most recent one. The regattas follow a set course demarcated by buoys. SISA members provide "sail-alongs" for those new to sailing and interested in

learning. According to policy, SUPs should be issued in support of one of the priority uses when that use is both appropriate and compatible. Sailors rarely participate in priority uses. Local boat shops also occasionally demonstrate boats at the lake, and commercial wind sports lessons have been advertised without requesting SUPs.

5.5.4 Walking with Pets, Jogging, Biking, and Horseback Riding

A variety of nonwildlife-dependent activities occur at the Refuge in addition to recreational boating. Walking with pets, jogging, bicycling, and horseback riding occur throughout the year, but these activities peak between April and July. Track teams have historically used the Observation Hill Trail for practice sessions, even though a 1994 compatibility determination did not allow competitive jogging. A number of visitors walk dogs, jog, and bike along the entrance road. Although the posted speed limit is 25 miles per hour, vehicles often travel faster, posing a safety hazard to those recreating on the roadway.

The most recent compatibility determinations allow walking, bicycling, noncompetitive jogging, and horseback riding on maintained roads, trails, and firebreaks. Currently, the requirement to remain on roads, trails, and firebreaks is not being well communicated to the public, and people do leave them. Horseback riding and bicycling are not very common. Some equestrians and bicyclists go off-trail, thus increasing disturbance to wildlife and habitat. Most use by cyclists, horseback riders, and dog walkers appears to occur on the Kingfisher, Gotts Point, and Observation Hill trails. Refuge personnel have noticed that when parts of the Observation Hill Trail have been closed for several months, during recent years to protect a bald eagle nest from disturbance, there has been an increase in the visibility of deer and other wildlife in the closed area, showing the importance of seasonal closures and on-trail travel.

5.5.5 Swimming and Sunbathing

Swimming and other beach activities are popular at Lake Lowell. In FY11, an estimated 38,700 people participated in swimming and other beach activities. The only designated swimming beach on the Refuge is currently located at the east end of the Upper Dam and is marked with docks and buoys. Swimming also occurs along the shoreline to the east and south, including areas accessed via the parking lots along the curved portions of Iowa Avenue, the Lower Dam Recreation Area, Gotts Point, and, occasionally, at other Refuge accesses. Swimming also occurs in conjunction with recreational boating activities. A 2011 swimming fatality occurred outside of the Refuge's designated swimming area, and emergency response was delayed because of confusion over the victim's location.

Swimming may occur from Refuge islands, although there are no designated beaches. The Refuge does not have management control of lands below the ordinary high water mark and therefore has no control over swimming in the Snake River.

Sunbathing mostly occurs on the docks and beach adjacent to the swimming area at the Upper Dam and on the beach at the Lower Dam Recreation Area. Some sunbathing occurs in conjunction with swimming at easily accessed shoreline areas around the lake, including Gotts Point and Parking Lot 7. Sunbathing is not known to occur on the Refuge islands.

Lake Lowell has persistent problems with water quality and is on the State's 303(d) list as an impaired water body (Chapter 3). Nutrient-rich irrigation-return flows have combined with summer's shallower depths and high water temperatures to produce dense blue-green algae blooms. Refuge personnel have also received complaints from recreationists about swimmer's itch and ear infections. The Refuge does not monitor for these health concerns and issues no warnings. As far as the Refuge knows, no agency is monitoring water quality for swimming-related health risks. The Refuge will report large algal blooms and other health concerns to the Southwest District Health Department, and work with it to test water quality and assess water contact suitability. Southwest District Health will issue warnings if it feels conditions are unsafe.

5.5.6 Geocaching

Geocaching currently occurs on the Refuge. Geocachers use global positioning system (GPS) coordinates to find a small, hidden cache. Geocachers can cause habitat damage by burying caches or placing them in sensitive vegetation. Local geocachers have been notified that the practice is not allowed on the Refuge, but caches are now often placed on private land accessed through off-trail travel across the Refuge. Geocaching demands could potentially be met by providing virtual geocaches—GPS coordinates to legally accessible scenic, historic, or wildlife-related locations—but such a system is currently unavailable.

5.5.7 Winter Sports

Ice skating and ice fishing occasionally occur on the Refuge. Both of these ice-dependent sports occur during seasonal closures for wintering wildlife. Ice sports also raise safety concerns because there are no trained staff members available to conduct systematic ice evaluations, while winter temperatures do not normally provide stable ice conditions. Signs are currently in place to discourage these uses.

Cross-country skiing is currently allowed on roads and trails. Because of the lack of heavy snowfall and/or enduring snow cover in the Treasure Valley, cross-country skiing is an infrequent Refuge use.

There have been requests in the past for ice diving and cross-country skiing when the lake is frozen.

5.5.8 Picnicking and Events

The Lower Dam Recreation Area offers both a covered picnic shelter and scattered picnic tables. Visitors often request reserving the shelter for weddings, birthdays, or other events, but it is currently available on a first-come, first-served basis. There are currently no regulations regarding event size, sound systems/bands, or large tents/inflatables. Several times a year, visitors erect a giant inflatable "bounce house," and visitors have also installed removable waterslides. Some of these events and event accessories disturb other users and/or wildlife, make use difficult for general Refuge visitors, or present an unnecessary safety hazard.

5.6 Illegal Uses

The Refuge struggles with numerous law enforcement (LE) issues, such as resource violations, trespass into closed areas, theft, gang activity (including "tagging" at most Refuge entrances), alleged

sexual abuse of a child, and assaults. Most violations occur at night and on weekends, but with increasing visitation, they can arise any time. Enforcement of regulations has become increasingly important as pressure from increased visitation/public use affects Refuge resources and increases concerns about visitor safety and user conflicts.

In the past, there were at least two dual-function Refuge LE officers. Currently, the Refuge has one LE officer. Assistance is provided by a Service Zone LE officer, who is responsible for eastern Oregon, all of southern Idaho, and northern Nevada. Assistance is also provided by the Canyon County Sheriff's Office, Canyon County Marine deputies, and IDFG, but these agencies have other priorities and obligations. These agencies are also unable to enforce Refuge-specific regulations, leaving many violators unaccountable for their actions. Violations of Refuge regulations have been catalogued by Refuge staff since 2009 and were also reported to the Refuge by the Canyon County Marine deputies in 2011.

Because of the extent of illegal dumping, littering, and vandalism, some Refuge areas have been restricted. The decisions to make Gotts Point a walk-in only area, and close the gates at Parking Lots 1 through 7 during portions of the year, were both responses to these illegal activities.

5.6.1 North Side Recreation Area

The most common violations in the North Side Recreation Area include walking with off-leash dogs; horseback riding, walking, jogging, and biking off the maintained road, trail, or firebreak; and entering closed areas (e.g., farm fields, osprey and bald eagle nest areas, Upper Dam Marsh). Off-leash dogs can chase, injure, and kill wildlife. Additionally, they can cause other Refuge visitors to be uneasy. Off-trail users have created many social trails whose use has increased disturbance to wildlife and impacts to wildlife habitat—both upland and riparian habitats.

5.6.2 East Upper Dam Boat Launch

Enforcement issues at this location are associated with heavy public use and include vandalism, litter, and noncompliance with parking restrictions. Other violations include fireworks and occasional vehicle trespass on the beach. This area is across from the County park; Canyon County Marine deputies are often present conducting boat inspections and other enforcement activities.

5.6.3 Lower Dam Recreation Area

This area receives significant use from visitors primarily for nonwildlife-dependent activities and is plagued with enforcement challenges, including vandalism and litter, use of fireworks and metal detectors, night use, trespass of vehicles on the beach and lawn, theft of government and private property, assaults, and other violent crimes. Trespass into this area after October 1 is also quite common and can impact wintering waterfowl using the lawn. Overcrowding during the summer has reached a point where emergency responders have been unable to reach patients.

5.6.4 South Side Recreation Area

Various hunting violations occur in this area, including several poaching cases, use of lead shot, and trespass into closed areas. With the help of IDFG officers, many hunters responsible for violating State hunting regulations have been caught.

Target shooting, paintballing, and vandalism occur regularly. Dumping is common because the road bordering the Refuge (Lake Shore Drive) is a popular route to the County landfill. During low-water years, off-road vehicles can reach the shoreline from boat launches and cause habitat damage.

5.6.5 East Side Recreation Area

The Tio Lane entrance is located at the end of a one-mile County road. With its relative isolation and thick riparian habitat, the entrance has several enforcement issues. It is a favored location for paintballers. The area's seclusion attracts regular night use. Anglers fishing the New York Canal leave litter, and it is not uncommon to find fire rings. Over 2,500 marijuana plants were discovered in this area in 2005. It is open to hunting and, therefore, has some resource violations. The most common violations along the Kingfisher Trail are similar to those at North Side Recreation Area (e.g., off-leash dogs, horseback riding, walking, jogging, and biking off the maintained road or trail).

5.6.6 Gotts Point

In the years leading up to the Gotts Point road closure (2007), this fairly isolated location was plagued by law enforcement issues, including vandalism of government property (bathroom, signs, fences, gates, and other facilities), human-caused wildfires, litter, dumping, habitat damage from off-road driving, misuse of the gravel road (leading to disrepair), and other unlawful activities (drug use and solicitation). The area was closed several times for extended periods while repair and replacement work were completed.

Although enforcement issues are not as pervasive as they were when the road was open out to Gotts Point, there are still problems with off-road driving, litter, and vandalism. These unlawful activities affect both Refuge resources and visitors' experience. Gotts Point is also a common area to find visitors after sunset in violation of the day use only regulation.

5.6.7 Lake Lowell

Although the Refuge's airspace is restricted, and float plane use on national wildlife refuges is not allowed (50 C.F.R. 27.34), the Refuge has received occasional reports of float planes landing on the lake. A citation was issued in 2005 to a pilot who landed on the lake. During the growing season, it is not unusual to see low-flying crop dusters using the airspace over the Refuge as a turnaround. This low flight can occur over sensitive areas like heron rookeries.

Each season, Canyon County Marine deputies report violations of the day use only regulation by Refuge boaters. These violations are a safety concern because they can cause harm to the individual through potential stranding on the Refuge at night, as well as disturbance to wildlife.

There are some violations of the no-wake zone in the southeast end of the lake. According to the 2011 USGS lake use study (Appendix L), 12 percent of vessels observed in this zone were not in compliance with the no-wake regulation. Bass fishermen have complained on several occasions about other boaters speeding through the no-wake zone without any repercussions. Access by boat to some closed upland areas has also been documented.

5.6.8 Snake River Islands Unit

Law enforcement coverage has been lacking on the Snake River islands because of limited staffing and logistical difficulties. Common law enforcement issues include litter, fires, camping, and trespassing during the waterfowl-nesting season. Hunting violations include using of lead shot for upland game, building permanent hunting blinds, and hunting game that are not open (e.g., raccoons, turkeys).

Like many other Federal lands, growing of illegal drugs on the Refuge has become commonplace. Our Refuge Officer works diligently on both units to locate and remove illegal grow sites. In 2011, a small marijuana site was located on one of the Refuge islands. Coordination with State and local law enforcement agencies is important in the effort to locate and eradicate such sites.

5.6.9 General

In the past year, the Refuge has noticed an increase in the number of individuals camping in their vehicles in Refuge parking areas. According to County Sheriff's deputies, this is an increasing, local trend, and may be associated with the poor state of the economy and high number of foreclosures.

5.7 Area Outdoor Recreational Opportunities and Trends

Idaho is well known for outdoor recreational opportunities. The State's 2002 Idaho Outdoor Recreation Survey (cited in Idaho Department of Parks and Recreation [IDPR] 2006) found that the top 10 favorite outdoor activities for adults, in order of preference, were walking; hiking; watching wildlife other than birds or fish; swimming in a pond, lake, or river; viewing fish; bird watching; biking; four-wheel driving; golf; and outdoor photography. The top 10 favorite outdoor activities for kids (as reported by adults) were swimming in a pond, lake, or river; hiking; swimming in a public outdoor pool; walking; biking; watching wildlife other than birds or fish; running; waterskiing or other towing water sports; outdoor basketball; and ATV riding.

IDPR operates 30 State parks and manages registration programs for boats, snowmobiles, and off-highway vehicles. IDPR distributes funds from the registrations and other sources to communities and other agencies to develop and maintain trails, facilities, and programs. Some of these funds have been distributed to Canyon County Parks, Recreation, and Waterways for facilities and services at Lake Lowell (e.g., maintenance of paving, purchase of docks and regulatory buoys).

5.7.1 Nearby Recreational Opportunities

Many parks in Canyon and Ada counties provide local outdoor recreational opportunities. For instance, Canyon County Parks, Recreation, and Waterways administers Idaho's only archaeological park, Celebration Park. Located near Melba, along the Snake River, Celebration Park supports hiking, fishing, boating, picnicking, camping, horseback riding, bird watching, and interpretive programs. Several large reservoirs in southwest Idaho and eastern Oregon offer many of the same recreational opportunities as Lake Lowell (Table 5-7).

Table 5-7. Recreational Opportunities at Other Large Reservoirs in Southwest Idaho and Eastern Oregon

Reservoir	Approximate Distance from Lake Lowell	Managing Agency	Fishing	Hunting	Motorized Boating	Tow-behind Activities	Sailing	Kiteboarding and Windsurfing	Swimming	Picnicking
Lucky Peak	36 miles	U.S. Army Corps of Engineers, IDPR, and IDFG	X	X	X	X	X	X	X	X
Black Canyon	45 miles	Reclamation (manages recreation) and IDFG (manages the adjacent Montour Wildlife Management Area under an agreement with Reclamation)	X	X	X	X	X	X	X	X
Arrowrock	56 miles	Boise National Forest under agreement with Reclamation	X	X	X	X	X	X	X	X
C.J. Strike	73 miles	Idaho Power, BLM, and IDFG	X	X	X	X	X	X	X	X
Owyhee	78 miles	Oregon State Parks and Recreation	X	X	X	X	X	X	X	X
Brownlee	98 miles	Idaho Power	X	X	X	X	X	X	X	X
Cascade	104 miles	Reclamation and IDPR	X	X	X	X	X	X	X	X
Anderson Ranch	106 miles	Boise National Forest under agreement with Reclamation	X	X	X	X	X	X	X	X

5.7.2 Outdoor Recreation Rates and Trends

Although the housing boom has slowed in the Treasure Valley and across the nation, the surrounding area's population is likely to continue growing, and demand for recreational opportunities will increase. The 2006-2010 Statewide Comprehensive Outdoor Recreation Plan (IDPR 2006) measured baseline recreation information from 2002 against data collected in 2004-2005. Even in this short amount of time, there were large changes in participation in many activities. Table 5-8 represents participation rates that changed by 10 percent or more for activities currently found on the Refuge (whether allowed or not).

Table 5-8. Percent Change in Participation by Activity, 2002-2005

Activity	Change
Geocaching	154%
Outdoor photography	44%
Jet boating	30%
Bird watching	29%
Snowshoeing	28%
Canoeing	26%
Walking for exercise	22%
Watching wildlife	21%
Cross-country skiing	15%
Running	-26%

Source: IDPR (2006).

Some reasons that geocaching might top this list are that there was a dramatic change in people's knowledge of the activity between 2002 and 2005 and handheld GPS units may have become more readily available and inexpensive. Given that only 4.8 percent of the population considered themselves regular participants or enthusiasts, it is believed that the number of people participating in geocaching is still small (IDPR 2006). The increased interest in geocaching could create the need for an increased law enforcement response.

The large increase in outdoor photography can likely be attributed to the ability to take high-quality digital pictures fairly inexpensively in comparison to traditional film photography. Digital photography is relatively simple and offers an immediate opportunity to view pictures that film photography cannot provide. Among Idahoans surveyed in 2005, 70 percent participated in outdoor photography and more than half were regular participants or enthusiasts (IDPR 2006). IDPR (2006) surmised that the increase in participation in outdoor photography may partially account for the rise in wildlife viewing and bird watching as well.

IDPR (2006) pointed out that the 30 percent increase in participation in jet boating was much greater than the 5.5 percent increase in registration of all power boats in Idaho from 2001 to 2006. Canoeing increased as well, by 26 percent, between 2002 and 2005. About 42 percent of Idahoans participate, at least occasionally, in nonmotorized boating. Statewide boater registrations went up 2 percent between 2008 and 2009, from 86,454 to 88,200 registrations (IDPR 2010). In Canyon County, boater registrations increased by just under 1 percent in the same period, from 4,664 to 4,707. In Ada County, they decreased 2 percent in the same timeframe, from 7,411 to 7,257 boater registrations. According to Bowker et al. (1999), demand for water-based recreational activities regionally is expected to grow faster than population growth.

IDPR (2006) noted that "the outdoor recreation professionals on the Task Force also identified emerging issues that are yet to catch the attention of much of the recreation public (i.e., the closing window of opportunity many communities in Idaho have to acquire land for parks, open space, and community pathways, and the growing need for opportunities to increase the physical fitness of residents."

The 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation, a comparison of national participation in wildlife-oriented recreation between 1996 and 2006, showed a significant decline of 7 percent in the number of hunters from 1996 to 2001. Although there was also a decline of 4 percent from 2001 to 2006, the change was not significant. There was also a significant decline of 15 percent in the number of anglers from 1996 to 2006. Finally, although the number of all wildlife watchers (including around-the-home and away-from-home) increased from 1996 to 2006, there was actually a non-significant 3 percent decline in the number of away-from-home wildlife watchers (USFWS and U.S. Census Bureau 2006).

5.8 Social/Economic Environment

The following description of the current social and economic environment was compiled by the Policy Analysis and Science Assistance Branch of the USGS.

5.8.1 Regional Economic Setting

Located southwest of Boise, Idaho, the Refuge offers opportunities for visitors to enjoy a variety of recreational activities; as discussed throughout this CCP, some of these activities depend on the presence of wildlife and others do not. These recreational opportunities attract outside visitors and bring in dollars to the community. Associated visitor activities—such as spending on food, gasoline, and overnight lodging in the area—provide local businesses with supplemental income and increases the local tax base. Management decisions for the Refuge about public use, expansion of services, and habitat improvement may either increase or decrease visitation to the Refuge and thus affect the amount of visitor spending in the local economy.

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30- to 60-mile radius of the impact area (Stynes 2012). Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. After consultation with Refuge staff, it was decided that only the Lake Lowell Unit would be considered for the economic analysis due to the relatively small amount of visitation to the Snake River Islands Unit. The Lake Lowell Unit lies within Canyon County, Idaho. The city of Boise, located in Ada County, is approximately 28 miles from the Refuge. Most of the economic activity related to the Lake Lowell Unit is located within Canyon and Ada counties. Therefore, this two-county area constitutes the local economic region (or study area) for this analysis. Idaho's Treasure Valley closely coincides with the two-county study area, and it houses some of Idaho's largest metropolitan areas, including the cities of Boise, Caldwell, and Nampa, which collectively accounted for about 21 percent of the state's 2010 population (U.S. Census Bureau 2012). The next sections describe the socioeconomic characteristics and trends in the two-county region.

5.8.2 Population and Density

Table 5-9 summarizes the population characteristics of Idaho and the local two-county area. In 2010, the U.S. Census Bureau estimated the total population for the two counties to be 581,288, or 37 percent of Idaho's total population. Ada County was the most heavily populated county in both the study area and the state with 392,365 residents in 2010 (Idaho Department of Labor 2011b). Canyon County (188,923 residents) was the second-most populous county in the state in the same year (Idaho Department of Labor 2011a; U.S. Census Bureau 2012). In the years leading up to the economic recession of the late 2000s, the two-county area experienced rapid population growth, with the populations of Ada and Canyon counties increasing by 27 percent and 40 percent respectively, between 2000 and 2008 (U.S. Census Bureau 2009). The rapid population growth in the study area throughout the majority of the past decade has been motivated by several factors, including a healthy labor market, relatively low real estate prices, ample opportunities for outdoor recreation, and easy access to the Boise metropolitan area (Cauchon 2007; Idaho Department of Labor 2011b).

Table 5-9. Population Estimates for Idaho and the Two Counties near Deer Flat Refuge

Area	Population (2010)[a]	% Change (2000-2010)[a]	Persons per Square Mile (2010)[a]	Expected Population Growth (2010-2030)[b]
Idaho	1,567,582	21.1%	19	31%
Ada County	392,365	30.4%	373	42%
Canyon County	188,923	43.7%	322	34%

Sources: [a] U.S. Census Bureau (2012) and [b] Church (2003).

In 2009-2010, population growth in the study area slowed due to repercussions of the national economic recession, with the populations of Ada and Canyon counties averaging only 2.0 and 3.0 percent growth, respectively, during these years (U.S. Census Bureau 2012). Despite slowed growth from 2008 to 2010, the Treasure Valley and the Boise metropolitan area remained among the fastest growing regions of the state over the past decade (Church 2003; U.S. Census Bureau 2012).

In 2010, the population densities of both counties in the region were between 300 and 400 persons per square mile, with Ada County being more densely populated (373 persons per square mile) than Canyon County (322 persons per square mile) (U.S. Census Bureau 2012). Both counties had substantially higher population densities than the state as a whole (19 persons per square mile in 2010). In the case of Ada County, the high population density is largely due to the city of Boise, which accounted for over half (52 percent) of the county's 2010 population (U.S. Census Bureau 2012). Similarly, the cities of Nampa (81,557 residents) and Caldwell (46,237 residents) collectively accounted for 68 percent of the population of Canyon County in 2010 (U.S. Census Bureau 2012).

5.8.2.1 Population Projections

Future population projections for the two-county area, as well as the State, are characterized by in-migration over the next 20 years. The population of Idaho is expected to increase by 31 percent over the course of the next two decades, and, by 2030, it is projected to reach nearly two million (Church 2003). During these years, Idaho is anticipated to be one of the fastest growing states, with growth rate projections consistently among the top 10 in the nation (U.S. Census Bureau 1996). The Treasure Valley and Boise metropolitan area are expected to remain the most populated areas statewide over the next two decades and to continue to be the fastest growing region in the state over the next 20 years. Valley, Boise, Ada, and Canyon counties are expected to have an average growth rate of 42 percent over this time horizon. The two counties that make up the study area are expected to remain among the fastest growing counties in the state, with Ada and Canyon projected to be the first and eighth fastest growing counties statewide over the next two decades (Church 2003)

5.8.3 Gender, Age, and Racial Composition

In 2010, the median age of residents in Canyon County (31.6 years) was lower than the state median of 34.6 years and the Ada County median of 34.8 years. The racial demographics of Ada County were very similar to those of the state in 2010 (Table 5-10). In Canyon County the percentage of Hispanic or Latino residents was approximately 13 percent higher while the percentage of white residents was 6 percent lower than the state average (U.S. Census Bureau 2012).

Table 5-10. Racial Demographics for the State and Counties near Deer Flat Refuge (2010)

Area	Idaho	Ada County	Canyon County
	% of Total Population		
White alone	89.0%	90.3%	83.0%
Hispanic or Latino	11.2%	7.1%	23.9%
Two or more races	2.5%	2.9%	3.0%
Asian alone	1.2%	2.4%	0.8%
Black or African American alone	0.6%	1.1%	0.6%
American Indian and Alaska Native alone	1.4%	0.7%	1.0%
Native Hawaiian and other Pacific Islander alone	0.2%	0.2%	0.2%

Source: U.S. Census Bureau (2012).
Note: Percentages may add to more than 100 percent because individuals may report more than one race.

5.8.4 Economic Conditions and Trends

5.8.4.1 Unemployment and Poverty

Since the early 1990s, trends in the unemployment rate in Idaho have generally paralleled the national average. Unemployment trended downward in the early 2000s and remained below the national level from 2002 to 2007 before increasing in the latter half of the same decade (Bureau of Labor Statistics 2011). The period of expansion in the early 2000s may be attributed to several factors, including the growth of several service industries, continued development of the state's technology sector, and increasing demand for local government and construction services as the state's population continued to grow (Idaho Division of Financial Management 2004).

In 2008, Idaho's unemployment rate trended sharply upward as the state began to feel the effects of a sluggish national economy, with the construction, manufacturing, administrative and support services, and retail trade industries suffering the state's greatest job losses (Idaho Department of Labor 2009, 2011c). Since 1990, unemployment in the study area exhibited trends similar to statewide unemployment, with Ada and Canyon counties averaging unemployment rates of 4.0 and 5.8 percent respectively, over the past two decades (Bureau of Labor Statistics 2011). Between 2008 and 2010, unemployment in the two-county area increased sharply, particularly in Canyon County where the combined effects of slower population growth, a struggling housing market, and rising lumber, concrete, and fuel prices decreased local demand for labor (Idaho Department of Labor 2011a).

Table 5-11 summarizes measures of unemployment, poverty, and income in the two-county area. In 2010, the median household income in Idaho as a whole was $43,490, which was about $6,500 lower than the national median household income of $50,046 (U.S. Census Bureau 2012). Median household income in the region averaged $46,672, with the median income in Ada County ($50,612) being substantially higher than that in Canyon County ($42,732).

Table 5-11. Unemployment, Poverty, and Household Income for the State and Counties near Deer Flat Refuge

Area	Median Household Income 2010	Unemployment Rate 2010	Net Change in Unemployment Rate 2007-2010	Percent of Persons Below Poverty 2010
Idaho	$43,490	9.5%	+6.5%	25.0%
Ada County	$50,612	8.9%	+6.4%	29.8%
Canyon County	$42,732	11.3%	+7.8%	16.2%

Source: U.S. Census Bureau (2012).

As shown in Table 5-11, poverty levels in Canyon County (16.2 percent) were below the state average of 25 percent in 2010. In contrast, poverty levels in Ada County (29.8 percent) were greater than the state average in 2010. On average, 23 percent of the population of the two-county area was living below the poverty line in 2010 (U.S. Census Bureau 2012).

5.8.4.2 Employment and Income by Industry

Table 5-12 summarizes employment by industry for the two-county area. In 2009, total employment in the study area represented 339,730 jobs, with about 77 percent of these jobs located in Ada County. In the study area, 60 percent of the total employment came from five main sectors (Bureau

of Economic Analysis 2010): professional, scientific, management, administration, and waste services; educational, health, and social services; retail trade; finance, insurance, real estate, and rental and leasing; and public administration. In 2008, the two largest employers in Ada County were Micron Technology and Hewlett Packard; these companies remain some of the largest local employers in Ada County (Ada County Accounting Department 2008; Idaho Department of Labor 2011b). In Canyon County, the largest local employers in the past decade have been in the education, manufacturing, health care, food processing, and wood processing sectors. These employers currently include the Caldwell and Nampa School Districts, the St. Alphonsus Medical Center, Plexus, the Amalgamated Sugar Company, and Woodgrain Millwork Incorporated (City of Nampa Department of Planning and Zoning 2003; Idaho Department of Labor 2011a).

Table 5-12. Employment by Industry for the Counties near Deer Flat Refuge

Employment by Industry	Ada County	Canyon County	Two-county Region
Total Employment (jobs) in 2009	**262,868**	**78,862**	**339,730**
Percent of Employment by Sector			
Professional, scientific, management, administration, and waste services	17%	9%	16%
Educational, health, and social services	13%	13%	13%
Retail trade	11%	13%	11%
Finance, insurance, real estate, and rental & leasing	11%	8%	10%
Public administration	10%	11%	10%
Arts, entertainment, recreation, accommodation, and food services	9%	6%	8%
Manufacturing	6%	10%	7%
Construction	6%	8%	7%
Other services (except public administration)	5%	6%	5%
Wholesale trade	4%	3%	4%
Transportation and warehousing	2%	4%	3%
Agriculture, forestry, fishing and hunting, and mining	1%	6%	2%
Information services	2%	1%	2%

Source: Bureau of Economic Analysis (2010).

Professional, scientific, management, administration, and waste services accounted for the largest percentage of total employment in the region, with 15.6 percent of total local employment coming from this sector. In the two-county area, most jobs in education, health, and social services (77 percent) and public administration (87 percent) were located in Ada County, which is home to both the state capital and Boise State University. These sectors were the second and fifth largest sectors of the local economy, respectively, and accounted for 13.1 percent and 10.3 percent of total employment in the combined two-county area (Bureau of Economic Analysis 2010).

On the whole, farm employment accounted for a relatively small share (1.5 percent) of the region's total employment. Employment from this sector, however, did account for a larger share of total employment located in Canyon County (4 percent of in-county employment) than Ada County (less than 1 percent). On the whole, Ada County was much less dependent on farm earnings (less than 1 percent of in-county farm earnings) than the state as a whole, which had about 4.0 percent of its total earnings from farming. Canyon County is similar to the state as a whole than to Ada County on this point, with 4.7 percent of its total earnings from farming (Bureau of Economic Analysis 2010).

5.8.5 Land Use and Ownership Changes Surrounding Refuge Lands

5.8.5.1 Current Land Use

As of 2006, about 30 percent of the land in the two-county area near the Refuge was federally owned, with the majority of Federal land ownership in BLM holdings (21 percent of land in the two-county area). About 65 percent of the land in the study area was privately owned, with the remaining 4 percent State-owned (Conservation Biology Institute 2006; data compiled using the Economic Profile System Human Dimensions Toolkit [EPS-HDT] developed by Headwaters Economics).

Ada County is largely covered by grassland and shrubland, which account for about 75 percent of all land cover in the county. Mixed cropland is also prevalent, accounting for 17 percent of the land cover (NASA 2006; data compiled using EPS-HDT). As of 2006, urban development accounted for 6 percent of all land cover in the county (NASA 2006; data compiled using EPS-HDT). Land ownership in Ada County in 2006 was 49 percent private, 43 percent Federal, 7 percent State, and 1 percent under other ownership (i.e., Tribal, City, County, or Other) (Conservation Biology Institute 2006; data compiled using EPS-HDT).

Canyon County is less urbanized than Ada County, with about 3 percent of the county's land cover in urban development in 2006. Mixed croplands accounted for about 75 percent of the county's land cover, grassland accounted for 14 percent, and shrubland accounted for 4 percent (NASA 2006; data compiled using EPS-HDT). Water accounted for an additional 2 percent of land cover in Canyon County, with the majority of this coming from Lake Lowell, which covers a total of 14.5 square miles (NASA 2006 data compiled using EPS-HDT; Reclamation n.d.). Land ownership in Canyon County in 2006 was 93 percent privately owned, 6 percent federally owned, 5 percent State-owned, and 1 percent under other ownership (i.e., Tribal, City, County, or Other) (Conservation Biology Institute 2006; data compiled using EPS-HDT).

5.8.5.2 Changes in Land Use

As populations grow, the spread of American cities across the rural landscape has several potential environmental impacts including, for example, decreased watershed permeability, increased noise and air pollution, and the loss of arable land and open spaces (Auld 2001; Knight et al. 1995). In addition to these environmental impacts, urban sprawl may have significant economic impacts on local communities through increased costs of public community services such as emergency response, infrastructure, or public works and utilities (Chen 2000; Speir and Stephenson 2002).

Idaho's population growth over the past decades has been cause for the continued conversion of rural lands to urban purposes. Between 1982 and 1997, Idaho ranked thirty-fifth in the nation for the most rural acres (205,000 acres) converted for urban growth (Goodwin 2003). About half (45 percent) of this transformation occurred between 1992 and 1997, with over 27,000 acres converted in the two-county study area during this five-year period. Land conversion in Ada and Canyon counties between 1992 and 1997 occurred faster than in any other region in Idaho, with Ada County converting land at a rate of 4,480 acres per year and Canyon County averaging 2,600 acres per year (U.S. Department of Agriculture 2000). Between 1997 and 2007, an additional 130,100 acres of land was developed statewide, resulting in 907,300 total acres of developed land in Idaho and representing a 61 percent increase from 1982 levels (U.S. Department of Agriculture 2009). These trends are likely to continue as statewide and local area populations are projected to continue growing over the next few decades.

Appendices A-P

Gopher Snake
Addison Mohler/USFWS

Appendix A. Appropriate Use Determinations

A.1. Introduction

The Appropriate Refuge Uses Policy (603 FW 1 [2006]) outlines the process that the Service uses to determine when general public uses on refuges may be considered. Priority public uses previously defined as wildlife-dependent uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) under the National Wildlife Refuge System Improvement Act of 1997 are generally exempt from appropriate use review. Other exempt uses include situations in which the Service does not have adequate jurisdiction to control the activity, as well as refuge management activities.

In essence, the appropriate use policy provides refuge managers with a consistent procedure to first screen and then document decisions concerning a public use. When a use is determined to be appropriate, refuge managers must then decide if the use is compatible before allowing it on a refuge. The policy also requires review of existing public uses.

During the comprehensive conservation process (CCP) process, the Refuge Manager evaluated all existing and proposed uses at Deer Flat National Wildlife Refuge (NWR) using the following guidelines and criteria as outlined in the appropriate use policy:

- Do we have jurisdiction over the use?
- Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?
- Is the use consistent with applicable executive orders and Department of the Interior (Department) and U.S. Fish and Wildlife Service (Service) policies?
- Is the use consistent with public safety?
- Is the use consistent with goals and objectives in an approved management plan or other document?
- Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?
- Is the use manageable within available budget and staff?
- Will this be manageable in the future within existing resources?
- Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?
- Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see Section 1.6D of the appropriate use policy for description of recreational uses) compatible, wildlife-dependent recreation into the future.

The Refuge Manager and staff members completed compatibility determinations in Appendix B, for each of the following appropriate uses: boating at no-wake speeds; individuals biking, jogging, and horseback riding; farming and grazing; high-speed watercraft; research; swimming and beach use; picnicking; walking with pets; sailing regattas; and mosquito management.

The following uses were evaluated and are included in this document.

Refuge Use	Appropriate	Page
Boating at No-wake Speeds at Lake Lowell Unit	Yes	A-3
Competitive Cycling	No	A-7
Competitive Jogging	No	A-11
Competitive Rowing	No	A-15
Cycling and Jogging by Individuals and Groups	Yes	A-19
Farming and Grazing	Yes	A-23
Float Plane (landing and taking off)	No	A-27
Traditional Geocaching (burial or placement of a physical cache)	No	A-31
High-speed Watercraft at Lake Lowell Unit	Yes	A-35
Horseback Riding by Individuals and Groups	Yes	A-39
Ice Skating	No	A-43
Radio-controlled Planes	No	A-45
Research	Yes	A-49
Swimming and Beach Use	Yes	A-53
Walking with Pets (dogs)	Yes	A-57
Sailing Regattas	Yes	A-63
Mosquito Management	Yes	A-67

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Boating at No-wake Speeds at Lake Lowell Unit

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting Robert A. Peyton Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Boating at No-wake Speeds at Lake Lowell Unit

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Boaters using Lake Lowell must comply with all State and Federal boater safety requirements.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. We are currently at the maximum boating visits identified in the 1990 Master Plan, as updated in 1996 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes. This use is currently manageable in partnership with the Canyon County Sheriff's Department.

(h) Will this be manageable in the future within existing resources?

Yes, as long as we continue to partner with the Canyon County Sheriff's Department.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. This mode of transportation allows fishermen, wildlife observers, and other wildlife-dependent recreationists to access to wildlife and environments that could not be reached otherwise. This access increases their enjoyment of the Refuge and appreciation of its wildlife and habitats. Boating at no-wake speeds in the no-wake zones should cause fewer disturbances to wildlife than high-speed boating. Motorized boats can also cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting more area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (DeLong 2002; Huffman 1999). Boats traveling at no-wake speeds do cause some level of disturbance to wildlife but the slow speed, low noise levels, and low approach velocity minimizes the adverse effects associated with boat use in no-wake zones while allowing wildlife-dependent recreationists access to wildlife and environments that could not be reached otherwise.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. This use increases access for wildlife-dependent recreationists. As stated above, boats traveling at no-wake speeds do cause some level of disturbance to wildlife but the slow speed, low noise levels, and low approach velocity of boats at no-wake speeds minimize the adverse effects associated with boat use in no-wake zones while allowing wildlife-dependent recreationists access to wildlife and environments that could not be reached otherwise.

Conclusion

Boating at no-wake speeds is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility.

References

DeLong, A.K. 2002. Managing visitor use and disturbance of waterbirds—a literature review of impacts and mitigation measures. Prepared for Stillwater National Wildlife Refuge. Appendix L in: Stillwater National Wildlife Refuge Complex Final Environmental Impact Statement for the Comprehensive Conservation Plan and Boundary Revision (Volume II). Department of the Interior, Fish and Wildlife Service, Region 1, Portland, Oregon. 114 pp. Available at: http://www.fws.gov/pacific/planning/main/docs/NV/stillwater/4%20Volume%20II/Appendix%20L/App%20L%20final%20lit%20review.pdf. Accessed May 18, 2012.

Huffman, K. 1999. San Diego South Bay survey report—effects of human activity and water craft on wintering birds in South San Diego Bay. USFWS.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

Document continues on next page.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Cycling

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A **compatibility determination is required before the use may be allowed.**

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Cycling

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. Refuge paths and roads are not designed for high-speed bicycling. There is a potential for riders to be struck by vehicles on the winding entrance road or to strike pedestrians on narrow and/or winding Refuge trails. Recent requests for competitive group bicycling activities include use of Refuge parking areas for start and finish lines and "watering" stops. Use of potentially busy parking areas for competition bicycling would be dangerous and an impediment to other Refuge visitors' safe enjoyment and use of Refuge facilities.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

No. A compatibility determination from 1994 does not allow "organized competitive race events."

(g) Is the use manageable within available budget and staff?

No. There is no staff available to direct traffic and ensure the safety of riders and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No. There will be no staff available to direct traffic and ensure the safety of riders and the rest of the visiting public.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that riders are focused on competing or training and riding as quickly as possible, they are not able to take the time to appreciate the Refuge's resources. Noise caused by competition bicycling groups and the speed at which they travel may actually negatively impact Refuge wildlife. According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors, including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level.

Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than other means of transportation. Stalmaster and Newman (1978) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Noncompetitive bicycling in a group of more than 10 riders (e.g., a family outing) may be allowed under special conditions provided in a special use permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be utilized by wildlife-dependent recreationists. This use increases the potential for wildlife disturbance through high-speed movement and noise created by a group of competitors, potentially negatively impacting wildlife observers and other wildlife-dependent users.

Conclusion

Because competition bicycling creates a potential public safety issue, negatively impacts wildlife-dependent recreationists and wildlife, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Fernández-Juricic, E., P.A. Zollner, C. LeBlanc, and L.M. Westphal. 2007. Responses of nestling black-crowned night herons (*Nycticorax nycticorax*) to aquatic and terrestrial recreational activities: a manipulative study. Waterbirds 30(4):554-565.

Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the North American Wildlife and Natural Resources Conference 56:238-247.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Pease, M.L., R.K. Rose, and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. Wildlife Society Bulletin 33(1):103-112.

Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42:506-513.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Jogging

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?		✓
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Jogging

(a) Do we have jurisdiction over the use?

Yes. This use is conducted on the upland portions of Lake Lowell Unit and falls under the jurisdiction of Deer Flat NWR.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

No. A compatibility determination from 1994 does not allow “organized races and competitions.”

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that joggers are focused on competing or training, they are not able to take the time to appreciate the Refuge's resources. Noise caused by jogging in groups and the speed at which the group is traveling may actually negatively impact Refuge wildlife. According to Knight and Cole (1991), there are three wildlife responses to human disturbance: 1) avoidance; 2) habituation; and 3) attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance, as well as the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995).

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be used by wildlife-dependent recreationists. This use increases the potential for wildlife disturbance through high speed movement and noise, potentially negatively impacting wildlife observers and other wildlife-dependent users.

Conclusion

Because competitive jogging has been denied by a previous compatibility determination, can negatively impact wildlife-dependent recreationists and wildlife, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

Fernández-Juricic, E., P.A. Zollner, C. LeBlanc, and L.M. Westphal. 2007. Responses of nestling black-crowned night herons (*Nycticorax nycticorax*) to aquatic and terrestrial recreational activities: a manipulative study. Waterbirds 30(4):554-565.

Gabrielsen, G.W. and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands. Transactions of the North American Wildlife and Natural Resources Conference 56:238-247.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Rowing

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Competitive Rowing

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to direct traffic and ensure the safety of competitive rowers and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that competitive rowers are focused on competing or training, they are not able to take the time to appreciate the Refuge's resources.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. This use takes up space that could otherwise be utilized by wildlife-dependent recreationists. In addition, competitive rowing events would exclude the general public and reduce the quality of wildlife-dependent activities by concentrating many users in the race location. The proposed racing location along the Lower Dam is a popular fishing spot for boat and shoreline anglers.

Conclusion

Because competitive rowing would require additional budget and staff, can negatively impact wildlife-dependent recreationists, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Bicycling and Jogging by Individuals and Groups

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	✓	✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Bicycling and Jogging by Individuals and Groups

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Individual cyclists and joggers should not create public safety concerns. Allowing cycling only on wider multiuse trails (Kingfisher Trail, Gotts Point Trail, East Dike Trail, and the Observation Hill Trail System) should reduce safety conflicts with pedestrian users. Also, multiuse trail etiquette signage will require cyclists to yield to pedestrians and equestrians. Only pedestrian uses will be allowed on more narrow trails and trails used by environmental education groups (Nature Trail, Centennial Trail, and Murphy's Neck Trail).

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use will be allowed on select multiuse trails giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where joggers and bicyclists are absent, the use is not inconsistent with current goals, objectives, and plans

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes and no. Bicycling and jogging are not defined as wildlife-dependent activities, although individuals could be engaged in wildlife observation while jogging or cycling. The speed and noise created by bicycling and or jogging may in fact negatively impact wildlife. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than other means of transportation. Slow-moving cyclists that view wildlife while cycling or wildlife-dependent users that access viewing areas via bicycle may increase their appreciation of the Refuge.

Bicycling or jogging in a group of more than 10 individuals may be allowed under special conditions provided in a special use permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes and no. This use increases the potential for wildlife disturbance through high-speed movement and noise, potentially negatively impacting wildlife observers and other wildlife-dependent users on multiuse trails. Because this use is only allowed on multiuse trails, wildlife-dependent users will have the opportunity to use walking trails (Nature Trail, Centennial Trail and Murphy's Neck Trail) and the Lower Dam Recreation Area without interacting with joggers and cyclists. Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities will allow wildlife-dependent users to view wildlife and habitats in areas where cyclists and joggers are absent.

Bicycling or jogging in a group of more than 10 individuals may be allowed under special conditions provided in a Special Use Permit. Additional requirements to ensure safety and reduce disturbance (such as additional limits to use in time and space) may be established.

Conclusion

Limiting cycling and jogging only to multiuse trails and allowing only individuals and groups with up to 10 riders (a special use permit will be required for groups of more than 10 riders) will limit the disturbance to wildlife and other visitors. Any disturbance created by this use is expected be intermittent and short term in nature. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of cycling and jogging will be studied and alterations and changes to the use will be made if necessary.

References

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Pease, M.L., R.K. Rose, and M.J. Butler. 2005. Effects of human disturbances on the behavior of wintering ducks. Wildlife Society Bulletin 33(1):103-112.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Farming and Grazing

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Farming and Grazing

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. See section (i) below.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Grazing has been shown to be beneficial for single species management such as for foraging geese. Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Greenwalt (1978) explained that

some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese. Pasture grasses serve as an important source of amino acids and carbohydrates to meet the energy and nutrient requirements of geese (Baldassarre and Bolen 2006). Grazing by livestock simulates some of the effects of natural disturbances by removing woody vegetation, reducing thatch, and encouraging the production of young shoots, which are preferred forage for Canada and cackling geese (Raveling 1979). Grazing can be used to set back succession, increase native annual forb species and cover, and decrease vegetation height and litter depth (Hayes and Holl 2003), all of which are beneficial to foraging Canada geese.

The farming program provides high carbohydrate forage for wintering and migrating waterfowl. Crop fields planted to small grains such as winter wheat can indirectly benefit some other bird species by provide some foraging habitat for a variety of seed-eating migratory bird species. The Refuge's farmed and grazed lands provide areas of high-energy grain crops and green forage grasses to meet the energy needs of waterfowl and other wildlife and reduce crop depredation in nearby agricultural lands.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Production of wildlife food and creation of quality goose pasture is likely to draw wildlife to the Refuge and provide a greater opportunity for wildlife-dependent recreation.

The public occasionally encounters farming operations while recreating on Refuge lands. Although some aspects of farming operations—including noise, dust, spraying, sight of grazing animals, and temporary traffic congestion—may be occasional annoyances to members of the public, conflicts and impacts are expected to remain minor over the life of the plan.

Conclusion

Farming and grazing are beneficial to the Refuge's natural resources and help achieve Refuge purposes by controlling invasive and exotic species, improving quality of grassland and wetland habitat, and provide important food resources used by waterfowl and other migratory birds. Therefore, farming and grazing are considered to be appropriate uses subject to stipulations necessary to ensure safety and compatibility.

References

Baldassarre, G.A. and E.G. Bolen. 2006. Waterfowl ecology and management. 2nd edition. Malabar, FL: Krieger Publishing Company.

Greenwalt, L.A. 1978. The National Wildlife Refuge System. Pages 399-412 in: H.P. Brokaw, ed. Wildlife and America. Washington, D.C.: Council on Environmental Quality.

Hayes, G.F. and K.D. Holl. 2003. Cattle grazing impacts on annual forbs and vegetation composition of mesic grasslands in California. Conservation Biology 17(6):1694-1702.

McLandress, M.R. and D.R. Raveling. 1981. Changes in diet and body composition of Canada geese before spring migration. Auk 98:65-79.

Raveling, D.G. 1979. The annual energy cycle of the cackling Canada goose. Pages 81-93 in: R.L. Jarvis and J.C. Bartonek, eds. Management and biology of Pacific Flyway geese. Corvallis, OR: OSU Book Stores.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Float Plane (landing and taking off)

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?		✓
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Float Plane (landing and taking off)

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

No. Under the Code of Federal Regulations (50 C.F.R. 27.34) the "unauthorized operation of aircraft … at altitudes resulting in the harassment of wildlife, or the unauthorized landing or take-off on a national wildlife refuge, except in an emergency is prohibited."

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes.

(d) Is the use consistent with public safety?

No.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to ensure the safety of pilots and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. The Federal Aviation Administration (FAA) has worked with other Federal agencies including the U.S. Air Force, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Department of Agriculture APHIS Wildlife Services to address aircraft-wildlife strikes in the United States. A Regional Memorandum of Understanding among these parties states that "civil and military aviation communities widely recognize that the threat to human health and safety from aircraft collisions with aircraft-wildlife strikes is increasing." A focus of the cooperation between these Federal agencies is to identify, separate, and mitigate bird air strike hazards by providing separate areas for airplanes and wildlife to exist.

According to the FAA Wildlife Strike Database (FAA 2012), there have been over 120,000 air strikes nationally between 1990 and 2010. Most bird strikes occur during daylight hours between July and October.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. Landing and take-off of float planes may disturb wildlife-dependent recreationists because of the noise and speed of the aircraft.

Conclusion

Because the use of aircraft is contrary to the purpose, goals, and objectives of the Refuge; would be in violation of the Code of Federal Regulations, is widely recognized as a threat to birds, and would be a safety concern for other Refuge visitors, it would not be considered an appropriate use of the Refuge.

References

FAA (Federal Aviation Administration). 2012. Wildlife strike database. Available at: http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

Document continues on next page.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Traditional Geocaching (burial or placement of a physical cache)

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?		✓
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Traditional Geocaching (burial or placement of a physical cache)

(a) Do we have jurisdiction over the use?

Yes. This use is conducted on the upland portions of Lake Lowell Unit and falls under the jurisdiction of Deer Flat NWR.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

No. The use is not consistent with the Code of Federal Regulations; 50 C.F.R. Part 27.63 prohibits search for and removal of valued objects and 50 C.F.R. Part 27.93 prohibits abandonment of property on national wildlife refuges.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. While geocachers are walking to a designated location, they may take the time to appreciate the Refuge's resources. However, caches can be attractive and potentially dangerous to wildlife. In addition, these treasures are placed in such a way to present a challenge to locate, and exuberant searchers can have a profound effect on soils, vegetation, and local wildlife within the immediate vicinity of the cache.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. Geocachers may disturb wildlife-dependent recreationists (hunters, anglers, wildlife observers, and photographers) close to an area where a cache has been stashed.

Conclusion

Because geocaching violates the Code of Federal Regulations, this use has been found to be not appropriate at Deer Flat NWR.

References

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: High-speed Watercraft at Lake Lowell Unit

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: High-speed Watercraft at Lake Lowell Unit

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. Although the Refuge Manual (8 RM 9.6) states that "waterskiing will not be allowed on refuge-controlled waters, except where mandated," current policies derived from the 1997 amendments to the National Wildlife Refuge System Administration Act of 1966 provide that uses may be allowed if they are found to be both appropriate and compatible with the purpose for which the Refuge was established.

(d) Is the use consistent with public safety?

Yes. Boaters using Lake Lowell must comply with all State and Federal boater safety requirements. No races or motorized nonwildlife-dependent group activities are allowed, providing a safer boating experience for visitors.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. We are currently at the maximum boating visits identified in the 1990 Refuge Management Plan, as updated in 1996 (USFWS 1996). As structured in the Preferred Alternative, high-speed boating should have a limited impact on the purpose of the Refuge.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes. This use is currently manageable in partnership with the Canyon County Sheriff's Department.

(h) Will this be manageable in the future within existing resources?

Yes, as long as we continue to partner with the Canyon County Sheriff's Department.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No and yes. Boating at high speeds does not contribute to the public's understanding and appreciation of the Refuge, and it is not beneficial (and can actually be detrimental) to the Refuge's resources. Motorized boats can also cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting more area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (DeLong 2002; Huffman 1999). Boating at high speeds is mostly used for recreation purposes (such as tow-behind activities). One disturbance study showed that motorboats were more likely to elicit a response in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). High-speed boating displaces western and Clark's grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (Ivey 2004; Shaw 1998), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Storer and Nuechterlein 1992).

Some wildlife-dependent visitors boat at high speeds to reach their ultimate destination. Once at their destination, they may be able to gain a greater appreciation of the Refuge through involvement in wildlife-dependent activities, but it is unlikely that appreciation is gained while boating at high speeds.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No and yes. As described above, given the tendency of birds to flush when subjected to a high intensity of disturbance, wildlife viewing opportunities are expected to be poor in high-speed watercraft areas between April and September.

Fishing could be both negatively and positively impacted by high-speed watercraft. Using watercraft at high speeds would allow anglers to reach their fishing area more quickly, allowing more time to fish. However, Refuge personnel have received complaints from anglers about noise and wake from high-speed watercraft.

Conclusion

Limiting high-speed watercraft to the center of the lake will limit the disturbance to wildlife (especially nesting wildlife) and other wildlife-dependent visitors. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for high-speed watercraft appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of high-speed watercraft use will be studied and alterations and changes to the use will be made if necessary.

References

Burger, A.E. 1997. Status of the western grebe in British Columbia. Wildlife Working Report WR-87. B.C. Ministry of Environment, Lands, and Parks. Victoria, British Columbia. 40 pp.

DeLong, A.K. 2002. Managing visitor use and disturbance of waterbirds—a literature review of impacts and mitigation measures. Prepared for Stillwater National Wildlife Refuge. Appendix L in: Stillwater National Wildlife Refuge Complex Final Environmental Impact Statement for the Comprehensive Conservation Plan and Boundary Revision (Volume II). Department of the Interior, Fish and Wildlife Service, Region 1, Portland, Oregon. 114 pp. Available at: http://www.fws.gov/pacific/planning/main/docs/NV/stillwater/4%20Volume%20II/Appendix%20L/App%20L%20final%20lit%20review.pdf. Accessed May 18, 2012.

Huffman, K. 1999. San Diego South Bay survey report—effects of human activity and water craft on wintering birds in South San Diego Bay. USFWS.

Ivey, G.L. 2004. Conservation assessment and management plan for breeding western and Clark's grebes in California. Prepared for the American Trader Trustee Council, an Interagency Group Comprised of Representatives from the California Department of Fish and Game, National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service.

Shaw, D.W.H. 1998. Changes in population size and colony location of breeding waterbirds at Eagle Lake, California between 1970 and 1997. Thesis. California State University, Chico.

Stalmaster, M.V. and J.L. Kaiser. Flushing responses of wintering bald eagles to military activity. Journal of Wildlife Management 61(4):1307-1313.

Storer, R.W. and G.L. Nuechterlein. 1992. Western grebe (*Aechmorphorus occidentalis*) and Clark's grebe (*Aechmorphorus clarkia*). In: A. Poole and F. Gill, eds. Birds of North America, No. 26. Philadelphia, PA., Academy of Natural Sciences and American Ornithologists' Union. 24 pp.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Horseback Riding by Individuals and Groups

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Horseback Riding by Individuals and Groups

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Individual horseback riders should not create public safety concerns. Equestrian groups with more than 10 horses and riders would be required to obtain an SUP.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use will be allowed on select multiuse trails, giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where horses will be absent, the use is not inconsistent with current goals, objectives, and plans

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Slow-moving riders that view wildlife and wildlife-dependent users that use horses to gain access to viewing areas may increase their appreciation of the Refuge, without additional disturbance to wildlife. In fact, observations by Owen (1973) and others suggest that many species of wildlife are habituated to livestock and are less likely to flee when approached by an observer on horseback than by an observer on foot. In one study (Owen 1973), equestrians could approach geese up to a distance of 150 feet without noticeable behavioral changes in the geese. This is compared to a suggested hiking trail distance of 250 feet (Miller et al. 1998). Wildlife impact will depend on the way in which each horse is ridden. Allowing horseback riding only on multiuse trails and not allowing trotting, galloping, or cantering should reduce disturbance to Refuge wildlife and provide sufficient areas for wildlife away from potential disturbance.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Fast-moving riders may increase the potential for wildlife disturbance, which in turn could reduce the quality of wildlife-dependent recreation occurring in the same vicinity as horseback riding. The frequency of horseback riding on the Refuge is currently very intermittent, and these riders are rarely seen moving at fast speeds for extended periods. If this frequency and type of use is maintained, wildlife-dependent users can expect to encounter horseback riders infrequently on the multiuse trails. Because this use is only allowed on multiuse trails (Observation Hill Trails, Kingfisher Trail, East Dike Trail, and Gotts Point Trail), wildlife-dependent users will have the opportunity to use walking trails (Nature Trail, Centennial Trail, and Murphy's Neck Trail) and the Lower Dam Recreation Area without interacting with horses.

Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities will allow wildlife-dependent users to view wildlife and habitats in areas where horses are absent.

Not allowing trotting, galloping, or cantering should reduce disturbance to Refuge wildlife and increase the safety of the nonriding public.

Conclusion

Limiting horseback riding to multiuse trails and slow speeds will limit the disturbance to wildlife and other visitors. Any disturbance created by this use is expected be intermittent and short term in nature. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for horseback riding appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife,

and wildlife-dependent recreationists by the continuation of horseback riding will be studied and alterations and changes to the use will be made if necessary.

References

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications 8(1):162-169.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl 24:123-130.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Ice Skating

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?		
(g) Is the use manageable within available budget and staff?		
(h) Will this be manageable in the future within existing resources?		
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Ice Skating

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. Safety is a major concern for recreational users who rely on the structural integrity of the ice on Lake Lowell to enjoy their sport. According to the National Weather Service average monthly high temperatures in Treasure Valley do not reach freezing levels (www.rssweather.com/climate/Idaho/Boise/). This, combined with high winds and long fetch, makes the freezing of the water on Lake Lowell very unpredictable and any frozen areas of the lake potentially unsafe. Systematic ice evaluations by qualified personnel are not conducted on Lake Lowell. Because we proposed to allow ice fishing in the preferred alternative, in Fishing Areas A and B within 200 yards of the dams subject to areas posted by the Bureau of Reclamation, additional safety concerns associated with the possibility of skaters falling into fishing holes were also evaluated.

Conclusion

The National Wildlife Refuge Administration Act, as amended, states that

> the Secretary shall not initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety. The Secretary may make the determinations referred to in this paragraph for a refuge concurrently with development of a conservation plan under subsection (e) of this section. (16 United States Code [U.S.C.] 668dd-3)

Because local weather conditions largely preclude ice skating from being a safe recreation activity and in accordance with the aforementioned law, this use has been found to be not appropriate at Deer Flat NWR.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Radio-controlled Planes

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?		✓
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		✓
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?		✓
(h) Will this be manageable in the future within existing resources?		✓
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		✓

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ✓ Appropriate _____

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Radio-controlled Planes

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

No. According to the Academy of Model Aeronautics (AMA) National Model Aircraft Safety Code, "All pilots shall avoid flying directly over unprotected people, vessels, vehicles or structures and shall avoid endangerment of life and property of others…. At all flying sites a safety line(s) must be established in front of which all flying takes place" (AMA 2011). Therefore, flying planes in general public use areas where other visitors are present would not be safe.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

No. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals as defined in the Refuge Management Plan of 1990 (USFWS 1996).

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. This is the first time the use has been requested.

(g) Is the use manageable within available budget and staff?

No. There is no staff available to establish and monitor appropriate safety lines and other requirements of the AMA National Model Aircraft Safety Code (AMA 2011) to ensure the safety of pilots and the rest of the visiting public.

(h) Will this use be manageable in the future within existing resources?

No.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Given that radio-controlled aircraft pilots are focused on flying their aircraft, they are not able to take the time to appreciate the Refuge's resources. In addition, operation of radio-controlled aircraft is not beneficial (and can actually be detrimental) to the Refuge's resources. Radio-controlled aircraft are fast-moving and loud, two attributes that are directly associated with wildlife disturbance. For example, rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

No. If proper safety protocols were followed (AMA 2011), this activity would require that a flying area be established with a safety line preventing other public access in the area of flight. Such a designated flight area would take up space that could otherwise be used by wildlife-dependent recreationists. In addition, the speed and noise of radio-controlled aircraft would disturb wildlife and thus reduce the quality of wildlife observation and photography experiences for other Refuge users.

Conclusion

Because the operation of radio-controlled aircraft would not be safe, would require additional budget and staff, can negatively impact wildlife and wildlife-dependent recreationists, and does not allow for the appreciation of the Refuge's natural or cultural resources, this use has been found to be not appropriate at Deer Flat NWR.

References

AMA (Academy of Model Aeronautics). 2011. National model aircraft safety code. Available at: http://www.modelaircraft.org/files/105.pdf. Accessed May 18, 2012.

Bowles, A.E. 1995. Responses of wildlife to noise. Pages 109-156 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife recreationists: coexistence through management and research. Washington, D.C.: Island Press.

Knight, R.L. and D.N. Cole. 1995. Factors that influence wildlife responses to recreationists. Pages 71-79 in: R.L. Knight and K.J. Gutzwiller, eds. Wildlife and recreationists: coexistence through management and research. Washington, D.C.: Island Press.

USFWS (U.S. Fish and Wildlife Service). 1996 (1990, updated in 1996). Refuge management plan (RMP). Deer Flat National Wildlife Refuge. Nampa, ID. 33 pp.

Document continues on next page.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Research

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Research

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

Yes. Scientific findings gained through these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing

uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings will contribute to resource management and that the project cannot be conducted off of Refuge lands. The investigator(s) must identify in advance the methods/strategies required to minimize or eliminate potential impact(s) and conflict(s).

Data collection techniques will generally have minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of nonindigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, and vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers will coordinate and share collections to reduce sampling for multiple projects.

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel. Spread of invasive species will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a project (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) will usually be localized and temporary in nature.

Projects will contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. As a result, these projects will help fulfill Refuge purposes; contribute to the mission of the National Wildlife Refuge System (NWRS); and maintain the biological integrity, diversity, and environmental health of the Refuge.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings will contribute to resource management and that the project cannot be conducted off of Refuge lands. The investigator(s) must identify methods/strategies in advance required to minimize or eliminate potential impact(s) and conflict(s).

Conclusion

Because of the long-term contributions that research can have to the adaptive management of Refuge resources and the ability to manage resource to reduce conflicts and disturbance, this use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Swimming and Beach Use

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Acting [signature] Date: 4-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Swimming and Beach Use

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. There have been several near-drowning incidents at Lake Lowell, and a few fatalities in the past few years; however, the Refuge is hopeful that directing swimmers to two designated swimming areas that are easily accessible to rescue personnel will help to minimize safety issues. There will be no lifeguards stationed at the swimming areas.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this be manageable in the future within existing resources?

Yes.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Swimming and beach use (including picnicking) do not contribute to the public's understanding and appreciation of Refuge resources. Although this use does not contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or benefit the Refuge's natural or cultural resources, this use should not cause undue harm because swimmers will be directed to two designated swimming areas, which will reduce interaction with high concentrations of wildlife and provide ample quantities of sanctuary where wildlife can find cover. Because picnicking and other uses associated with beach use mostly occur in developed public use areas, they should also have little impact on wildlife.

Although swimming areas often include erratic movement and elevated human noise levels, the designated swimming areas on Lake Lowell are not of great concern for wildlife concentrations. Keeping most shoreline swimming contained to designated areas will reduce the amount of wildlife disturbance associated with the activity.

Allowing visitors to swim and picnic also may provide the opportunity to engage members of the public that may not normally visit refuges where swimming is not allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Because swimmers will be directed to two designated swimming areas with minimal wildlife use and minimal use by wildlife-dependent recreationists, the use can continue without impairing existing or future wildlife-dependent activities. Picnicking by individuals and small groups should not interfere with other recreationists. Events such as birthday parties and weddings will require Special Use Permits, to ensure that other recreationists are not be inconvenienced.

Conclusion

Directing swimmers to two designated swimming areas will reduce disturbance to wildlife and wildlife-dependent recreationists and increase safety for swimmers. Because most picnicking takes place in developed public use areas, and events will require a Special Use Permit, disturbance to wildlife and other recreationists should be minimal. In addition, allowing swimming and picnicking gives the Refuge the opportunity to engage members of the public that may not normally visit refuges. Thus, the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for swimming or beach use appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Conditions created by the continuation of swimming and beach use (especially the safety of Refuge swimmers) will continue to be watched and alterations or changes to the use will be made if necessary.

Document continues on the following page.

Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Walking with Pets (dogs)

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Walking with Pets (dogs)

(a) Do we have jurisdiction over the use?

Yes.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. Although there is a Canyon County Ordinance (03-05-021) that states that canines are not allowed in "any public parks within the county … except when such an animal is kept confined in a vehicle or trailer," discussion with Deputy Tweedy of the Canyon County Sheriff's office provided information that local authorities are acting on a contradictory code (04-01-21) that allows pets in public areas as long as they are on a leash that is 6 feet in length or less (Sterling Codifiers Inc. 2011).

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes. The Refuge is not aware of any Executive orders or Department or Service policies that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(d) Is the use consistent with public safety?

Yes. Pets controlled on leashes on multiuse trails and in the Lower Dam Recreation Area are not expected to cause a public safety concern.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. Because this use will be allowed on select multiuse trails giving wildlife and wildlife-dependent users the opportunity to use areas of the Refuge where pets will be absent, the use is not inconsistent with the goals and objectives in the CCP.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes.

(h) Will this use be manageable in the future within existing resources?

Yes. It is possible that agreements with Canyon County and the State of Idaho could increase the law enforcement presence and the ability of non-Refuge law enforcement personnel to enforce Refuge

regulations. The Refuge currently allows leashed dogs; however, this requirement is often ignored by visitors. Because the on-leash and on-trail requirements are vital to minimizing wildlife disturbance, the Refuge will monitor visitors' compliance with trail use and leash requirements. If compliance monitoring indicates that visitors with dogs routinely disregard leash and trail requirements, the Refuge will evaluate options for minimizing adverse effects associated with pet/wildlife interactions, including the possibility of prohibiting pets on the Refuge.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. This use does not contribute to the public's appreciation of Refuge resources and may actually be detrimental to Refuge wildlife. Authors of many wildlife disturbance studies conclude that dogs with people, on-leash dogs, or loose dogs provoke a more pronounced disturbance reaction from wildlife than humans alone (Sime 1999). The disturbance effects of human intrusion increased when people were accompanied by dogs in studies of different species including shorebirds (Hoopes 1993; Yalden and Yalden 1989, 1990), passerines (Knight and Miller 1996), and small mammals (Mainini et al. 1993). Another study suggests that harassment of wildlife by domestic dogs is opportunistic and is associated with the concentration of wildlife in a given area (Jones & Stokes 1977). A follow-up study suggests that dog-induced wildlife flushes increase with an increased density of dogs (Abraham 2001). Free-running and feral dogs have been known to kill quail, rabbits, and deer (Bowers 1953; Lowry and McArthur 1978; Nelson and Woolf 1987). Pure-bred dogs trained to hunt can also ferret out ground-nesting birds and small game animals when left to roam free (Bowers 1953).

Domestic dogs can introduce diseases like parvovirus, canine distemper, and plague to wildlife populations. Diseases like giardia infection and rabies can be transmitted to wildlife and to humans. Muscle cysts can be transmitted through dog feces to ungulate species including mule deer (Sime 1999). Dog waste is also known to host endo- and ecto-parasites, and wildlife can contract diseases from contact with dogs or dog wastes (Sime 1999). To reduce this effect on wildlife and people, pet owners are required to pick up their pet's feces and dispose of it properly, as is also required by county and city ordinances.

Nussear et al. (2008) inadvertently showed that unleashed dogs increase the zone of coverage (or zone of influence) beyond what it would be by the handler alone, thereby increasing the potential to disturb or harm wildlife. When wildlife react by moving away from the disturbance or alter behavior by hiding they will be less likely to be observed. Users of a national wildlife refuge should be able to expect to see wildlife during their visit. Because expectations of seeing wildlife and the amount of wildlife actually seen factor into the quality of experience for wildlife-dependent users (Hammitt et al. 1993), the reduction in observable wildlife that would be caused by allowing nonwildlife-dependent uses could result in avoidance of the Refuge by wildlife-dependent users. To reduce this potential negative effect on wildlife and wildlife-dependent visitors, dogs will be required to be leashed on the Refuge.

Visitors and law enforcement staff have reported dogs fighting in public use areas. These fights can cause damage to the pets as well as visitors who try to separate the dogs. Small children can easily be knocked over or injured by unleashed pets, and unleashed pets have a greater opportunity to bite or harass other visitors. Feeling personally threatened by dogs or other pets may reduce the enjoyment for other visitors. The NWRS Improvement Act (Public Law 105-57) requires that priority

consideration be given to wildlife-dependent users, and the presence of pets is not necessary for nonhunting, wildlife-dependent recreational activities.

Although this use does not contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or benefit the Refuge's natural or cultural resources, this use should not cause undue harm as detailed in the Compatibility Determination for Walking with Pets. Pets would only be allowed on a leash no more than 6 feet long, on designated trails and in the Lower Dam Recreation Area, to reduce their interaction with high concentrations of wildlife and people and to provide ample quantities of sanctuary where wildlife can find cover.

Allowing visitors to walk with pets also may provide the opportunity to engage members of the public that may not normally visit refuges where pets are not allowed.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Although this use increases the potential for wildlife disturbance adjacent to multiuse trails and will impact wildlife-dependent visitors using these trails, this use is being allowed on select multiuse trails (Observation Hill Trails, Kingfisher Trail, East Dike Trail, and Gotts Point Trail), thereby allowing wildlife-dependent users the opportunity to use walking trails (Nature Trail, Centennial Trail, and Murphy's Neck Trail) in the absence of dogs.

Wildlife-dependent visitors are also allowed off-trail in the area around the Observation Hill Trails (North Side Recreation Area) from August 1 through January 31, in the area around the Kingfisher and East Dike Trails (East Side Recreation Area) all year, and in the area around the Gotts Point Trail (Gotts Point) from February 1 through September 30. These off-trail opportunities will allow wildlife-dependent users to view wildlife and habitats in areas where pets are absent. Allowing visitors to walk pets under the above noted conditions will not impair existing wildlife-dependent recreation or reduce the potential to provide quality, compatible, wildlife-dependent recreation into the future.

Conclusion

Because pets will only be allowed on a leash that is 6 feet or less, on multiuse trails and in the Lower Dam Recreation Area, the impact to wildlife and wildlife-dependent users will be minimized. In addition, allowing walking with pets also gives the Refuge the opportunity to engage members of the public that may not visit refuges where pets are not allowed. Thus, the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for walking with pets appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Conditions created by the continuation of walking with pets will be studied and alterations and changes to the use will be made if necessary.

References

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Sailing Regattas

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No _____

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A **compatibility determination is required before the use may be allowed.**

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Sailing Regattas

(a) Do we have jurisdiction over the use?

Yes. On June 24, 2010, the Department of the Interior Office of the Solicitor concluded that the Service had jurisdiction over surface water uses on Lake Lowell and that Lake Lowell was not in existence at statehood and, therefore, is not classified as navigable water.

(b) Does the use comply with applicable laws and regulations (Federal, State, Tribal, and local)?

Yes. The Refuge is not aware of any laws or regulations that would preclude this use on the Lake Lowell Unit of Deer Flat NWR.

(c) Is the use consistent with applicable Executive orders and Department and Service policies?

Yes.

(d) Is the use consistent with public safety?

Yes. Due to the size of the vessels and the height of their sails, sailboats are highly visible to other users. This reduces the likelihood of collisions with other Refuge visitors and allows the area within the racing buoys to be open to other users. Safety is also increased by following all International Sailing Federation rules, boating rules set forth by the U.S. Coast Guard and the State of Idaho, and all Refuge rules and regulations. The speed restriction of 20 mph or less will also help to reduce potential safety issues with other sailors or non-regatta users.

(e) Is the use consistent with goals and objectives in an approved management plan or other document?

Yes. We are currently at the maximum boating visits identified in the 1990 Refuge Management Plan, as updated in 1996 (USFWS 1996). As structured in the compatibility determination for sailing regattas, this activity should have a limited impact on the purpose of the Refuge.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?

Yes. No compatibility determinations have been previously completed for this use.

(g) Is the use manageable within available budget and staff?

Yes. This use is currently manageable in partnership with the Canyon County Sheriff's Department.

(h) Will this be manageable in the future within existing resources?

Yes, as long as our budget and staffing remain fairly consistent and we continue to partner with the Canyon County Sheriff's Department. If the County no longer conducted maintenance of boating docks, the resources needed to continue this use would need to be re-evaluated.

(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?

No. Boating at high speeds does not contribute to the public's understanding and appreciation of the Refuge, and it is not beneficial (and can actually be detrimental) to the Refuge's resources. These sailing vessels cover a larger area in a relatively short time in comparison to human-powered boats, affecting more area and providing less time for wildlife to react. Boating at high speeds is mostly for recreational purposes (such as tow-behind activities). High-speed boating displaces western and Clark's grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (Ivey 2004; Shaw 1998), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid boats (Storer and Nuechterlein 1992).

Some sailing regatta participants have engaged in wildlife viewing while sailing. It is possible that a participant may be introduced to the beauty of the Refuge and its wildlife through a sailing regatta, simply by being on the Refuge. However, the goal of a sailing regatta is to sail as fast as possible, compete with other sailors, and win a race, not to view wildlife. During the pre-race briefing there is no discussion of wildlife values or the Refuge's purpose. Because of the cursory nature of the participants' interaction with wildlife and the Refuge, it cannot be said that this use contributes to the public's understanding and appreciation of the Refuge's natural resources.

Because of the area in which sailing regattas take place, the speed restrictions assigned to regattas, and the limited number of participants, the regattas should have minimal impacts on wildlife; however, they cannot be said to benefit the Refuge's natural resources.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?

Yes. Given that regattas occur during a time of low visitation, are restricted to 25 vessels, must leave room for other users to dock, and allow other users to enter their course, other users should not be excluded from using the West Pool or the Lower Dam Recreation Area boat launches during sailing regattas.

Because sailing regattas are confined to the center of the West Pool, there is adequate open water habitat available outside of the racing area for wildlife and wildlife-dependent users to use undisturbed. Wildlife-dependent users who use the emergent zones will also be outside of the regatta course.

Wildlife-dependent users will also be able to cross the regatta race course to access other portions of the Refuge, keeping them from being inconvenienced.

Conclusion

Limiting sailing regattas to the center of the lake, restricting the number of participants and speed of vessels, allowing other users to cross the race course, and ensuring adequate dock space for other users will limit the disturbance to wildlife (especially nesting wildlife) and other wildlife-dependent visitors. Thus the use is considered to be an appropriate use subject to stipulations necessary to ensure safety and compatibility. This finding of appropriateness only applies to Deer Flat NWR Lake Lowell Unit. It does not provide precedence for other competitive group event appropriateness findings at other refuges or for future appropriateness findings at Deer Flat NWR. Impacts to public safety, wildlife, and wildlife-dependent recreationists by the continuation of sailing regattas will be studied and alterations and changes to the use will be made if necessary.

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Finding of Appropriateness of a Refuge Use

Refuge Name: Deer Flat National Wildlife Refuge

Use: Mosquito Management

This form is not required for wildlife-dependent recreational uses; take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (federal, state, tribal, and local)?	✓	
(c) Is the use consistent with applicable executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use, or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the Refuge's natural or cultural resources, or is the use beneficial to the Refuge's natural or cultural resources?		✓
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ✓

When the refuge manager finds the use **appropriate** based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ Appropriate ✓

Refuge Manager: [signature] Date: 3-31-2015

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: [signature] Date: 4/1/15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appropriate Use Justification

Refuge Name: Deer Flat National Wildlife Refuge

Use: Mosquito Management

(a) Do we have jurisdiction over the use? Yes

(b) Does the use comply with applicable laws and regulations? Yes

(c) Is the use consistent with applicable Executive orders and Department and Service policies? Yes. Service policy recognizes the importance of maintaining a balanced ecosystem landscape through wildlife population management as noted in 601 FW s 3.14 (B), Biological Integrity, Diversity, and Environmental Health. Controlling mosquito populations is consistent with that policy by reducing wildlife threats from mosquito-borne diseases, such as transmission of West Nile Virus to migratory birds.

(d) Is the use consistent with public safety?
With the spread of mosquito-borne diseases across the country, there is increasing pressure to manage mosquito populations that occur on lands of the National Wildlife Refuge System, especially in wetland areas that are part of the Refuge. The mosquito species documented to be breeding on, or residing on DFNWR, and targeted for monitoring and treatment, are *Culex inornata, Culex pipiens, Culex tarsalis, Culex ervthrothorax, Ochlerotatus nigromaculus, Aedes vexans,* and *Anopheles freebornii*. The presence of Western Equine Encephalitis (WEE) was detected in cattle on ranch property that borders the south boundary of the Refuge in 1999. Active arbovirus surveillance in the adult mosquito population was initiated in 2000. In 2006 there was a West Nile Virus outbreak in Idaho. The Lake Lowell Unit accounted for 40% of the positive West Nile pools detected and tested in Canyon County during the 2006 epidemic. In 2010 and again in 2011 there was no disease activity noted in the mosquito population on DFNWR. While mosquitoes are a natural component of wetlands, we recognize that they can pose a threat to human and wildlife health.

(e) Is the use consistent with goals and objectives in an approved management plan or other document? The use is consistent with the draft comprehensive conservation plan and the Service's Draft Mosquito and Mosquito-Borne Disease Management Policy.

(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?
This is the first time these uses have undergone an appropriate use determination, although monitoring has occurred since 1999.

(g) and (h) Is the use manageable within available budget and staff? Use will be conducted by Canyon County Mosquito Abatement District.

(i) Does the uses contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?
Providing information on mosquito-borne diseases is beneficial to the public. Early monitoring and treatment is essentially to avert large-scale outbreaks and the aggressive treatment necessary to control them.

(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW1 for description), compatible, wildlife-dependent recreation into the future?
Mosquito control does not substantially impair wildlife-dependent recreational uses on the Refuge because control is seasonal and does not take place on a daily basis. Wildlife-dependent uses in the Refuge may be temporarily displaced, but are not expected to be excluded by mosquito management activities. Mosquito control will benefit wildlife-dependent recreational uses by providing a more pleasant visitor experience.

Document continues on next page.

Appendix B. Compatibility Determinations

B.1 Introduction

The compatibility determinations (CDs) we developed during the comprehensive conservation planning process evaluate public uses identified in this CCP. The evaluation of funds needed for management and implementation of each use is also provided.

B.1.1. Uses Evaluated at This Time

The following section includes CDs for all refuge uses that are required to be evaluated at this time. According to Service policy, CDs will be completed for all uses proposed under a CCP. Existing wildlife-dependent recreational uses must also be reevaluated and new CDs prepared during development of a CCP or every 15 years, whichever comes first. Uses other than wildlife-dependent recreational uses are not explicitly required to be reevaluated in concert with preparation of a CCP, unless conditions of the use have changed or unless significant new information relative to the use and its effects have become available or the existing CDs are more than 10 years old. However, the Service's planning policy recommends preparing CDs for all individual uses, specific use programs, or groups of related uses associated with the proposed action. Accordingly, the following CDs are included in this document.

Refuge Use	Compatible	Next Year Due for Reevaluation	Page
Farming and grazing	Yes	2025	B-5
Fishing	Yes	2030	B-17
Horseback riding, jogging, and bicycling	Yes	2025	B-31
Hunting deer	Yes	2030	B-43
Hunting waterfowl and upland birds	Yes	2030	B-51
Recreational boating	Yes	2025	B-65
Research	Yes	2025	B-77
Sailing regattas	Yes	2025	B-85
Swimming, beach use, and picnicking	Yes	2025	B-95
Walking with pets (other than hunting dogs)	Yes	2025	B-105
Wildlife observation, photography, interpretation, and environmental education	Yes	2030	B-113
Mosquito Management	Yes	2025	B-125

B.1.2 Compatibility—Legal and Historical Context

Compatibility is a tool refuge managers use to ensure that recreational and other uses do not interfere with wildlife conservation, the primary focus of refuges. Compatibility is not new to the National Wildlife Refuge System (NWRS or Refuge System); the concept dates back to 1918. As policy, it has been used since 1962. The Refuge Recreation Act of 1962 directed the Secretary of the Interior to allow only those public uses of refuge lands that were "compatible with the primary purposes for which the area was established" (16 U.S.C. 460k-460k-4). If a general public use is determined to be appropriate, the use must then undergo a compatibility review. A compatibility review is required for all appropriate public uses, including wildlife-dependent recreational uses.

The term *compatible use* is defined as a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.

The National Wildlife Refuge System Administration Act (Administration Act) defines *sound professional judgment* as a finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to other applicable laws. Included in this finding, determination, or decision is a refuge manager's field experience and knowledge of the particular refuge's resources.

Part 603 FW 2 of the Fish and Wildlife Service Manual sets forth the policy and guidelines for determining compatibility of proposed uses and provides procedures for documentation and periodic review of existing uses. In addition, the policy requires an opportunity for public review and comment on all CDs. When prepared in conjunction with a CCP, CDs are distributed for public review along with the Draft CCP/EIS.

Under compatibility policy, each use is defined as a recreational, economic/commercial, or management use of a refuge by the public or a non-Refuge System entity. Uses generally providing an economic return (even if conducted for the purposes of habitat management) are also subject to CDs. The Service does not prepare CDs for uses over which the Service does not have jurisdiction. For example, the Service may have limited jurisdiction over refuge areas where property rights are vested by others; where legally binding agreements exist; or where there are treaty rights held by Tribes. In addition, aircraft overflights, emergency actions, some activities on navigable waters, and activities by other Federal agencies on "overlay refuges" are exempt from the compatibility review process.

New compatibility policy, developed in response to the 1997 amendments to the Administration Act, was adopted by the Service in October 2000 (http://refuges.fws.gov/policymakers/nwrpolicies.html). The policy requires that a use must be compatible with both the mission of the Refuge System and the purposes of the individual refuge. This standard helps to ensure consistency in application across the Refuge System.

The Service recognizes that CDs are complex. For this reason, refuge managers are required to consider "principles of sound fish and wildlife management" and "best available science" in making these determinations (House of Representatives Report 105-106). Evaluations of the existing uses on Deer Flat National Wildlife Refuge are based on the professional judgment of refuge personnel including observations of refuge uses and reviews of appropriate scientific literature.

The refuge manager has the authority to determine, by exercising sound professional judgment, what is a compatible use. In addition to determining if a use would materially interfere with or detract from the fulfillment of the Refuge System mission or the purposes of the refuge, the refuge manager must also evaluate the direct and indirect impacts of a use on refuge resources. Further, the cumulative impacts of the use when conducted in conjunction with other existing or planned uses of the refuge must also be considered. After evaluating the anticipated impacts of a proposed use and determining if any stipulations (terms or conditions) are needed to avoid or minimize potential adverse impacts, the refuge manager will determine whether or not the use is compatible. This determination is documented in writing and is available for review by the public.

A proposed use can be denied without determining compatibly under certain circumstances, such as instances in which:

1) a proposed use would conflict with other applicable laws or regulations;
2) the use would result in conflicts with the goals or objectives of an approved CCP; or
3) a use is determined to be inconsistent with public safety.

Refuges are closed to all public uses until officially opened. Regulations require that adequate funds be available for administration and protection of refuges before opening them to any public uses. However, wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) are to receive enhanced consideration and cannot be rejected simply for lack of funding resources unless the refuge has made a concerted effort to seek out funds from all potential partners. Once found compatible, wildlife-dependent recreational uses are deemed the priority public uses at a refuge. If a proposed use is found not compatible, the use must be modified to be compatible or if the use cannot be modified to be compatible, then the use may not be allowed. Economic uses that are conducted by or authorized by the refuge also require CDs.

B.1.3 References

House of Representatives Report 105-106 (on National Wildlife Refuge System Improvement Act):
http://refuges.fws.gov/policyMakers/mandates/HR1420/part1.html
Compatibility regulations, adopted by the Service in October 2000:
http://refuges.fws.gov/policymakers/nwrpolicies.html.

Document continues on next page.

B.2 Compatibility Determination for Farming and Grazing

RMIS Database Use: Farming and Grazing

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge (NWR or Refuge) was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (Executive Order [E.O.] 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Uses

The discussion below is applicable only to the Lake Lowell Unit of the Refuge and is not applicable to the Snake River Islands Unit.

Farming

Deer Flat NWR currently uses production methods that include cooperative agreement farming, which involves a negotiated agreement between the Refuge and a private farmer (the cooperator) to produce crops for both parties. Except for maintenance of underground irrigation systems and pumps, the cooperator is responsible for the costs of production. In return for producing a specified amount of crops for the Refuge, the cooperator is allowed to harvest and sell the remaining crops. In the current cooperative farming program, the farmers keep 75 percent of the crop and leave the remaining 25 percent for wildlife. All crop selections are agreed to by the Refuge, and special conditions are documented in each cooperative agreement.

Currently, 255 acres are in cooperative farming programs on Deer Flat NWR. The agriculture fields on the Refuge are referred to as Farm Field 1, Farm Field 5, and the Marsh Field, and all of them are on the north side of Lake Lowell. Crops are grown in concert with proper timing for the particular type of crop. The typical growing season varies from 120 to 200 days. Crops grown include cereal grains and green forage for migratory and wintering waterfowl use. Grain crops grown to meet the high energy demands of migratory and wintering waterfowl consist of corn and wheat. Green forage crops, which provide for the fall, winter, and spring Canada goose population, consist of alfalfa and winter wheat.

Farming operations that surround the Refuge participate in “clean farming,” in which fields are tilled in the fall to reduce the amount of invasive weeds and to ready the field for spring planting outside of the wet season. This practice limits the amount of waste grains available in the area to migrating waterfowl. Areas farmed by the cooperator for their share provide additional benefit (not included in the Refuge share) to waterfowl by providing waste grains and/or green forage in harvested fields.

Grazing

The only area where grazing is currently permitted on the Refuge is the Leavitt Tract. The previous land owner historically used the Leavitt Tract to graze his personal cattle. The cooperator is charged a fee based on the number of Animal Unit Months (AUM) that are grazed. An AUM equals the amount of forage required by an animal unit (e.g., one cow or a cow-calf pair) multiplied by the number of months that the animal unit is allowed to graze on the Refuge. The cooperator is allowed to graze 25 and 30 head of cattle from mid-April through September and occasionally 15 to 20 head of horses in the winter. Much of the tract is flooded from a failing irrigation system and backwater from Lake Lowell. Cattle drink from the flooded portion of the field or a runoff ditch also located on the parcel.

Wintering Canada geese benefit from this use because grazing is an effective way to maintain short grasses. Geese prefer young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). To provide high-quality forage for wintering and migrating geese, the Refuge has managed grazing to ensure that young shoots less than 6 inches tall are available by early October each year and to reduce the accumulation of thatch, which can reduce the number of shoots.

Changes to the Use

Farming

Cooperative farming will continue with an increased focus on best management practices. An additional well will be available on Farm Field 5 and we will reimplement shoreline planting. At one time, approximately 400 acres were farmed on the Refuge, which included planting millet along some of the lake's shoreline. Because lakeshore plantings can be less labor intensive and do not require irrigation, they can be less costly than expanding cooperative farming in upland areas. However, according to Refuge narratives, historic shoreline plantings had mixed success due to the unpredictability of moisture. This strategy was eliminated due to budget constraints at the time. As housing development continues to increase and foraging space becomes even more limited around the lake, this strategy may be implemented to achieve Refuge goals and objectives.

Special conditions in place will continue (see Stipulations section below), including restrictions on pesticide uses, the use of best management practices, limits to the types of crops grown, no grass-crop harvesting from April 15 through June 15 (to reduce the risk of destroying nests of ground-nesting birds), and a requirement to have 6 inches of green browse by October 1.

Grazing

Changes to the grazing program consist of herd rotations as a mechanism to reduce soil compaction and control invasive/undesirable plant species in grazing lands, cleaning and updating irrigation infrastructure (cleaning ditches, redoing corrugations, and replacing irrigation checks) to provide better water control, reestablishing permanent goose pasture by seeding cool season perennial grasses, changing the grazing period to April 1 through August 15, and managing short grasses by activities such as haying, mowing, and burning. These changes will be highlighted in cooperative land management agreements and grazing plans. The Refuge will also conduct a grazing fee market analysis to aid in evaluating current grazing fees.

Availability of Resources

Table B-1 identifies funding needed to administer and manage cooperative agreement farming and grazing on the Refuge. Most of the costs associated with carrying out the improvements are one-time expenses (see Table B-1). The farming and grazing programs could continue in their current state without additional upgrades, however, these programs will be enhanced by the planned projects. Additional projects to upgrade the programs will require new funding sources. The Service will explore available options to obtain funding to implement these projects, including partnership efforts. Because there will be a minimal expansion in farmed/grazed acreage, the program will continue to be managed by current staff.

Table B-1. Costs to Implement Improvements to the Farming and Grazing Programs

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Install new well in Farm Field 5	$80,000-$100,000	
Update irrigation in Leavitt Tract	$12,000	
Interseed grass in Leavitt Tract	$48,000	
Plant crops on shoreline		$70,000
Maintain short grass in Leavitt Tract		$12,000
Total	**$140,000-$160,000**	**$82,000**

Anticipated Impacts of Uses

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from farming and grazing will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts from Farming

Deer Flat NWR is located within the Columbia Basin, which was once dominated by shrub-steppe habitat. The basin is now dominated by cropland farming, which represents approximately 25 percent of the total upland area on the Refuge.

Direct impacts of cropland management include exposure of soils to wind erosion and impacts from machinery. In general, tillage and cropping that leaves soil bare for portions of the year negatively affect soil quality indicators (Nelson et al. 2006) such as aggregate stability, infiltration rates, and available water capacity. Compaction can result from the use of farming equipment for seeding; causing undesirable increases in bulk density, while tilling may also prevent the accumulation or accelerate the decomposition of organic matter and can diminish earthworm populations (Natural Resources Conservation Service [NRCS] 2012).

Farming may also result in the use and introduction into the environment of chemical agents from pesticide usage and the potential exacerbation of weed issues through ground disturbance and field-to-field movement of cultivating and harvesting equipment. In addition, small mammals, reptiles, and amphibians may be occasionally subject to mortality from farm machinery, and nesting birds may be occasionally disrupted and nests destroyed.

One study claims that globally, due to habitat loss, farming is already the greatest extinction threat to birds (the best known taxon), and its adverse impacts are likely to increase with the growing human population and demand for food (Green et al. 2005). The same study advocates for wildlife-friendly farming that encourages wildlife use but results in lower yields, similar to the Refuge's cooperative farming program.

Farming activities such as plowing, haying, and cultivating can create a disturbance to migratory birds and other resident wildlife. Timing pasture management activities appropriately provides Canada geese, other migratory birds, and wildlife optimum habitat conditions when they most need it, in the fall through winter seasons.

Impacts from Grazing

The impacts of grazing depend on many factors including timing, habitat type, and stocking rate. Numerous studies, gathered in a review of grazing literature, found that grazing has negative impacts on various grassland birds, nesting waterfowl, and small mammals (Fleischner 1994). These species are not only subject to injury and mortality from trampling during the nesting season, but the conversion of tall pasture grasses to short-cropped grasses results in habitat loss for some species. Fleishcher (1994) also enumerated other negative impacts of grazing such as altering species composition, decreasing density and biomass of individual species, reducing species richness, and changing community organization. Vavra (2005) found similar results also showing that grazing can alter species composition.

Negative impacts from grazing are mostly associated with difficulties in containing the cattle that are attracted to water and can therefore damage sensitive wetland areas if they gain access to those sites. In a review of grazing impacts, Kauffman and Krueger (1984) pointed to studies that showed cattle can cause damage in riparian forest sites and waterways by trampling the understory, compacting soils, degrading water quality, and making areas undesirable for other wildlife. Overgrazing can lead to bank instability, increased runoff, and erosion (Behnke and Raleigh 1978).

Grazing has been shown to be beneficial for single-species management such as for foraging geese. Some refuges use grazing in improved pasture in an attempt to increase the amount of edible green shoots available for wintering geese (Greenwalt 1978). Geese use refuge pastures for foraging, preferring young shoots that are higher in protein and lower in fiber than mature stems (McLandress and Raveling 1981). Pasture grasses serve as an important source of amino acids and carbohydrates to meet the energy and nutrient requirements of geese (Baldassarre and Bolen 2006). Grazing by livestock simulates some of the effects of natural disturbances by removing woody vegetation, reducing thatch, and encouraging the production of young shoots, which are preferred forage for Canada and cackling geese (Raveling 1979). Grazing can be used to set back succession, increase native annual forb species and cover, and decrease vegetation height and litter depth (Hayes and Holl 2003); all of which are beneficial to foraging Canada geese.

Refuge-specific Impacts

The introduction and spread of weeds are expected to be mitigated partly through such practices as equipment cleaning, mowing to prevent seed set and dispersal, and treatments to any source populations that have the potential to infest agricultural fields (usually windborne seed dispersal). Cooperators will be required to follow the same procedures as Refuge equipment operators by cleaning equipment before moving between fields when working in areas of weed infestations to minimize the spread of undesirable plants as per cooperative land use agreements. The Refuge will continue to monitor farming and grazing sites for invasive weeds and will maintain an aggressive approach to invasive plant control and restoring sites to vegetation with high wildlife value. In addition, the Refuge will continue to work with Canyon County Weed Control to prevent, identify, and eradicate new infestations.

For weed species that are or become established, mechanical, cultural, and biological controls methods will be evaluated. If these methods are not expected to be effective or will have undesirable consequences (such as impacting nests of grassland-nesting birds), then the Refuge may decide to use an herbicide. Chemical usage will be subject to provisions of the Refuge Integrated Pest Management (IPM) Plan (Appendix G). Among other provisions, this plan provides direction that “the most

efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water, and groundwater) as well as least potential effect to native species . . . would be acceptable for use on the refuge." Each approved pesticide will undergo a chemical profile analysis; active ingredients will be analyzed for their risk quotient and this value compared to a level of concern for surrogate species, as established by the Environmental Protection Agency. All applications of herbicides will conform to the specific pesticide label requirements. Employment of this approach will provide for a moderate to minor risk from chemical exposure. However, unquantified risks may still occur via factors not assessed under current protocols, such as species-specific sensitivity that differs from surrogate species sensitivity; exposure through inhalation, exposure through ingestion of pesticide-contaminated soil, and other factors (see Appendix G).

Activities associated with farming practices may have some impact on birds using farm fields. For example, silage activities in the Upper Dam Marsh field may cause geese to move from the immediate area where the farming equipment is operating. However, because these disturbances are short-term and localized, geese, other migratory birds, and wildlife can easily move to an adjacent undisturbed location. Both farming and grazing can have an impact on nesting birds and cause habitat degradation and soil compaction as indicated above. Refuge-specific studies to determine the timing of local birds using farm fields to nest will be conducted in order to reduce impact. Impacts to habitat and soil will also be monitored as noted in stipulations listed below.

Positive effects are also anticipated. In addition to providing high-carbohydrate forage for wintering and migrating waterfowl, per the purpose of the farming program, crop fields planted in small grains such as winter wheat can indirectly benefit a variety of seed-eating migratory bird species by providing some foraging habitat. The Refuge's farmed and grazed lands provide areas of high-energy grain crops and green forage grasses to meet the energy needs of waterfowl and other wildlife and reduce crop depredation in nearby agricultural lands.

Impacts to Priority Public Uses

Currently, the public occasionally encounters farming operations while recreating on Refuge lands. Although some aspects of farming operations—including noise, dust, spraying, sight of grazing animals, and temporary traffic congestion—may be occasional annoyances to members of the public, conflicts and impacts are expected to remain minor over the life of the CCP.

Determination

_____	Use is Not Compatible
___X___	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Cooperative land management agreements will contain the following special conditions to ensure compatibility.

Farming Stipulations

- The cooperative farmer is required to perform habitat maintenance work to sustain the field conditions for the benefit of wildlife. Work may include mechanical weed control and fertilization.

- By October 1, alfalfa must be cut to a maximum of 6 inches tall, and winter wheat cut to 3 to 6 inches tall.
- The agreement does not imply or establish a use precedent. Future use of the area will be based on the most satisfactory use of the land for wildlife benefits, cooperator performance, habitat management needs, and administrative needs.
- The cooperative farmer will exercise care to prevent fire and will assume responsibility for fire, which may result from his/her operations.
- No Refuge equipment will be provided for use by the cooperator.
- At the end of the permit period, cooperator is responsible for removing all equipment from Refuge lands.
- The cooperator shall be responsible for repairing damage to Refuge facilities or habitat beyond normal wear and tear resulting from his/her operation.
- Cropland farming will be done under an approved cooperative land management plan and annual cropland management plan per agency policy.
- Pest plants and weeds will be controlled by crop rotations, mechanical treatments, and biological controls where practical; herbicides must be approved by the Refuge manager on a case-by-case basis.
- Pesticide use must be in compliance with the Service policy requirements for completing an approved pesticide use proposal, and pesticide use must meet other State and Federal requirements.
- The cooperator will provide a record of herbicides used including chemical name, amount used, date, location, and how applied.
- Pesticide applicators must meet all State, Federal, and agency requirements.
- Diligence shall be exercised in the control of County-listed invasive weeds.
- Monitoring of the cropland farming program will be performed by qualified Refuge staff.
- The share of crops left for wildlife will be at least 25 percent.

Grazing Stipulations

- Fencing and ditching will be used to contain cattle and focus grazing on specific pastures during the dry season.
- Season of use shall be from April 1 to August 15 to minimize disturbance to waterfowl and to avoid grazing under wet soil conditions. The Refuge reduces impacts of pasture management by limiting grazing operations and restricting the introduction of cattle during the breeding season in areas where significant impacts to nesting birds will occur.
- The permittee shall remove all cattle, equipment, and materials from the Refuge by the end of the grazing season.
- The selected grazing cooperator must deliver cattle to the Leavitt Tract by way of the Tio Lane entrance.
- Permittees shall be required to leave fields with 2 or more inches of grass and forbs growth at season's end.
- The agreement does not imply or establish a use precedent. Future use of the area will be based on the most satisfactory use of the land for wildlife benefits, cooperator performance, habitat management needs, and administrative needs.
- Subleasing is prohibited. Animals must be the property of the cooperator.

- At the end of the permit period, the cooperator shall be responsible for removing all livestock from Refuge lands.
- The cooperator shall be responsible for repairing damage to Refuge facilities or habitat beyond normal wear and tear resulting from his/her operation.
- Stocking rates of livestock may be altered should pasture conditions warrant, dependent upon judgment of the Refuge manager.
- The cooperator will notify the Refuge manager or designee, at least three days in advance of the date cattle are to be turned in or removed from the Refuge. Any changes in the number of animals shall be immediately reported to the Refuge manager, or designee. All changes will be documented in writing by the cooperator and provided to the Refuge manager or designee at the end of the season. Livestock will be contained in assigned units, and fences must be maintained by the cooperator.
- The cooperator is responsible for removing dead livestock carcasses from the Refuge within 24 hours of discovery.
- The cooperator shall comply with the livestock regulations of the State of Idaho relating to health and sanitation requirements.
- Monitoring of the grazing program will be performed by qualified Refuge staff, including surveys to determine if grazing is adversely impacting ground-nesting birds.
- Before using grazing as a tool to rehabilitate cheatgrass-infested uplands, more study will be completed, and experts in this area will be contacted. If grazing is used in upland rehabilitation, a small area will be used as a test area before grazing is allowed in large sage-steppe areas.

Justification

The Refuge farm fields are an important food source for waterfowl and other wildlife when natural foods are limited. With the exception of the smartweed beds, Lake Lowell contains minimal submerged aquatic food for feeding waterfowl. Current crops provide food for wintering waterfowl (primarily geese), quail, pheasant, deer, and mourning doves. Ducks and pheasant use or have historically used Refuge alfalfa fields for nesting. The crops on the Refuge provide a consistent food source for the wintering waterfowl and therefore are important to continue. The conversion from agriculture to low-density development, and changes to local agricultural practices in the area surrounding the Refuge have resulted in food loss for wintering waterfowl. These changes to local agriculture include growing higher-valued specialty crops such as seed alfalfa, onions, and mint; using more efficient harvesting equipment so little waste grain remains in the field; and fall plowing and tilling often by mid-November, which is prior to the peak of waterfowl concentrations. As a result, the availability of winter browse and nutritional foods off-refuge has been substantially reduced. Because this trend is likely to continue in the future, cropland management will be essential for waterfowl management in future years. Although wintering waterfowl numbers have declined over time, numerous waterfowl still winter at Deer Flat NWR.

As a management tool, cooperative land management use is a beneficial Refuge operation in meeting purposes of the Refuge as well as goals and objectives established in the CCP. The farming and grazing activities within the cooperative land management program contribute to achieving Refuge purposes and goals identified in the CCP as well as the NWRS mission by providing valuable foraging areas for wintering and migrating waterfowl. The combination of management practices and stipulations identified above will ensure that farming and grazing contribute to the enhancement,

protection, conservation, and management of native wildlife populations and their habitats on the Refuge. Therefore, farming and grazing are considered to be compatible Refuge uses.

Grazing contributes by economically providing weed control and other habitat maintenance functions that are not feasible for limited Refuge staff to accomplish. A grazed short-grass pasture will complement the marsh habitat on the Leavitt Tract and provide forage and resting habitat for migrating and wintering geese.

The cooperative land management plan will be written after the CCP is complete and will include a description of the agreement between the Refuge and the private farmer to manage the land for both parties. The grazing management plan will better define the objectives of grazing, the amount of stock grazed, and any time restrictions necessary to meet biological management goals. These management plans will also identify what habitat and/or wildlife will be monitored to determine the benefits and/or impacts of the grazing program. Monitoring will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. Thus, allowing farming and grazing to occur with stipulations will not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Reevaluation Date

__2025___ Mandatory 10-year reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

___X____ Environmental Impact Statement and Record of Decision

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Refuge Compatibility Determination for Farming and Grazing (B.2)

Use is compatible with stipulations.

Project Leader Approval:	Lisa Rodsdahman (Signature)	4/1/15 (Date)

Concurrence:

Refuge Supervisor:	Acting Robert L. Payton (Signature)	4/1/15 (Date)
Regional Chief, National Wildlife Refuge System:	KEVIN S FORESTER (Signature)	4/1/15 (Date)

B.3 Compatibility Determination for Fishing

RMIS Database Use: Fishing

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655).
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d]).
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended).

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Fishing is allowed on both the Lake Lowell and the Snake River Islands Units and is the most popular of the priority wildlife-dependent recreational activities. Fishing from above mean high water level on the Snake River Islands is not closely monitored and is thought to be infrequent. Fishing from boats in the Snake River is outside of the jurisdiction of the Service. The Lake Lowell Unit received approximately 46,000 fishing visits in Fiscal Year (FY) 2011.

At the Lake Lowell Unit, the majority of fishing occurs from boats and is allowed from April 15 through September 30. Fishing from open shoreline is allowed any time. During waterfowl hunting season, fishing from human-powered boats is allowed in Fishing Areas A and B. When Lake Lowell freezes, ice fishing will be allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by the Bureau of Reclamation. It is the angler's responsibility to confirm and understand the hazards associated with this activity. Fishing from the Snake River Islands Unit is allowed from June 1 through January 31.

At the Lake Lowell Unit, spring and summer fishing are focused on fishing for large and smallmouth bass from boats. The majority of bank fishing is focused on catfish with some anglers fishing for perch, crappie, and bluegill.

There are five boat launches (three of which are improved and maintained) on the Lake Lowell Unit from which fisherman can launch motorized boats. Individuals can also launch human-powered boats from a variety of formal and informal locations along the shore. Boating regulations are described in the Recreational Boating Compatibility Determination.

In 2011, four Special Use Permits (SUPs) were issued for fishing tournaments, with tournaments occurring from April 15 through September 30, excluding May 14 through July 9. Fishing tournaments are allowed only every other weekend to provide opportunities for nontournament anglers. Tournaments range in size from small club tournaments of 5-10 boats, to a maximum of 100 boats. Participants in tournaments are required to abide by all no-wake zones, area closures, and State fishing regulations. All bass tournaments must launch from the Lower Dam Recreation Area. The Refuge charges a fee of $100 for each bass tournament.

Changes to Described Uses

The Refuge will improve and expand facilities and programs to enhance fishing as follows.

- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands will be clearly delineated in Refuge brochure.
- Access to Lake Lowell Unit:
    - To protect nesting birds, access will be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 yards on either side of trails accessing the lakeshore. Off-trail travel will be allowed August 1 through January 31.
    - Anglers will be allowed off-trail in the East Side Recreation Area all year.
    - Anglers will be allowed off-trail at Gotts Point February 1 through September 30.
    - Anglers will be allowed access to Murphy's Neck through the walk-through on Orchard Avenue from March 15 to September 30.

  - Gotts Point will be fully open to vehicle access upon completion of a memorandum of understanding with Canyon County to resolve law enforcement issues.
  - Lower Dam Recreation Area will be open from April 15 through September 30.
- The following seasonal closures will be implemented and clearly marked at the Lake Lowell Unit as necessary to protect sensitive wildlife habitat:
  - Up to 300-yard buffer around eagle nests February 15 through July 15.
  - Winter waterfowl closure at Gotts Point October 1 through January 31.
  - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
    - To determine grebe colony boundaries, the staff biologist will mark nests within, and especially on the periphery of, a colony using a global positioning system (GPS) capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a geo-referenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of a grebe nesting closure, the closure will be based on the full extent of the colony in the first year.
  - Up to 250-yard buffer around heron rookeries from February 1 through July 1
  - Up to 100-yard closure around shorebird feeding areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- No-wake zones will be implemented as follows to protect sensitive wildlife habitat and provide no-wake recreational opportunities:
  - Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.
  - Establish no-wake area in the Narrows between the East and West Pools.
  - Establish no-wake zone east from line between Parking Lot 1 and Gotts Point.
- Provide designated, ABA-accessible fishing access trails, for example:
  - From parking areas at Gotts Point.
  - At Parking Lots 4 and 7.
  - From planned 0.65-mile ADA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck.
- Provide multipurpose (e.g., fishing, observation), ABA-accessible docks or platforms, for example:
  - At north end of Lower Dam Recreation Area near existing Environmental Education Building.
  - Just west of boat launch at east end of the Upper Dam.
  - Along planned 2-mile ABA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3.
- Remove walk-through access to Murphy's Neck from Orchard Avenue after installing Murphy's Neck Trail with fishing access from Lower Dam Recreation Area to provide alternate, safer access.
- Provide fishing line receptacles.

Availability of Resources

Deer Flat NWR is open to all of the priority, wildlife-dependent recreational activities, including fishing, and the infrastructure is there for all of these user groups. Even though fishing is the most popular visitor activity, to date only a limited number of facilities have been developed specifically for fishing. Most of the costs associated with carrying out the improvements are one-time expenses (see Table B-2). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Currently, most on-water law enforcement and boating-related dock maintenance is provided by the Canyon County Sheriff's Office. If the Sheriff's Office ever discontinued this assistance, there will be additional costs associated with maintaining this use. Because the Sheriff's Office is not currently able to provide law enforcement for Refuge-specific regulations, it will be important for the Refuge to increase its law enforcement presence and/or work with Canyon County to enable county deputies to enforce these regulations.

Table B-2. Costs to Implement Improvements to the Fishing Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install new docks	$44,600	
*Install seasonal public use regulation signs	$1,400	
*Install public use in hunt area signs	$200	
*Open Gotts Point to vehicles and create accessible trails to water	$62,400	
*New trail at Murphy's Neck	$95,200	
*Print/reprint general Refuge brochures	$3,200	$800
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	
*Install buoys for seasonal closures and permanent no-wake areas	$4,300	
*Buoy and dock maintenance		$7,400
*Replace 25% of regulatory and directional signs		$5,200
*Maintain Murphy's Neck and Gotts Point Trails		$1,000
*Visitor contact station	$480,000	$1,600
*Install and maintain comfort station and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$1,215,500-$1,220,500**	**$81,400**

* Costs marked with an asterisk (*) represent costs that are also entered into other CD for activities using the same resource. For example, installing new docks will benefit fisherman, and visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that may use the new docks.

Anticipated Impacts of the Use

The following discussion analyzes impacts of the use, as it is described in the CCP.

General Impacts to Habitat

A number of studies have investigated the impacts of boats on aquatic plants, including reduced biomass, shorter canopies, reduced overall coverage, and increased scours compared to sites with restricted boat use (Asplund and Cook 1997; Wagner 1991; Zieman 1976). While exclusion zones and closures may not prevent habitat degradation, they can have an effect on minimizing damage to this important habitat (Asplund and Cook 1997). Boating can also have effects on shoreline erosion (Johnson 1994; Nanson et al. 1994), resuspension of sediments leading to water clarity issues (Garrad and Hey 1987; Johnson 1994; Yousef et al. 1980), and water pollution (Mastran et al. 1994).

Shoreline fishing has been shown to have environmental consequences in the way of soil compaction, degradation of plant communities, and increased contribution to pollution in the form of litter (O'Toole et al. 2009). Shoreline activities, such as human noise, can cause some birds to flush and go elsewhere. In addition, vegetation trampling and deposition of human waste and litter are expected to commonly occur (Liddle and Scorgie 1980). Disturbance and destruction of riparian vegetation, and impacts to bank stability and water quality, may result from high levels of bank fishing activities.

General Impacts to Wildlife

Recreational angling has the potential to cause disturbance to birds and other wildlife using the open waters and flooded emergent vegetation of the Refuge. Fishing activities may influence the composition of bird communities, as well as distribution, abundance, and productivity of waterbirds (Bell and Austin 1985; Bouffard 1982; Cooke 1987; Edwards and Bell 1985; Tydeman 1977). In one study, an increase in the number of anglers and associated shoreline activity discouraged waterfowl from using otherwise suitable habitat (Jahn and Hunt 1964). Anglers can also influence the numbers, behavior, and diurnal distribution of avian scavengers (Knight et al. 1991).

Boating associated with fishing can alter bird distribution, reduce use of particular habitats or entire areas by waterfowl and other waterbirds, alter feeding behavior and nutritional status, and cause premature departure from areas. Impacts of motorized boating can occur even at low densities, given their noise and speed (Knight and Cole 1995). Both motorized and nonmotorized boating have been shown to change wildlife distribution and use of particular habitats, alter feeding behavior and nutritional status, and cause premature departure from desirable habitat (Bouffard 1982; Kaiser and Fritzell 1984; Korschgen et al. 1985). Studies have also shown that boating disturbance may cause increased flight time and flushing distances in waterfowl species (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Wildlife species that are more sensitive to recreation-related disturbances (e.g., bald eagles, shorebirds, grebes) may find it increasingly difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented by disturbance (Burger 1997; Pfister et al. 1992; Skagen et al. 1991).

Motorized boats can cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting a greater area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (Huffman 1999). However, canoes and kayaks can cause measurable disturbance effects because they can access shallower and more densely vegetated areas of a marsh (Speight 1973). Slow-moving boats in close proximity to nesting great blue herons can cause temporary nest abandonment (Vos et al. 1985), and Huffman (1999) found that nonmotorized boats within 30 meters (98 feet) of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the

craft and shore. There have been several studies documenting impacts to birds native to Deer Flat NWR. One study showed a decrease in use of a bald eagle feeding site when human activity (including motorized boating) occurred within 200 meters (Skagen 1980). Another disturbance study showed that motorboats were more likely to elicit response in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). Rodgers and Schwikert (2002) measured flushing distances from motorized watercraft for 23 waterbird species, of which the great blue heron was one of the more sensitive, flushing between distances of 8 and 137 meters.

Fishing also results in the direct take of fish. Fishing regulations and harvest are coordinated with the Idaho Department of Fish and Game (IDFG) to avoid excess pressure on populations. The State also conducts the stocking program on Lake Lowell. Fishing will be permitted by angling only unless an SUP is issued. Outreach materials such as fishing brochures, informational panels, and public education on best fishing practices will help educate anglers on fishing regulations and ethical behavior. Working in cooperation with the State of Idaho and requiring the anglers to comply with State regulations will ensure that harvesting of fish does not harm long-term populations and fits well within the public's expectations and local fishing culture.

Local Impacts

Many of the wildlife species that frequent Deer Flat NWR rely on aquatic vegetation. Herons and egrets forage in smartweed beds; grebes make their nests from and in emergent vegetation and ducks raise their broods in the protection that its cover provides. The shallow water and marshy habitat are vital to the survival of wildlife species that call Deer Flat NWR home.

Colonial-nesting birds may be among the most sensitive species subjected to potential disturbance from fishing and fishing-associated boating. Lake Lowell is one of only three lakes in Idaho that routinely sees colonies of nesting western and Clark's grebes whose breeding population is considered imperiled in the state (IDFG 2005). IDFG has printed pamphlets for public distribution that provide information on conflicts between boaters and grebes and the importance of responsible boating. Anglers at Lake Lowell often fish in the shallow, heavily vegetated areas that birds prefer and may negatively impact distribution and abundance of breeding grebes. It is inevitable that there will be some impact to wildlife species from fishing. However, the overall effect of this impact is anticipated to be adequately mitigated by implementing the stipulations listed below.

According to a recent visitor use study done on Lake Lowell (see Appendix L), 38 percent of boaters on the lake were actively engaged in fishing activities during the time of the survey. Between 83 percent and 100 percent of boaters located in the emergent bed or on the edge of the emergent bed were actively involved in fishing. The estimated number of angling visits at the Refuge has increased in recent years (from 33,500 in FY07 to 46,000 in FY11). However, the 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation showed that between 1996 and 2006, the number of state-resident anglers decreased by 28 percent (USFWS and U.S. Census Bureau 2007). Because both the national and Idaho State trends appear to show a decline in participation in fishing, it is anticipated that future levels of fishing will not materially interfere with the purposes of the Refuge.

In 2011 the estimated number of annual shoreline or dock fishing visits to Deer Flat NWR was 18,300. The impact of these visitors is not monitored, but there is evidence in the way of social trails and litter. Popular shoreline fishing areas have well-worn paths through the vegetation, which

fragment and impact habitat in the surrounding area. Careless anglers also leave trash that can have an impact on wildlife. For instance, discarded tangled fishing line can be attractive to a nesting bird that attempts to use it and instead becomes ensnared. By maintaining closed areas, increasing law enforcement, and working with local advocacy groups, these impacts can be reduced. It is anticipated that by implementing the stipulations listed below, this use can coexist with wildlife needs.

Refuge staff will monitor the number of anglers and their effects on wildlife, especially nesting birds. Ongoing monitoring of angling activities on Deer Flat NWR will allow managers to apply adaptive management and address issues as they come up. Monitoring efforts will be a part of an overall fisheries management plan that will help guide fisheries management on the Refuge into the future.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from fishing will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts to Other Priority Public Uses

Fishing is considered a priority public use under the 1997 Refuge Improvement Act (Public Law 105-57). Conflicts between anglers and hunters are not common as they typically happen in separate seasons. The majority of Lake Lowell is closed to fishing during most of the hunting season. Wildlife photographers and observers may have limited contact with bank anglers, but a majority of fishermen are in boats. Groups involved with environmental education and interpretation are typically located around the Visitor Center and are removed from anglers. Conflicts between fishermen and nonwildlife-dependent recreational boaters are more common.

Fishing will continue as it has historically, with a few minor changes. There will be more no-wake zones where anglers will have to slow down sooner to get to popular fishing areas. Sensitive wildlife areas will also be closed off to any entry including anglers. These areas will change annually based on wildlife surveys, which will present a moving target for anglers to keep track of.

Trash associated with fishing activities leaves an unsightly environment that is unpleasant for other Refuge visitors. Placing trash receptacles and restroom facilities in strategic locations, placing fishing docks in high use areas, and creating improved trails to popular spots are planned. These improved facilities will mitigate negative impacts associated with concentrated shoreline fishing and allow other areas with limited access to receive reduced angler use and minimal disturbance to wildlife. An appropriate level of cooperative law enforcement will also provide layers of protection for trust resources.

Determination

_____ Use is Not Compatible
____X____ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Refuge staff will monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data will be used to modify these stipulations if necessary to ensure continued compatibility of these activities.
- All fishing on the Refuge will require the appropriate State license and will occur consistent with applicable Refuge and State regulations designated by IDFG or Oregon Department of Fish and Wildlife (ODFW) as appropriate.
- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands will be clearly delineated in the Refuge brochure.
- Use will be restricted to official daylight hours only.
- Access to Lake Lowell Unit:
    - To protect nesting birds, access will be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas. During these months, lakeshore access is restricted to 100 yards on either side of trails accessing the lakeshore. Off-trail travel will be allowed August 1 through January 31.
    - Anglers will be allowed off-trail in the East Side Recreation Area all year.
    - Anglers will be allowed off-trail at Gotts Point from February 1 through September 30.
    - Anglers will be allowed access to Murphy's Neck through the walk-through on Orchard Avenue from March 15 to September 30.
    - Gotts Point will be fully open to vehicle access upon completion of a memorandum of understanding with Canyon County to resolve law enforcement issues
    - Lower Dam Recreation Area will be open from April 15 through September 30.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests within, and especially on the periphery of, a colony using a GPS capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a geo-referenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of a grebe

nesting closure, the closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
    - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- No-wake zones will be implemented as follows to protect sensitive wildlife habitat and provide no-wake recreational opportunities:
    - Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.
    - Establish no-wake area in the Narrows between the East and West Pools.
    - Establish no-wake zone east from line between Parking Lot 1 and Gotts Point.
- No live, nonnative aquatic bait will be allowed as per Service policy (605 FW 3).
- Fishing line receptacles will be provided.
- Fishing tournaments allowed during boating season (April 15 through October 1) except May 14 through July 9. All no-wake zones, area closures, and State fishing regulations must be followed (except catch-and-release before end of June). Bass tournaments only allowed every other weekend (to provide opportunities for nontournament anglers). All bass tournaments must launch from the Lower Dam Recreation Area. The fee will be $100, and there will be a limit of 100 boats. The 30 boat trailer parking spots closest to the ramp will be marked and made available to non-tournament participants.
- No live, nonnative aquatic bait will be allowed as per Service policy (605 FW 3).
- Open fires will be prohibited.
- Ice fishing will be allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by Reclamation. Anglers will be responsible for checking ice conditions and confirming that they are safe.

Justification

Fishing, when compatible, is considered a priority public use for the NWRS. Angling brings visitors to the Refuge and often enhances their appreciation of natural resources. Parts of Deer Flat NWR are closed to all public use to provide areas of undisturbed habitat for fish and wildlife. The stipulations listed above will provide protections that reduce disturbances to colonial waterbirds and other wildlife. The combination of closed areas, seasonal use areas, minimally used areas, and seasonal high use areas, allows quality fishing opportunities and high-quality fish and wildlife habitat to coexist on the Refuge.

Fishing is a priority wildlife-dependent use for the NWRS through which the public can develop an appreciation for fish and wildlife (E.O. 12996, March 25, 1996) and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). The Service's policy is to provide expanded opportunities for wildlife-dependent uses when compatible and consistent with sound fish and wildlife management and to ensure that they receive enhanced attention during planning and management. Although these activities can result in disturbance to wildlife and habitat, disturbances on the Refuge related to fishing are expected to be intermittent and minor and are not expected to

diminish the value of the Refuge for its stated purposes. The stipulations stated above will ensure proper control of the use and provide management flexibility should detrimental impacts develop. Facilitating this use on the Refuge will increase visitor knowledge and appreciation of fish and wildlife resources. This enhanced understanding will foster increased public stewardship of natural resources and support for the Service's management actions in achieving the Refuge purposes and the mission of the NWRS.

It is anticipated that wildlife populations will find sufficient food resources, nesting and breeding areas, and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing fishing at Lake Lowell and from islands in the Snake River Unit. The relatively limited number of individuals expected to be adversely affected due to fishing will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing fishing will not materially interfere with or detract from the mission of the NWRS or the purposes for which the Refuge was established.

Mandatory Reevaluation Date

2030 Mandatory 15-year reevaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

X Environmental Impact Statement and Record of Decision

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Refuge Compatibility Determination for Fishing (B.3)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) _____ (Date) 4/1/15

Concurrence:

Refuge Supervisor: Acting _____ (Signature) _____ (Date) 4/1/15

Regional Chief, National Wildlife Refuge System: _____ (Signature) _____ (Date) 4/1/15

B.4 Compatibility Determination for Horseback Riding, Jogging, and Bicycling

RMIS Database Uses: Horseback Riding, Jogging, and Bicycling

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Uses

These uses rarely, if ever, occur on the Snake River Islands Unit. Several trails at Deer Flat NWR's Lake Lowell Unit are used extensively by the public for activities including horseback riding, jogging, and bicycling. Existing trails used for these activities are primarily on the north side of the lake and include the East Dike and Kingfisher Trails in the East Side Recreation Area, the Gotts Point Trail, and the Observation Hill Trail System and the Centennial and Nature Trails in the North Side Recreation Area. While trails on the south side do exist, they are short, go directly from the parking lots to the lake edge, and are typically not used by joggers, cyclists, or horseback riders. Horseback riders do sometimes use the fire breaks in the South Side Recreation Area. Refuge trails are maintained gravel roads and single-track dirt paths, with the exception of the concrete Centennial Trail. Trails are easily accessed from existing parking areas. Spring and summer months have the highest rates of these kinds of usage. Based on Refuge staff counts, we estimated the number of walkers/joggers to be 16,500 in 2010, but there are no data for equestrians or cyclists. All three of the uses described in this CD were addressed and deemed compatible in a previous CD.

Refuge Uses

The Refuge will continue to allow horseback riding, jogging, and bicycling on designated trails with stipulations to maintain public safety, reduce conflicts between wildlife-dependent user groups, and ensure compatibility with the Refuge's purpose and NWRS mission. Through these uses, the Refuge will reach out to nontraditional Refuge users with information about the Refuge and Refuge System. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, multiple-use trails may provide an introduction to a national wildlife refuge. More details for the uses follow.

Horseback Riding

Horseback riding will be allowed only on designated trails (the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System) to prevent soil erosion and trail widening that commonly occurs with equestrian trails. In addition to enforcing Refuge restrictions, the Refuge staff will seek the cooperation of users and develop partnerships with interested groups to ensure compliance with compatibility stipulations and protection of Refuge resources.

Groups of more than 10 horses and riders will be required to obtain an SUP, because equestrian groups could restrict use for other wildlife-dependent users due to limited space on trails and in parking lots. Special group events such as competitions and poker rides will not be allowed on the Refuge. Riders will not be allowed to tie a horse to any physical structure or vegetation and must remain with their horses at all times. The Refuge will not provide support facilities such as trailer parking, hitching posts, and water access. Per multiuse trail etiquette, pedestrians and bicyclists must yield to equestrians.

Jogging

Jogging will be allowed on all trails in open areas. Groups of more than 10 joggers will be required to obtain an SUP, because large groups may restrict use for other wildlife-dependent users due to limited trail space. Special events such as competitions, training, and practice meets will not be allowed on the Refuge because they are not wildlife-dependent events and may impact visitors participating in wildlife-dependent recreational activities.

Bicycling

Bicycling will be allowed only on designated trails including the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System. Based on limited survey data, bicycling is not a common use on Refuge trails, and conflicts with other users have not been reported. However, bicycling sometimes has occurred off-trail, which is not allowed.

Special events such as racing (or other competitions) and/or practice will not be allowed on the Refuge. In addition, bicycling competitions will not be allowed to use Refuge parking areas for race preparations, starting lines, finish lines, or refreshment areas because the resulting congestion limits access by wildlife-dependent users and could cause automobile/bicycle safety concerns. Groups of more than 10 cyclists will be required to obtain an SUP because large groups may restrict use for other wildlife-dependent users due to limited trail space. Bikes must be ridden at a safe speed, and cyclists must yield to horses and pedestrians. Refuge staff will seek the voluntary cooperation of users and will also rely on law enforcement to ensure compliance with these stipulations and to ensure safety of all user groups on trails.

Availability of Resources

Most of the costs associated with carrying out the improvements, are one-time expenses (see Table B-3). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Increased volunteer assistance, strengthened existing partnerships, and new partnerships will be sought to support these programs in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts. When provided appropriate training, Refuge volunteers, interns, and various user groups could assist with monitoring, education, interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Table B-3. Costs to Implement Improvements Necessary to Allow Horseback Riding, Jogging, and Bicycling

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install multiple-use trail regulation signs	$7,800	$300
*Upgrade fire break	$37,000	$800
Safety upgrade to Tio Lane walk-through	$1,000	
*Print/reprint general Refuge brochures	$3,200	$800
*Human/wildlife interaction disturbance studies	$140,000	
Miscellaneous management		
Total	**$189,000**	**$1,900**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource. For instance, upgrading the fire break to a multiuse trail will benefit horseback riding, jogging, and bicycling, but the trail could also be used by visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that will use the new trail facility.

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use.

Impacts to Habitat

Unpaved or unsurfaced trails are susceptible to a variety of trail impacts from horseback riding, jogging, and bicycling, including vegetation loss due to trampling and soil compaction and erosion (Adkison and Jackson 1996; Dale and Weaver 1974; Leung and Marion 2000). Trail widening and creation of side trailing (social trailing) increases the area of disturbed land (Liddle 1975). Horses, pedestrians (including joggers), and cyclists can all cause structural damage to plants and increase soil compaction and erosion (DeLuca et al. 1998; Whittaker 1978). Vegetation and soil compaction and erosion impacts can be much more pronounced from horses than hikers (Bainbridge 1974; Hammitt and Cole 1987; Hendee et al. 1990), with soil compaction as much as 1,500 pounds per square inch exerted on the soil surface with each step (Hendee et al. 1990). Hikers tend to flatten vegetation while horses tend to chum up soil, thus cutting plants off at the rootstalk (Whittaker 1978). Trail widening is also a consideration as horses tend to walk on the downslope sides of trails (Whitson 1974), creating a much wider area of disturbance and increasing trail maintenance problems. This can increase the spread of previously established nonnative species by providing loose, disturbed soil for germination and spreading reproductive plant structures.

These impacts are unlikely to occur on the well-defined, gravel surface of the East Dike, Kingfisher, and Gotts Point Trails and the Observation Hill Trail System trails, which is why they have been designated for these uses. Although equestrians, cyclists, and joggers will be required to remain on designated trails, if some users travel off-trail to access the lakeshore, a scenic vista, or other points of interest, then the habitat impacts noted above will result from development of social trails. Use of social trails will also cause wildlife disturbance.

Control of invasive plant species on the Refuge is a difficult and never-ending challenge. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Horse droppings are a source of nonnative plant seeds that are capable of germination and growth on disturbed sites (Campbell and Gibson 2001). Bicycles are another potential seed dispersal mechanism. Refuge visitors can inadvertently carry propagules from invasive plants on their clothing or equipment, spreading those plants to new areas. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants on or near these trails will be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Impacts to Wildlife: Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from these uses will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

General Response of Wildlife to Disturbance

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife will respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Burger (1999) as cited by Oberbillig (2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Other factors that affect disturbance impact include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) conclude that a buffer zone of 330 feet will minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommend buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails. Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance.

Horseback Riding**.** Horseback riding may influence the behavior of various wildlife species. Observations by Owen (1973) and others suggest that many species of wildlife are habituated to livestock and are less likely to flee when approached by an observer on horseback than by an observer on foot. In one study (Owen 1973), equestrians could approach geese up to a distance of 150 feet without noticeable behavioral changes in the geese. This is compared to a suggested hiking trail distance of 250 feet (Miller et al. 1998).

Jogging. As cited in Bennett and Zuelke (1999), joggers and landscapers caused birds to flush more than fishermen, clammers, sunbathers, and some pedestrians, possibly because joggers move quickly and landscapers create more noise. The latter groups tend to move more slowly or stay in one place for longer periods, and thus birds likely perceive these activities as less threatening (Burger 1981,

1986; Burger et al. 1995; Knight and Cole 1995). However, joggers tend to spend less time in a particular area than pedestrians and are less likely to directly approach or otherwise disturb wildlife. The effects of human disturbance can be reduced by restricting jogging to an established trail because wildlife show greater flight response to humans moving unpredictably than to humans following a distinct (and repeated) path (Gabrielsen and Smith 1995). Joggers will be restricted to an established, designated trail to prevent significant disturbance.

Bicycling. Rapid movement directly toward wildlife frightens animals, while movement away from or at an oblique angle to animals is less disturbing (Knight and Cole 1995). Human-caused noise, including road noise, has been shown to negatively affect wildlife (Bowles 1995), although the response is often difficult to assess because it may be confounded by responses to visual stimulus. Pease et al. (2005) showed that bicycles (and pedestrians) disturbed more dabbling ducks than did other means of transportation. Stalmaster and Newman (1978) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Bicycling on designated trails is not anticipated to disturb wildlife because riders tend to stay on the trail and the noise source is predictable. In addition, group size will be limited by prohibiting special events and training on the Refuge, thereby reducing the potential for substantial disturbance to wildlife.

Potential Impacts to Priority Public Uses

Trails on public lands often attract a variety of user groups with conflicting needs. For instance, slow-moving uphill hikers may reduce the quality of experience of cyclists who enjoy the speed on a downhill single-track trail. Some trail users who meet horses or see, smell, or step in evidence of their use say it detracts from their experience (Watson et al. 1993), while some trail users may enjoy seeing and meeting horses. The number of encounters that create conflict at Deer Flat NWR is unknown. Horseback riding is an occasional use at Deer Flat NWR currently, and available parking for horse trailers will continue to limit its use. Should increased equestrian use of the Refuge result in conflicts for parking space, we will reassess the number of horses allowed on the Refuge at any given time.

Bicycles and horses using the same trail as pedestrians can sometimes create safety hazards for other visitors. Although user groups are not physically separated on the trails designated for bicycles and horses, the designated trails planned for bicycles and horses are wide (between 12 and 20 feet), have good visibility, and should accommodate safe, shared use by pedestrians and joggers, as well as equestrians and bicyclists traveling at a safe speeds. If the number of trail users increases significantly, the potential for accidents or user group conflicts may also increase. Measures to reduce potential conflicts between equestrians and other user groups will include providing information at the trailhead kiosks, and in the Refuge's brochure that clearly indicates permitted users and rules of conduct. Providing signs that clearly indicate which users have the right-of-way will help mitigate conflict, as is evident on other public lands in the area (e.g., Military Park in Boise). Trail etiquette signing will state the proper hierarchy of yields and other rules of the trail.

Determination

_____	Use is Not Compatible
___X___	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Horseback riding, jogging, and bicycling will be allowed only on designated trails to minimize disturbance to wildlife and pedestrian users. Designated trails will be:
    - Observation Hill Trail System in the North Side Recreation Area.
    - East Dike and Kingfisher Trails in the East Side Recreation Area.
    - Gotts Point Trail
- The Refuge will not improve designated trails or provide additional trails or facilities to accommodate increased use by equestrians, joggers, or cyclists.
- Horses and cyclists will be required to maintain safe speeds conducive to multiuse trails. Pedestrians and bicyclists must yield to equestrians.
- Organized horseback riding, bicycling, or jogging groups of more than 10 people may be permitted under an SUP issued to the group leader. Groups involved in competitive events or training for competitive events (e.g., cross-country training or cross-country meets) will not be allowed.
- Equestrians will be required to remain with their horses at all times and not tie a horse to any physical structure or vegetation while on the Refuge.
- Use will be restricted to daylight hours only.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat.
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests within, and especially on the periphery of a colony, using a GPS capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a geo-referenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of a grebe nesting closure, closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
    - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff will monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, and conflicts between user groups. Monitoring data will be used to modify these stipulations or remove the use if necessary to ensure continued compatibility of these activities.

Justification

Horseback riding, jogging, and bicycling are not wildlife-dependent public uses of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.). However, these uses of the existing trails are secondary uses that can facilitate wildlife-dependent uses. Managed under the stipulations listed above, these uses are expected to result in only minor additional impacts to wildlife. Restricting the disturbance to an established trail will increase predictability of public use patterns on the Refuge, allowing wildlife to habituate to nonthreatening activities.

Although horseback riding, jogging, and bicycling can result in disturbance to wildlife, disturbance is expected to occur in limited areas of the Refuge. There are adequate amounts of undisturbed habitat available to wildlife for escape and cover.

It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from these activities. The relatively limited number of individuals expected to be adversely affected due to disturbance will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing these uses to occur with stipulations will not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Reevaluation Date

__2025__ Mandatory 10-year reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

__X__ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Horseback Riding, Jogging, and Bicycling (B.4)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FOERSTER (Signature) 4/1/15 (Date)

B.5 Compatibility Determination for Hunting Deer

RMIS Database Uses: Hunting (deer)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge, respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assumed the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Hunting is considered a wildlife-dependent public use of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.) and must be given priority over nonwildlife-dependent uses. Despite the direct and indirect impacts associated with sport-hunting, regional deer populations are not likely to be affected significantly by hunting on the Snake River Islands or Lake Lowell Unit of the Refuge.

Deer hunting takes place between Parking Lot 8 and the New York Canal on Lake Lowell Unit and on all islands in the Snake River Islands Unit. A limited number of doe and buck tags are issued to hunters for use at Lake Lowell Unit. These hunters are also required to follow special conditions outlined in their Refuge hunt permit. The Snake River Islands fall within several big game hunting units and follow hunting regulations published by Oregon Department of Fish and Wildlife (ODFW) and Idaho Department of Fish and Game (IDFG) for the unit in which each island is located.

Availability of Resources

The deer hunt will not require any additional infrastructure. Hunter access to the hunt area will be accommodated at existing Parking Lots 1 to 8 and from on-water access to the islands. Permanent blinds, additional trails, and roadway pullouts will not be constructed to support the hunt program. Hunter access will be restricted to pedestrian access only; all-terrain vehicles (ATVs) and pack animals are not permitted.

Administration of the hunt program will add workload for existing staff. The Refuge will incur the annual expense of editing and producing media related to the deer hunting opportunity. Monitoring efforts will need to be increased to determine the program's impacts to Refuge deer populations and other Refuge resources. The simple administration of the program will add annual workload to the biological, management, and public use staff. It is expected that the Service and IDFG law enforcement personnel will assist with any enforcement-related problems. The Refuge has adequate staff and base funding to cover the additional workload and costs. For a breakdown of anticipated cost of the deer hunting program, see Table B-4.

Table B-4. Costs to Implement Improvements to the Deer Hunting Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Coordination with IDFG and program management		$5,000
Deer monitoring, resource monitoring, hunt plan updates, coordination, program management		$5,000
Coordination with IDFG and patrols		$5,000
*Outreach, production of media, program management	$7,000	$5,000
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Maintain signage		$300
Total	**$222,000-$227,000**	**$82,700**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource.

Anticipated Impacts of the Use

Impacts to Habitat

Foot travel associated with deer hunting could result in trampling of vegetation and minor impacts to subcanopy riparian cover. Since deer hunting will involve small numbers of spatially dispersed hunters, and primarily take place during the time of year when most understory plants are dormant, this activity will likely have little direct impact on any native plant species. Although impacts to habitats within the hunt area are expected to be minor, as noted above, other habitats could be impacted from increased grazing and browsing should deer move away from the hunt zone. The redistribution of deer from the hunting zone may increase deer density within other nearby suitable habitat areas. Through trampling and direct herbivory, habitat conditions could be reduced within riparian, shrub-steppe, and agricultural areas. Higher densities over prolonged times can have impacts to habitat structure as young plants are consumed, suppressing the number of potential recruits into older age classes.

Impacts to Soil and Water

Minimal disturbance is anticipated to soils and water due to the dispersed nature of the activity. Additionally, the hunt uses existing infrastructure for parking and pedestrian access.

Impacts to Wildlife: Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species, only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from hunting will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts to Wildlife: Deer Hunting

Hunting by its nature results in the direct take of individual animals, as well as wounding and disturbance. In all cases, the Refuge will seek to minimize needless deer mortality, while providing a quality hunt experience. With regional deer populations exceeding 55,000 animals (McDonald 2011), deer hunting on Deer Flat NWR will not result in negative cumulate impacts to deer populations.

Deer hunting can have indirect impacts to habitat by reducing populations or redistributing deer, thereby changing densities of deer in a given area. Mule deer are largely dependent upon the fat stored during the spring, summer, and fall to survive winter. Even in the best winter range, deer lose weight throughout the winter. A main strategy for winter survival is securing habitat with adequate thermal cover to conserve energy by becoming sedentary. Energy loss will be minimized by the presence of sufficient food resources in close proximity to cover habitat (IDFG 2010). Due to the

limited number of hunters using the Snake River Islands for deer hunting and the existence of areas of Lake Lowell that are off limits to deer hunting, deer will continue to find adequate thermal cover.

The activity of hunting deer on the Refuge could also disturb other wildlife species. Periodic firearm discharge in close proximity to wetlands or other waterfowl roosting and feeding areas can result in behavioral responses by waterfowl and other wetland birds. This disturbance will be limited in scope by the limited number of hunters in an area at any given time. The rate of gunfire disturbance is expected to be infrequent and random, based upon opportunistic individual shots or shot clusters at deer in range. The frequency of gunfire may be only a few shots per day causing temporary and short-term disturbance to wintering waterfowl and waterbirds.

The controlled deer hunt season may impose some short-term effects to wintering bald eagle use within hunted areas. Wintering populations of bald eagles have shown susceptibility to disturbance, resulting in disrupted foraging behavior and changes in social dynamics between other species in the avian scavenger guild (Skagen et al. 1991) and avoidance of areas with high disturbance (Stalmaster and Newman 1978). Stalmaster and Newman (1978) also found that recreational activities occurring within 250 meters of roosting and foraging areas resulted in changes in distribution patterns by displacement to areas of lower human activity.

With regard to hunting, Stalmaster and Newman (1978) found that gunshots were the only noises that elicited overt escape behavior by eagles in their study. The areas open to hunting incorporate riparian woodlands that could serve as roosting habitat for wintering eagles. The hunted area at Lake Lowell is adjacent to an area that is used by bald eagles for foraging, potentially placing hunters within 250 meters of roosting and foraging eagles. As a result of hunting disturbance, perches and foraging areas within closed areas or islands with lower hunting pressure may see a higher frequency of eagle use during the hunt season.

Site selection and nesting activity for bald eagle nests and heron colonies may initiate in late January. The general hunting seasons are complete before this timeframe. If a late-season depredation hunt occurred at Lake Lowell Unit, a regulated number of hunters may be introduced to suitable habitat during this period. The depredation season is anticipated to have low hunter density, producing only few shots per depredation permit. The impact to nesting eagles and herons is not likely to be major. The framework of the depredation hunt additionally allows the Refuge to selectively close areas, as detected, to protect sensitive wildlife resources within the hunt area with spatial buffers. Resource buffers will be employed using current research to sufficiently safeguard nests or colonies from abandonment. As closures are implemented, the Refuge will supply hunt permit holders maps of closures to hunting activity.

Determination

_____ Use is Not Compatible
____X____ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Deer Flat NWR General Deer Hunt Stipulations

- Hunters must comply with the applicable provisions of State and Federal laws, as well as the hunting regulations of the State of Idaho.

- No permanent structures will be constructed on Service lands.
- Use of dogs to hunt or pursue big game is prohibited.
- No person including, but not limited to, a guide, guide service, outfitter, club, or other organization will provide assistance, services, or equipment on the Refuge to any other person for compensation unless such guide, guide service, outfitter, club, or organization has obtained a Special Use Permit from the Refuge.
- Hunting by aid or distribution of any feed, salt or other mineral, or electronic device, including game cameras, is prohibited.
- Deer hunters may enter the Refuge no earlier than two hours before shooting time and must leave the Refuge within two hours after shooting time. Unless retrieving a deer, retrieval times extend five hours past shooting time.

Lake Lowell Unit Deer Hunt Stipulations

- Deer hunting is permitted only in the areas between the shoreline of Lake Lowell and the Refuge's southern boundary, and extending from Parking Lot 8 southeasterly to the New York Canal.
- The use of flagging, blazing, or trail-marking devices to locate hunting area(s) or for any other purpose is prohibited.
- Hunters must obtain a Refuge-specific permit to hunt deer on the Lake Lowell Unit of the Refuge, which must be signed and carried in the field while hunting.
- Deer hunting will be limited to short-ranged weapons, as allowed in IDFG Game Management Unit 38. These weapons currently include muzzleloaders, archery equipment, crossbow, shotgun using slugs or shot of size #00 buck or larger, or a handgun using straight-walled cartridge not originally developed for rifles.
- All Lake Lowell Unit deer hunting will be from temporary tree stands.
- Each hunter is allowed to install non-damaging portable tree stands up to the maximum number allowed under 50 C.F.R. 32. The tree stands may be erected on, or after, the first day of their hunting season and must be removed by the last day of their season. Hunters must permanently affix their name, contact phone number, and address to their deer stand(s).
- Use of nails, wires, screws, or bolts to attach a stand to a tree, or hunting from a tree into which a metal object has been driven, is prohibited.
- Lake Lowell Unit deer hunters must use a Fall-Arrest System (FAS)/Full Body Harness meeting Treestand Manufactures Association (TMA) standards while using a tree stand. It shall be unlawful to use a tree stand without permission of the owner.
- Lake Lowell Unit deer permit holders will be limited to designated parking areas. Access will be walk-in only from existing Parking Lots 1 through 8.
- Lake Lowell Unit hunting permit holders must be accompanied by a Refuge employee or State Game Warden to retrieve a wounded or expired deer from a Closed Area.
- Terrestrial-based stalking and/or still hunting is not permitted at any time. Shooting (firearm or bow) from the ground is not permitted, except to dispatch wounded deer.
- Deer drives are prohibited.

Justification

Hunting, when compatible, is defined as one of the priority public uses of the Refuge System by the National Wildlife Refuge System Improvement Act of 1997. The Refuge hunt program will be

designed to provide a quality hunt and a safe experience, with a reasonable opportunity to harvest game species. No habitat degradation will be anticipated by continuing the deer hunt program; disturbance to birds and other wildlife, if any, will be temporary and localized, and ample amounts of additional quality habitat for these wildlife species exist on the Refuge. Thus, it is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge and local area will not be measurably lessened from hunting activities. The number of individuals expected to be removed from the deer population due to hunting will not impair the physiological condition and production of hunted species.

The Refuge environment includes wildlife, soils, vegetation, air quality, and water quality. Some disturbance to the Refuge environment is anticipated, but impacts will be minor due to the dispersed nature of the activity, entailing a limited number of participants over the duration of the hunt season. State and Federal regulations and Refuge-specific special conditions will help reduce or eliminate any unwanted impacts of the use to nontarget species. The Refuge will implement, as needed, spatial and/or temporal closures to protect sensitive nontarget wildlife resources such as eagle nests or wintering waterfowl. The planned hunt is not anticipated to have any impact on threatened or endangered species, as none are known to occur in the hunting area.

Specific Refuge regulations help safeguard Refuge habitat and adjoining private property. Disturbance to other wildlife will occur, but this disturbance is generally short term, with sufficient habitat being present in adjacent areas. The deer harvest will not significantly affect the regional population of deer. For these reasons, deer hunting will not prevent the Refuge from fulfilling the purposes of the Fish and Wildlife Act, Executive Order 7655, the Migratory Bird Conservation Act, the Refuge Recreation Act, or the mission of the NWRS for conserving, managing, restoring, and protecting wildlife resources. In addition, the hunt is anticipated to have a positive benefit to adjoining agricultural lands by alleviating localized depredation impacts.

In summary, deer hunting at Deer Flat NWR will not have any significant impacts to hunted species, to the regional populations of these species, to the Refuge environment, to adjacent lands, or to nearby residents. By allowing public hunting, the Refuge is fulfilling the mission of the NWRS by administering Refuge resources for the benefit of present and future generations. For these reasons, we have determined that deer hunting will not materially interfere with or detract from fulfilling Refuge purposes and the mission of the NWRS.

Mandatory Reevaluation Date

__2030__ Mandatory 15-year reevaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

__X__ Environmental Impact Statement and Record of Decision

References

IDFG (Idaho Department of Fish and Game). 2010. Project W-170-R-34: Annual Report, Mule Deer Study I, Job 2, July 2, 2009 to June 30, 2010. Idaho Department of Fish and Game. Boise, ID. 97 pp.

McDonald, L. 2011. Personal communication between Lester McDonald, Idaho Department of Fish and Game Landowner/Sportsman Relations Coordinator, and Eric Anderson, Ridgefield National Wildlife Refuge Complex Instructional Systems Specialist, November 2011.

Skagen, S.K., R.L. Knight, and G.H. Orians. 1991. Human disturbance of an avian scavenging guild. Ecological Applications 1:215-225.

Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. Journal of Wildlife Management 42:506-513.

Compatibility Determination for Hunting Deer (B.5)

Use is compatible with stipulations.

Project Leader Approval: Tracy Casselman (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting Robert R. Peyton (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: Kevin S Foerster (Signature) 4/1/15 (Date)

B.6 Compatibility Determination for Hunting Waterfowl and Upland Birds

RMIS Database Uses: Hunting (waterfowl), Hunting (upland bird), Hunting (other migratory birds)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations

of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Hunting is considered a wildlife-dependent public use of the Refuge, as defined by statute (16 U.S.C. 668dd et seq.) and must be given priority over nonwildlife-dependent uses. Waterfowl, upland game bird, and other migratory bird hunting are defined as priority public uses under the National Wildlife Refuge Improvement Act of 1997 (Public Law 105-57). Despite the direct and indirect impacts associated with sport-hunting waterfowl, upland game birds, and other migratory birds, flyway populations are not likely to be affected significantly by the hunting program on the Refuge. Changes in regional land uses (e.g., agriculture versus housing) are more likely to influence population trends than localized hunting programs.

Waterfowl and upland game bird hunting is open on both units of the Refuge during the general seasons designated by the Idaho Department of Fish and Game (IDFG) or Oregon Department of Fish and Wildlife (ODFW) as appropriate. Regulations for these hunts generally follow the respective state's rules. Where the Snake River is the boundary between Idaho and Oregon, hunters from either state may hunt the islands according to the regulations of the state for which they are licensed.

Hunters are allowed off-trail use within designated Refuge hunting areas. Hunters are required to stay out of any seasonal closures around important wildlife areas (e.g., shore bird feeding areas). An ABA-compliant hunting blind will be provided at an appropriate location available to parties with at least one IDFG-issued disabled hunt licensed hunter. Nontoxic shot is required on the Refuge, and hunters may not possess lead shot in the field. Waterfowl hunters on the Refuge will be limited to 25 shotgun shells in possession per day

While hunter use of these areas has not been closely monitored, the 2006 National Survey of Fishing, Hunting and Wildlife-associated Recreation showed that between 1996 and 2006, the number of state-resident hunters decreased by 33 percent (USFWS and U.S. Census Bureau 2007). Given this trend, it is unlikely that hunting will increase substantially in the near future. However, the number of hunters and their impacts will be monitored, and if necessary, additional measures will be developed in coordination with IDFG and ODFW to protect Refuge resources.

Waterfowl Hunting on the Lake Lowell Unit

The Lake Lowell Unit falls completely within a goose hunting closure area designated by IDFG. Waterfowl hunting (duck, coot, and common snipe but excluding goose) takes place in the South Side Recreation Area between Parking Lots 1 and 8 and in the East Side Recreation Area from the Leavitt Tract to the east side of Gotts Point. Waterfowl seasons are consistent with the State season and typically start the first of October and run through the end of January. Lake Lowell is closed to recreational boaters during the hunting season. Walk-in hunting is allowed in both areas, and hunters may use a human- or electric-powered boat up to 200 yards from the shore in the South Side Recreation Area. An estimated 2,518 acres (24 percent) of the Lake Lowell Unit is open to waterfowl hunting. Hunters may use Parking Lots 1 through 8 to access the South Side Recreation Area. To access the East Side Recreation Area, hunters can use the Tio Parking Lot at the end of Tio Lane and park at the end of Greenhurst Road near Gotts Point. There were approximately 5,100 waterfowl hunting visits to the Refuge in the 2010 to 2011 hunting season.

Waterfowl Hunting on the Snake River Islands Unit

Currently all islands in the Snake River Islands Unit (approximately 1,200 acres) are open to waterfowl hunting (ducks, geese, coot, and common snipe). Waterfowl seasons are consistent with State seasons and typically start the first of October and run through the end of January. The waterfowl hunt season on Snake River Islands will be shortened if it is shown to be necessary by analysis/study of goose nesting. No facilities are offered on the islands, but hunters are permitted to launch their boats from various access points along both of the outer banks of the Snake River. Other public uses of the Snake River Islands Unit are thought to be low and will not conflict with this use.

Upland Game Bird Hunting on the Lake Lowell Unit

Upland game bird hunting (dove, ring-necked pheasant, California and bobwhite quail, and chukar and gray partridge) is allowed in both the South Side and East Side Recreation Areas at the Lake Lowell Unit. An estimated 2,518 acres of the Lake Lowell Unit is open to upland game bird hunting, though some portions are seasonally flooded. Seasons are consistent with the State seasons and typically start the first of September (for dove) and run through the end of January (for partridge). Hunters may use Parking Lots 1 through 8 to access the South Side Recreation Area. To access the East Side Recreation Area hunters can use the Tio Parking Lot at the end of Tio Lane and park at the end of Greenhurst Road near Gotts Point. Hunting is allowed in both the South Side Recreation Area and the East Side Recreation Area. Kingfisher Trail in the East Side Recreation Area is frequented by visitors other than hunters, which may cause minor conflicts. There were approximately 1,200 upland game bird hunting visits to the Refuge in the 2010 to 2011 hunting season.

Upland Game Bird Hunting on the Snake River Islands Unit

Upland game bird hunting (dove, ring-necked pheasant, California and bobwhite quail, and chukar and gray partridge) is allowed on all islands in the Snake River Islands Unit. Seasons are consistent with the State seasons and typically start the first of October and run through the end of January. No facilities are offered on any of the islands, but hunters are permitted to launch their boats from various access points on the Snake River. Other public uses of the Snake River Islands Unit are thought to be low and will not conflict with this use.

Changes to Described Uses

Waterfowl and upland game bird hunting on the Refuge will not change much, the exceptions follow.

- Hunters are required to stay out of important wildlife and shorebird feeding areas closed seasonally.
- Waterfowl hunters will be limited to 25 shotgun shells in possession, per day.
- The waterfowl hunting season on the Snake River Islands Unit will be shortened if our analysis of goose nesting identifies nesting issues.
- An ABA-compliant hunting blind will be provided at an appropriate location, available to parties with at least one IDFG-issued disabled hunt licensed hunter.

Availability of Resources

Deer Flat NWR is open to all of the priority, wildlife-dependent recreational activities, including hunting, and the infrastructure is there for all of these user groups. Improvements and projects described in the CCP should increase the quality and safety of the Refuge hunt program. Most of the

costs associated with carrying out the improvements are one-time expenses (see Table B-5). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, installing a new accessible dock will benefit hunters, but the dock may also be used by visitors engaged in wildlife observation, photography, interpretation, and fishing. This same cost has been shown in all CDs that may use the new dock.

Table B-5. Costs to Implement Improvements to the Hunting Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install hunt area signs	$1,100	$300
*Install and maintain accessible hunting dock	$25,000	$2,000
*Install and maintain vault toilet at Parking Lot 1	$60,000	$1,500
*Quality of wildlife-dependent public uses survey	$75,000-$80,000	
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$301,000-$306,100**	**$66,200**

* Costs marked with an asterisk (*) represent costs that are entered into other CDs for activities using the same resource.

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use.

General Impacts to Habitat

The primary impact hunters have on habitat is the trampling of vegetation and creation of social trails. Trail widening and creation of social trails increases the area of disturbed land (Adkison and Jackson 1996; Dale and Weaver 1974; Liddle 1975). Pedestrians can cause structural damage to plants and increase soil compaction and erosion (DeLuca et al. 1998; Whittaker 1978). These impacts are unlikely to occur on the well-defined, gravel surface of Refuge trails; however, social trails associated with off-trail use remain an issue for refuge managers because plants are trampled and wildlife is disturbed. Because hunting requires off-trail use in the pursuit and/or recovery of game, this concern is difficult to mitigate.

Control of invasive plant species on the Refuge is a difficult, never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Propagules of nonnative plants can be transported into new areas on hunters' boots, clothing, dogs, and equipment. Once established, invasive plants can out-compete native plants, which alters habitats and indirectly impacts wildlife. Invasive plants will be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Local Impacts to Waterfowl Habitat

The impact of waterfowl hunters on the waterfowl habitat of both Refuge units is expected to be minor. The hunting season starts and ends outside of the growing season of most plants, so trampling and the spread of invasive plants are not major issues. There is a possibility of boats used for waterfowl hunting aiding in the spread of aquatic invasive species into the waters of the Refuge.

Informational media in hunting brochures, placards at Refuge launch areas, periodic inspections, and early detection monitoring help reduce the likelihood of infestation. The creation of social trails in the soil may be more of an issue but is still expected to be minor because most hunters spread out in available habitat as a way to reduce overcrowding. Impacts to the water in waterfowl hunting come mostly from the deposition of trash (including shell casings) by hunters; this problem will be mitigated through proper law enforcement.

Local Impacts to Upland Bird Habitat

At current levels, impacts to upland bird habitat are expected to be minor. Upland bird hunters do not consider either unit of Deer Flat NWR a destination hunt area, and local use is relatively low compared to the surrounding area. The hunting season starts and ends outside of the growing season of most plants, so trampling and the spread of invasive plants are not expected to be major issues. The creation of social trails may be more of an issue but is still expected to be minor because most hunters follow the irregular patterns of their quarry.

Impacts to Wildlife: Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from hunting will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts to Wildlife: General

Hunting, by its nature, results in the intentional take of individual animals, as well as wounding and disturbance (DeLong 2002). It can also alter behavior (e.g., foraging time), population structure, and distribution patterns of wildlife (Bartelt 1987; Madsen 1995; Owens 1977; Raveling 1979; White-Robinson 1982). In addition to loss of individual target species, hunting also causes disturbance to nontarget species because of noise (most notably the report of a firearm), human presence, and general disturbance associated with the activity. Hunting results in the increase of nontarget species being injured or killed (accidentally or intentionally) in addition to target species being crippled or killed and not retrieved. Disturbances to waterfowl caused by human activity (including hunting) are manifested by alertness, fright (obvious or unapparent), flight, swimming, disablement, or death in nontarget species (Korschgen and Dolgren 1992).

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989). The long-term effects are more difficult to assess but may include

altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife will respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain (as hunters do) than to humans following a distinct (and repeated) path.

Hunting can contribute indirectly to the well-being of wildlife by providing financial, educational, and sociological benefits to hunters. Hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of wildlife and habitat conservation, which ultimately contributes to the NWRS mission. The hunting community remains the largest support base for funding wildlife management programs, and refuges provide an opportunity for a high-quality waterfowl hunting experience to all citizens regardless of economic standing. Many individual refuges have developed extensive public information and education programs bringing hunters into contact with refuge activities and facilitating awareness of wildlife issues beyond hunting. Hunting is one of the six priority public uses of the NWRS.

Impacts to Wildlife: Hunting Impacts on Waterfowl

Waterfowl are wary, seeking refuge from all forms of disturbance but particularly those associated with loud noise and rapid movement (Korschgen and Dolgren 1992). Numerous studies show human activities associated with hunting (boating, vehicle disturbance, human presence) cause increased flight time in waterfowl species, which requires a considerable amount of energy (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Human disturbance compels waterfowl to change feeding habits, so that they may feed only at night or may desert feeding areas entirely, resulting in weight loss (Korschgen and Dolgren 1992).

The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi, and Atlantic). Idaho is included in the Pacific Flyway. A review of the policies, processes, and procedures for waterfowl hunting is covered in a number of documents.

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds be closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 C.F.R. 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive, in that hunting of migratory birds will not be permitted

without them. Thus, in effect, annual Federal regulations both allow and limit the hunting of migratory birds. The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for states to select from, which should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations.

In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (e.g., Flyway Study Committees, Flyway Councils, Service Regulations Committee) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, annual assessments used in establishing the Frameworks include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada. This survey is used to establish an annual Waterfowl Population Status Report. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program and the Parts Survey (in which biologists gather at "wing bees" to identify duck wings and goose tails submitted by hunters). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols determine the choice (package) of predetermined regulations (appropriate levels of harvest) that make up the framework offered to states that year. Each state's wildlife commission then selects season dates, bag limits, shooting hours, and other options from their respective Flyway package. Their selections can be more restrictive but cannot be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each state increases or decreases each year in accordance with the annual status of waterfowl populations.

Season dates and bag limits for national wildlife refuges open to hunting are never longer or larger than the state regulations. In fact, based upon the findings of an environmental assessment developed when a refuge opens a new hunting activity, season dates and bag limits may be more restrictive than the state allows. Each national wildlife refuge considers the cumulative impacts to hunted migratory species through the Migratory Bird Frameworks published annually in the Service's regulations on migratory bird hunting.

Impacts to Wildlife: Local Impacts to Waterfowl

Hunting on refuges as a whole or on Deer Flat Refuge specifically is not likely to have an adverse effect on the status of any recognized waterfowl population in North America. Several points support this contention: (1) the proportion of national waterfowl harvest that occurs on national wildlife refuges is small; (2) there are no waterfowl populations that occur wholly or exclusively on national wildlife refuges; (3) annual hunting regulations within the United States are established to levels consistent with the current population status; (4) refuges cannot permit more liberal seasons than provided for in Federal frameworks; and (5) there are sufficient sanctuaries that exist on the Lake Lowell Unit to allow for undisturbed feeding and resting.

Waterfowl hunting on the north side of Lake Lowell is allowed only in the East Side Recreation Area. There are two sanctuaries, one on the southeastern end of the lake and the other on the northeastern side of the West Pool. These are closed to public entry (with the exception of a small

number of permitted deer hunters in the southeastern sanctuary) throughout the year. These established sanctuaries on the Lake Lowell Unit in Refuge wetlands and fields ensure that wintering and migrating waterfowl, upland game birds, and other migratory birds, as well as nontarget species, can find food and rest areas on the Refuge even during the hunting season. Hunt regulations and sanctuary will be continually monitored and evaluated to ascertain their value in balancing the disturbance caused by allowing hunting on the Refuge. Under the stipulations outlined above, this activity does not materially detract from meeting Refuge purposes or the Refuge System mission. Refuge-specific regulations are designed to minimize impacts and will be evaluated for their effectiveness annually.

Population and Harvest Data: The Federal Harvest Information Program estimates that 16,800 hunters in Idaho spent an average of 102,700 days hunting and harvested 225,100 ducks annually from 2001 through 2010. Over that same time period, the harvest information program estimates Idaho hunters harvested 59,800 Canada geese annually. This is the third highest total in the Pacific Flyway, behind Oregon and Washington, respectively. The number of waterfowl harvested on Deer Flat NWR is unknown; however, it is thought to be a small percentage of total numbers harvested in the state and even smaller in the Flyway.

Wintering Populations: Waterfowl use in and around the Refuge has been well documented and has seen some changes over time. Long-time residents fondly recall when the skies around Lake Lowell used to be “black with ducks.” Annual Refuge narratives mirror these sentiments with photos and documentation of duck numbers in excess of half a million during the peak of migration. Those numbers have not been seen in the Treasure Valley since the late 1970s, probably due to the advent of “clean farming,” conversion of farmland to housing development, natural shifts in the Flyway, and/or a variety of other factors. Numbers of ducks and geese in the valley continue to provide a quality hunting experience, and Deer Flat NWR is a waterfowl hunting destination for both local and out-of-state hunters.

The staff at Deer Flat NWR has performed winter waterfowl surveys since 1951, including ground-based point counts on the Lake Lowell Unit and aerial surveys on both units. Because birds can move long distances over short periods of time during the winter migration, these surveys are not considered an accurate measurement. Regional and local population surveys like the one performed at the Refuge are best understood as an index (best used to measure trends over time) and not a true census at any particular time. In recent years (from 2001 to 2010) peak numbers of geese (typically seen in November) on the Lake Lowell Unit averaged 11,892 annually. In the same decade, peak numbers of ducks (typically seen in December) averaged 61,535 on Lake Lowell annually.

Impacts to Wildlife: Local Impact to Upland Birds

Population and Harvest Data: IDFG personnel perform surveys for California quail, pheasant, chukar, and grey partridge and assist in the mourning dove call counts. IDFG’s 2010 Upland Game Progress Report notes that populations of the species of upland game birds that are legal to hunt on Deer Flat NWR are considered stable. The Refuge does not contribute any significant harvest numbers to the total estimated for the southwest region of the state and even less statewide. Of the previously listed species, mourning doves and California quail are thought to be hunted most, because the other species are here intermittently due to marginal habitat or are escaped farmed birds that do not survive the hunting season or the winter. Refuge staff does not currently perform any inventory or monitoring for any of the upland game bird species.

Impacts to Wildlife: Nontarget Species

It is expected that impacts to nontarget species will be minimal because hunting seasons do not coincide with nesting seasons, so reproduction will not be reduced by hunting. Disturbance to the daily activities, such as feeding and resting, of wintering nonhunted birds might occur. Because the Refuge maintains sanctuary areas where no hunting is permitted, this effect is likely a minor negative effect. Refuge regulations further mitigate possible disturbance by hunters to nonhunted wildlife. Vehicles are restricted to roads and the harassment or taking of any nontarget wildlife is not permitted. Although ingestion of lead shot by nonhunted wildlife could be a cumulative impact, it is not relevant at the Refuge because nontoxic shot will be required.

Potential Impacts to Priority Public Uses

Trails on public lands attract a variety of user groups who often have conflicting needs. During the scoping period, some of the public expressed safety concerns with hunters using the same trails and small public use areas that are also accessed by wildlife observers and photographers. However, it is believed that this conflict is not a major concern. Even though nonhunters use the same trails as hunters, the designated trails for the former are wide (between 12 and 20 feet) and have adequate visibility. If the number of nonhunters using trails open to hunting increases significantly, the potential for accidents or user group conflicts may also increase. There is also the potential for conflict between nonhunters, waterfowl hunters, and upland hunters using the same off-trail areas. Conflicts between hunters and nonhunters and between different types of hunters will be monitored and addressed if necessary. Measures to reduce conflicts between hunters and other user groups will include providing information at the trailhead kiosks, and in the Refuge's brochure that clearly indicates permitted users and rules of conduct.

No significant effects to roads, trails, or other infrastructure from the hunting program are foreseen. Normal road, trail, and facility upkeep and maintenance will continue to be necessary. Additional facility construction or upgrade, if needed, is addressed in the Availability of Resources section.

Determination

_____	Use is Not Compatible
___X___	Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- All hunting on the Refuge will require the appropriate State license and will occur consistent with applicable regulations designated by IDFG or ODFW as appropriate.
- Waterfowl and upland hunting will be allowed in the East Side and South Side Recreation Areas of the Lake Lowell Unit. Walk-in hunting will be allowed in both areas, and hunters may use a human- or electric-powered boat up to 200 yards from the shore in the South Side Recreation Area. Waterfowl hunting will not be allowed on foot from the ice.
- Waterfowl and upland hunting will be allowed on all islands in the Snake River Islands Unit. Where the Snake River is the boundary between Idaho and Oregon, hunters from either state may hunt the islands according to the regulations of the state for which they are licensed.
- Hunters will be required to stay out of any seasonal closures around important wildlife areas (e.g., shorebird feeding areas).
- Hunters are allowed off-trail use within designated hunting areas.

- Hunting will be provided on a first-come, first-served basis. Hunters will be allowed to operate motorized vehicles only on designated roads and parking areas.
- Nontoxic shot is required, and hunters may not possess lead shot in the field.
- Dogs may be used for waterfowl and upland game hunting. Dogs must be leashed unless actively hunting and remain under strict voice control at all times.
- Dog training other than that which occurs while actively hunting is prohibited on the Refuge.
- To improve safety and minimize conflict with other priority uses, signs will be posted at Refuge access points to notify Refuge users when a hunt is underway.
- Waterfowl hunting:
    - Although use of permanent blinds is prohibited, portable blinds are allowed if they are removed at the end of each day. Temporary blinds may be constructed from natural vegetation less than 3 inches in diameter and are available on a first-come, first-served basis.
    - Waterfowl hunters will be limited to 25 shotgun shells in possession per day.
    - There may be a shortened waterfowl season on Snake River Islands if it is shown to be necessary by analysis/study of goose nesting.
    - Youth hunt will be allowed within all designated waterfowl hunt zones.
    - Use will be restricted to waterfowl hunting shooting hours designated by IDFG or ODFW as appropriate.
    - There will be an evaluation to determine whether to charge a fee and/or institute a more structured hunt opportunity.
- Upland game bird hunting:
    - Use will be restricted to upland game bird hunting shooting hours designated by IDFG or ODFW as appropriate.
    - There will be an evaluation to determine whether to implement more restricted hunting hours to reduce conflicts with waterfowl hunters.
- Open fires will be prohibited.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests within, and especially on the periphery of, a colony using a GPS capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a geo-referenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of a grebe nesting closure, the closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
    - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.

  - Wildlife closure at Gotts Point from October 1 through January 31.
  - Wildlife closure at Murphy's Neck from October 1 through March 15.
  - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff will monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data will be used to modify these stipulations if necessary to ensure continued compatibility of these activities. Adjustments to timing of upland hunting or the use of hunt areas by nonhunters may be needed to ensure the use remains safe and compatible.

Justification

By following established State guidelines, implementing stipulations, and maintaining closed areas, this waterfowl and upland game bird hunting program will not interfere with the Refuge achieving its purposes of providing sanctuary and as a refuge and breeding grounds for migratory birds and other wildlife. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing hunting to occur on the Refuge. The relatively limited number of individuals expected to be adversely affected due to hunting will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing hunting to occur with stipulations will not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Reevaluation Date

__2030___ Mandatory 15-year reevaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

___X____ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Hunting Waterfowl and Upland Birds (B.6)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FOERSTER (Signature) 4/1/15 (Date)

B.7 Compatibility Determination for Recreational Boating

RMIS Database Use: Noncompetitive recreational boating (motorized, human powered, electric, and wind-driven)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

This CD addresses the subject uses for the Lake Lowell Unit of the Refuge. The Service's jurisdiction over surface water uses on the Snake River Islands Unit is limited to areas above mean high water. Since there are no navigable areas above mean high water, recreational boating is not allowed on the Snake River Islands Unit.

Types of Boating

Recreational boating addressed in this CD includes use of motorized (jetboats, outboard and inboard motorboats, personal watercraft), human-powered (kayaks, canoes, paddleboards, rowboats, float-tubes), and electric/wind-driven (boats powered by trolling motors, sailboats, windsurfing boards, and kiteboards) craft on all waters of the Lake Lowell Unit. Tow-behind activities (e.g., waterskiing, wake boarding) are allowed in areas open to wake (see below) activities.

Boating itself is not considered a wildlife-dependent public use. However, it occurs as an integral part of wildlife-dependent public uses such as hunting, fishing, wildlife observation, and photography.

Associated Facilities

There are five boat launches, consisting of the launches at Upper Dam East, Upper Dam West, Lower Dam Recreation Area, and Parking Lots 1 and 7. Individuals can also launch human-powered boats from a variety of formal and informal locations along the shore.

Number of Visitors and Seasonal Patterns

In it is estimated that there were 76,400 nonwildlife-dependent recreational boating visits to Lake Lowell in FY 2011 with a majority of these being motorized boats. In FY 2011, approximately 35 percent of the boaters were anglers, and the rest were participating in other recreational activities.

Boating is allowed on the Refuge between April 15 and September 30, during daylight hours only. Lake Lowell is closed to recreational boating during the winter waterfowl season to provide refuge to migrating waterfowl in closed areas and high-quality hunts in open areas. Motorized boat use peaks in July before tapering off in the fall. Declining water levels often require closure of the Upper Dam West and Lower Dam Recreation Area boat launches in July or August. The water quality of the lake is also a concern to recreationists and partially accounts for falling use in August and September, since green and potentially toxic blue-green algae blooms are frequent in the late summer and early fall.

Location of Use in Lake Lowell

The Refuge will continue to provide recreational boating opportunities with an emphasis on supporting wildlife-dependent priority public uses. Boating will be allowed as follows (see Map 4):

- The no-wake zone on the east end of the lake will be expanded to go east from a line between Parking Lot 1 and Gotts Point rather than east from a line between Parking Lot 1 and the shore to the northeast.
- To protect emergent beds for nesting grebes and other wildlife, we will institute the following no-wake zones or closures:

  - Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.
  - No-wake area in Narrows between East Pool and West Pool (see Map 4).
  - Protect all active and historical grebe nesting colonies by establishing a 500-yard area not open to public use during boating season (Berg et al. 2004). If there is no nesting in a colony by July 15 of the following year, the closure around that colony will be reopened. Upland portions of the closures will be open to use from October 1 through January 31.
- The following seasonal closures will be implemented at the Lake Lowell Unit as necessary to protect sensitive wildlife habitat:
  - Up to 300-yard buffer around eagle nests from February 15 through July 15.
  - Winter waterfowl closure at Gotts Point from October 1 through January 31.
  - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
  - Up to 100-yard closure around shorebird feeding areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- To protect mudflat habitat and migrating shorebirds, institute the following closures.
  - Shorebird area at northern shoreline of the East Pool east of Tio Lane access (see Map 5) will be open to boating April 15 through July 14 and closed seasonally (July 15 through September 30) when water level falls below 2,522 feet in elevation.
- Tow-behind activities (e.g., waterskiing, wake boarding) will be allowed in areas open to wake activities.
- Kiteboarders and windsurfers will be allowed to launch from any open shoreline but must comply with speed limits in no-wake zones. Wind sport enthusiasts will be allowed to launch from any open shoreline but must comply with speed limits in no-wake zones.
- A kayak/canoe launch at Gotts Point will be provided for access to prime wildlife-observation areas.

Availability of Resources

Deer Flat NWR is open to a variety of recreational boating opportunities under this CCP. Most of the costs associated with implementing the CCP are one-time expenses (see Table B-6). Because the Refuge has limited capacity to staff and maintain facilities and provide law enforcement, the Refuge will explore all available options to obtain funding to implement these projects, including partnership efforts.

Currently, most on-water law enforcement and boating-related dock maintenance is provided by the Canyon County Sheriff's Office. If the Sheriff's Office ever decided to discontinue this assistance, there will be additional costs associated with maintaining this use. Because the Sheriff's Office is not currently able to provide law enforcement for Refuge-specific regulations, it will be important for the Refuge to increase its law enforcement presence and/or work with Canyon County to enable County deputies to enforce these regulations.

Funding will be sought through the Service budget process. Other sources will be sought through strengthened partnerships, grants, coordination with other law enforcement agencies, and additional Refuge operations funding to support a safe, quality, public use program. Increased volunteer assistance, strengthened partnerships, and new partners will be sought to support these programs in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts.

When provided the appropriate training, Refuge volunteers, interns, and various user groups can assist with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities using the same resource. For instance, rehabilitating the Lower Dam Recreation Area will benefit boaters but it will also benefit picnickers, swimmers, fisherman, and other visitors. This same cost has been shown in all CDs that may use the new Lower Dam Recreation Area.

Table B-6. Costs to Implement Improvements to the Recreational Boating Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Visitor contact station	$480,000	$1,600
*Install and maintain comfort station and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Print/reprint general Refuge brochures	$3,200	$800
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	$5,200
*Install and maintain buoys for seasonal closures and permanent no-wake areas	$4,300	$500
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$1,197,700**	**$76,200**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource.

Anticipated Impacts of Use

The discussion below analyzes impacts of the use.

The Lake Lowell Unit of Deer Flat National Wildlife Refuge provides valuable nesting, foraging, and resting habitat for migratory birds, including wintering waterfowl, shorebirds, secretive marsh birds, and other waterbirds. The lake is open to recreational use during critical nesting times for a variety of avian species.

General Impacts to Wildlife

Disturbance Effects: Both motorized and nonmotorized boating have been shown to change wildlife distribution and use of particular habitats, alter feeding behavior and nutritional status, and cause premature departure from desirable habitat (Bouffard 1982; Kaiser and Fritzell 1984; Korschgen et al. 1985). Studies have also shown that boating disturbance may cause increased flight time and flushing distances in waterfowl species (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Wildlife species that are more sensitive to recreation-related disturbances (e.g., bald eagles, shorebirds, grebes) may find it increasingly difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented by disturbance (Burger 1997; Pfister et al. 1992; Skagen et al. 1991).

Motorized boats can cover a larger area in a relatively short time in comparison to nonmotorized boats, affecting a greater area and providing less time for wildlife to react. Compared to motorboats, human-powered boats like canoes and kayaks appear to cause fewer disturbances to most wildlife species (Huffman 1999). However, canoes and kayaks can cause measurable disturbance effects because they can access shallower and more densely vegetated areas of a marsh (Speight 1973). Slow-moving boats in close proximity to nesting great blue herons can cause temporary nest abandonment (Vos et al. 1985), and Huffman (1999) found that nonmotorized boats within 30 meters (98 feet) of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore.

There have been several studies documenting impacts to birds native to Deer Flat NWR. One study showed a decrease in use of a bald eagle feeding site when human activity (including motorized boating) occurred within 200 meters (Skagen 1980). Another disturbance study showed that motorboats were more likely to elicit responses in wintering bald eagles than nearby automatic weapons fire, small arms fire, ordnance impacts, and helicopter flights associated with a military installation (Stalmaster and Kaiser 1997). Rodgers and Schwikert (2002) measured flushing distances from motorized watercraft for 23 waterbird species, of which the great blue heron was one of the more sensitive, flushing between distances of 8 and 137 meters.

Effects to Water Quality

In addition to noise and speed, motorized boats pollute waters with gas and oil. Older two-stroke engines, in which the gas and oil are combined, can discharge as much as 25 percent of the unspent mixture gas directly into the water. Hydrocarbons in gas and oil float on the surface of the water and bioaccumulate in the food web, posing a threat to sensitive shallow lacustrine habitats (Tjarnlund et al. 1995). Hoffman (1998) reviewed several studies, concluding that petroleum hydrocarbons can also be transferred to eggs from the plumage of incubating birds and can be toxic even in small amounts.

There is a possibility of boats aiding in the spread of aquatic invasive species into the waters of the Refuge. Informational media in hunting brochures, placards at launch sites (including Refuge launches), registration requirements, systematic and periodic inspections, and early detection monitoring help reduce the likelihood of infestation. The Idaho State Department of Agriculture is at the forefront of preventing the spread of aquatic invasive species into the waters of Idaho and works in concert with various agencies including the Service.

Refuge-specific Impacts

This section evaluates the likely impact at the Refuge, considering the scientific studies discussed above and considering the uses within the context of Deer Flat Refuge.

Loss of Habitat from Facility Construction: The addition of three fishing docks and one shorebird viewing blind is expected to affect approximately 5 acres or less of open water habitat.

Vegetation, Soil, and Water Impacts: As described above, the potential for water quality impacts and contaminants in the food web stemming from the release of gas and oil hydrocarbons into Refuge waters will continue to exist. The Refuge will promote the use of CARB star-rated motors at the level of two stars and above to reduce impacts from petroleum hydrocarbons. A total maximum daily load (TMDL) assessment for the Lake Lowell watershed was prepared by the Idaho Department of

Environmental Quality (IDEQ) that explored water quality concerns in Lake Lowell. Petroleum hydrocarbon pollution from boats was not explored in the TMDL because the focus was on pollution loads associated with agriculture runoff and other nonpoint sources. Even though oil and grease are listed as pollutants of concern in the Boise River (Lower) Subbasin Hydrologic Subunit, dissolved oxygen, sediment, and nutrients are the focus of the TMDL, because the presence of these pollutants at current levels likely render hydrocarbon levels insignificant (IDEQ 2010).

Disturbance Effects to Wintering and Migrating Wildlife. The wintertime closure is expected to adequately protect wintering and migrating birds using Lake Lowell. It is critical for waterfowl to conserve energy during migration and the cold winter months. Closed areas provide unmolested space for birds as they are resting and refueling for the journey ahead of them.

Disturbance Effects to Colonial-nesting Birds. Colonial-nesting birds at Lake Lowell may be among the most sensitive species subjected to potential disturbance from boating. Lake Lowell is one of only three lakes in Idaho that routinely hosts colonies of nesting western and Clark's grebes, whose breeding population is considered imperiled in the state (IDFG 2005). Idaho Fish and Game has printed pamphlets for public distribution that provide information on conflicts between boaters and grebes and the importance of responsible boating. High-speed boating displaces grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (Ivey 2004; Shaw 1998), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Storer and Nuechterlein 1992).

Disturbance Effects to Other Species. The Lake Lowell Unit includes riparian forest, emergent vegetation, and open water habitats that are used extensively by a variety of bird species. The disturbance effects to wildlife described in the General Impacts section above applies to the anticipated effects to wildlife on Deer Flat NWR. It is anticipated that wildlife species using the open water and emergent plant habitats of the Refuge will benefit from the reduced disturbances that restricted use areas will provide.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from boating will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts to Priority Public Uses

Boating, whether motor-, wind-, or human-powered, may provide additional wildlife-dependent recreational opportunities by opening up areas of the Refuge inaccessible to foot traffic. However, as

described above, given the tendency of birds to flush when subjected to a high intensity of disturbance, wildlife viewing opportunities will be expected to be poor in wake zones between April and September.

The majority of habitats used by priority species on the Refuge can be protected from undue impacts by separating boat use from wildlife use in time and space. During winter, nearly the entire lake will be protected from motorized boating use, providing protection during this season. During the breeding season, an adequate amount of habitat will be available to the majority of waterfowl and other wetland birds because nesting areas for the most sensitive wildlife species will be closed to boating; some additional areas used for nesting, feeding, and resting will be encompassed in no-wake zones. The stipulations below also provide parameters under which this use can be allowed in order to ensure compatibility.

Determination

_____ Use is Not Compatible
___X___ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Boaters must abide by all applicable Refuge, U.S. Coast Guard, and State of Idaho laws.
- Boaters will not be allowed to anchor or pull onto land adjacent to closed areas.
- No competitive activities are allowed, with the exception of sailing regattas (see Sailing Regattas CD) and bass fishing tournaments (see Fishing CD).
- Boats that are specifically designed to operate in mud or emergent vegetation, using above-water propulsion devices (e.g., boats equipped with “mud motors” or air boats) are not permitted on the Refuge.
- To minimize noise disturbance to wildlife, Idaho State noise ordinances will be enforced on Lake Lowell.
- Promote the use of CARB star-rated motors at the level of two stars and above.
- Use will be restricted to daylight hours only.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests within, and especially on the periphery of, a colony using a GPS capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a geo-referenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of a grebe

nesting closure, the closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
    - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
- No-wake zones will be implemented as follows to protect sensitive wildlife habitat and provide no-wake recreational opportunities:
    - Protect emergent plant beds on south side of the lake with a 200-yard no-wake zone measured from the edge of the shoreline or emergent vegetation, whichever is closest to the center of the lake.
    - Establish no-wake area in the Narrows between the East and West Pools.
    - Establish no-wake zone east from line between Parking Lot 1 and Gotts Point.
- Wind sport enthusiasts will be allowed to launch from any open shoreline but must comply with speed limit in no-wake zones.
- Refuge staff will monitor impacts of boating activities annually to assess compliance with these stipulations, impacts to waterfowl, shorebirds, waterbirds (especially *Aechmophorus* grebes), and other migratory birds as well as wildlife habitat, and conflicts between user groups. Monitoring data will be used to modify these stipulations if necessary to ensure continued compatibility of these activities.

Justification

Providing opportunities for priority wildlife-dependent recreational activities is in keeping with provisions under the National Wildlife Refuge System Administration Act of 1966 as amended. Although boating itself is not a wildlife-dependent recreational activity, wildlife-dependent activities like fishing and wildlife observation may be enhanced with boating.

A significant proportion of Lake Lowell Unit visitors are boaters. Educational programs targeting boaters on Lake Lowell are expected to help reduce the negative impacts associated with boating activities. Nonwildlife-dependent boating visitors provide the opportunity for the Refuge to reach out to nontraditional Refuge user groups and to encourage boating users to observe wildlife and to learn about the NWRS. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many people, boating at Lake Lowell may provide an introduction to a national wildlife refuge.

Although motorized boating has been documented to impact wildlife and the habitats on which they rely, implementing the stipulations described above will reduce these impacts. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing boating to occur on the Refuge. With the protections in place, number of individuals expected to be adversely affected due to boating will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing boating to occur with stipulations will not materially detract or interfere with the purposes for which the Refuge was established or the Refuge System mission.

Mandatory Reevaluation Date

__2025___ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

__X___ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Recreational Boating (B.7).

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FOERSTER (Signature) 4/1/15 (Date)

B.8 Compatibility Determination for Research

RMIS Database Use: Research

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

The Refuge staff receives periodic requests from non-Service entities (e.g., universities, State or Territorial agencies, other Federal agencies, nongovernmental organizations) to conduct research, scientific collecting, and surveys on Refuge lands. These project requests can involve a wide range of natural and cultural resources as well as public-use management issues including basic absence/presence surveys, collection of new species for identification, habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, bioprospecting, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific or Refuge-specific, or they may evaluate the relative contribution of the Refuge lands to larger landscapes (e.g., ecoregion, region, flyway, national, international), issues, and trends.

The Service's Research and Management Studies (4 RM 6) and Appropriate Refuge Uses (603 FW 1.10D(4)) policies indicate priority for scientific investigatory studies that contribute to the enhancement, protection, use, preservation, and management of native wildlife populations and their habitat as well as their natural diversity. Projects that contribute to Refuge-specific needs for resource and/or wilderness management goals and objectives, where applicable, will be given a higher priority over other requests.

Availability of Resources

Refuge staff responsibilities for projects by non-Service entities will be limited to the following: review of proposals, prepare SUPs and other compliance documents (e.g., for Section 7 of the Endangered Species Act of 1973, Section 106 of the National Historic Preservation Act), and monitor project implementation to ensure that impacts and conflicts remain within acceptable levels (compatibility) over time. Additional administrative, logistical, and operational support may also be provided depending on each specific request. Estimated costs for one-time (e.g., prepare a SUP) and annually reoccurring tasks by Refuge staff and other Service employees will be determined for each project. Sufficient funding in the general operating budget of the Refuge must be available to cover expenses for these projects. In cases where the Refuge staff is asked to act as a cooperator on research projects, funding may be cost-shared or specially designated funds may be used for the operation and administration of the projects. The terms and conditions for funding and staff support necessary to administer each project on the Refuge will be clearly stated in every SUP.

The Refuge has the following staffing and funding to administratively support and monitor research that is currently taking place on Refuge lands (see Table B-7). Any substantial increase in the number of projects will create a need for additional resources to oversee the administration and monitoring of the investigators and their projects. Any substantial additional costs above those itemized below may result in finding a project not compatible unless expenses are offset by the investigator(s), sponsoring agency, or organization.

New costs associated with carrying out the enhanced research, inventory, and assessment programs includes annual costs to hire a biological technician to carry out Refuge projects, and one-time costs that will be provided to contractors tasked with specific projects. New research, inventory, and assessment needs as described in the CCP are listed in Table B-7. Because the Service has limited

capacity to fund new positions and projects, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Costs marked with an asterisk (*) in the table below represent costs that are also entered into other CDs for activities that will be affected by the research. For instance, studies that determine the quality of wildlife-dependent recreation opportunities will help the Refuge better manage these uses and improve programs. Therefore, the cost will also be reflected in the CDs for each of the wildlife-dependent uses.

Table B-7. Costs to Implement Enhanced Research, Inventory, and Assessment Projects

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
Hire biological technician, who will conduct: • breeding and migratory bird inventories of shrub steppe and riparian habitats • inventory of wildlife use of wetlands • early detection of and rapid response to new/spreading invasive plants/animals • collecting baseline habitat and wildlife information • waterfowl, shorebird, ground-nesting birds, passerines, and grebe surveys, Biological technician will assist with the following research, monitoring, and information assessment projects: • human/wildlife interaction disturbance studies ○ prioritization of Refuge islands for wildlife value • analyzing historic biological data to assess long-term population trends • contaminants studies • mule deer studies • cheatgrass removal studies • surveys of wetland topography • soil surveys of shrub steppe and creation of GIS mapping layers		$51,000
*Disturbance studies		
Prioritization of Refuge islands		
Analysis of historical biological data		
Contaminants studies	$450,000	
Mule deer studies		
Cheatgrass removal studies		
Wetland topography surveys		
Soil surveys of shrub-steppe and creation of GIS mapping layers		
*Quality of wildlife-dependent public use programs	$75,000-$80,000	
Total	**$525,000-$530,000**	**$51,000**

Anticipated Impacts of the Use

Use of the Refuge to conduct research, scientific collecting, and surveys will generally provide information that will benefit fish, wildlife, plants, and their habitats. Scientific findings gained through these projects provide important information regarding life-history needs of species and

species groups as well as identify or refine management actions to achieve resource management objectives in refuge management plans (especially CCPs). Reducing uncertainty regarding wildlife and habitat responses to refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

If a research project's methods impact or conflict with Refuge-specific resources, priority wildlife-dependent public uses, other high-priority research, wilderness, or Refuge habitat and wildlife management programs, then it must be clearly demonstrated that the project's scientific findings will contribute to resource management and that the project cannot be conducted off of Refuge lands for the project to be compatible. The investigator(s) must identify in advance methods/ strategies required to minimize or eliminate the potential impact(s) and conflict(s). If unacceptable impacts cannot be avoided, then the project will not be compatible. Projects that represent public or private economic use of the natural resources of any national wildlife refuge (e.g., bioprospecting), in accordance with 16 U.S.C. 715s, must contribute to the achievement of the national wildlife refuge purposes or the NWRS mission to be compatible (50 C.F.R. 29.1).

Impacts will be project- and site-specific, where they will vary depending upon nature and scope of the fieldwork. Data collection techniques will generally have minimal animal mortality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of nonindigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, and vertebrates) will be collected for identification and/or experimentation and statistical analysis. Where possible, researchers will coordinate and share collections to reduce sampling needed for multiple projects. For example, if one investigator collects fish for a diet study and another research examines otoliths, then it may be possible to accomplish sampling for both projects with one collection effort.

Investigator(s) obtaining required State and Federal collecting permits will also ensure minimal impacts to fish, wildlife, plants, and their habitats. If after incorporating the above strategies a project will still result in long-term or cumulative effects, the project will not be considered compatible. A Section 7 consultation under the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884, as amended; Public Law 93-205) will be required for activities that may affect a federally listed species and/or critical habitat. Only projects that have no effect or will result in not likely to adversely affect determinations will be considered compatible.

Spread of invasive plants and/or pathogens is possible from ground disturbance and/or transportation of project equipment and personnel, but it will be minimized or eliminated by requiring proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary. If after all practical measures are taken and unacceptable spread of invasive species is anticipated to occur, then the project will be found not compatible without a restoration or mitigation plan.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support a projects (e.g., permanent transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered

behavior) will usually be localized and temporary in nature. When long-term or cumulative unacceptable effects cannot be avoided, the project will not be found compatible.

At least six months before initiation of fieldwork (unless an exception is made by prior approval of the Refuge manager), project investigator(s) must submit a detailed proposal using a format provided by the Refuge. Project proposals will be reviewed by Refuge staff and others, as needed, to assess the potential impacts (short-term, long-term, and cumulative) relative to benefits of the investigation to Refuge management issues and understanding of natural systems. This assessment will form the basis for allowing or denying a specific project. Projects that result in unacceptable Refuge impacts will not be found compatible. If allowed and found compatible after approval, all projects will also be assessed during implementation to ensure impacts and conflicts remain at acceptable levels.

If the proposal is approved, then the Refuge manager will issue a SUP with required stipulations (terms and conditions) of the project to avoid and/or minimize potential impacts to Refuge resources as well as conflicts with other public-use activities and Refuge field management operations. After approval, projects also are monitored during implementation to ensure impacts and conflicts remain within acceptable levels based upon documented stipulations.

The combination of stipulations identified above and conditions included in any SUP will ensure that projects contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge. As a result, these projects will help fulfill the Refuge's purposes; contribute to the mission of the NWRS; and maintain the biological integrity, diversity, and environmental health of the Refuge.

Projects that are not covered by the CCP (objectives under Goal 6, Gather sufficient scientific information to guide responsible adaptive management decisions for the Refuge's trust resources) will require additional NEPA documentation.

Determination

_____ Use is Not Compatible
___X___ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Each project will require a SUP. Annual or other short-term SUPs are preferred; however, some permits will cover a longer time period, if needed, to allow completion of the project. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to the Refuge manager's review and approval based timely submission of and content in progress reports, compliance with SUP stipulations, and required permits.

- Projects will adhere to scientifically defensible protocols for data collection, where available and applicable.
- Investigators must possess appropriate and comply with conditions of State and Federal permits for their projects.
- If unacceptable impacts to natural resources or conflicts arise or are documented by the Refuge staff, then the Refuge manager can suspend, modify conditions of, or terminate an ongoing project already permitted by SUP on the Refuge.

- Progress reports are required at least annually for multiple-year projects. The minimum required elements for a progress report will be provided to investigator(s).
- Final reports are due one year after completion of the project unless negotiated otherwise with the Refuge manager.
- Continuation of existing projects will require approval by the Refuge manager.
- The Refuge staff will be given the opportunity to review draft manuscript(s) from the project before manuscripts are submitted to a scientific journal(s) for consideration of publication.
- The Refuge staff will be provided with copies (reprints) of all publications resulting from a Refuge project.
- The Refuge staff will be provided with copies of raw data (preferably electronic database format) at the conclusion of the project.
- Upon completion of the project or annually, all equipment and markers (unless required for long-term projects), must be removed and sites must restored to the Refuge manager's satisfaction. Conditions for clean-up and removal of equipment and physical markers will be stipulated in the SUP.
- All samples collected on Refuge lands are the property of the Service even while in the possession of the investigator(s). Any future work with previously collected samples not clearly identified in the project proposal will require submission of a subsequent proposal for review and approval. In addition, a new SUP will be required for additional project work. For samples or specimens to be stored at other facilities (e.g., museums), a memorandum of understanding will be necessary.
- Sampling equipment as well as investigator clothing and vehicles (e.g., all-terrain vehicles, boats) will be thoroughly cleaned (free of dirt and plant material) before being allowed for use Refuge lands to prevent the introduction and/or spread of pests. Where necessary, quarantine methods will be used.
- The NWRS, Deer Flat Refuge, Refuge staff and other Service personnel that supported or contributed to the project will be appropriately cited and acknowledged in all written and oral presentations resulting from projects on Refuge lands.
- At any time, Refuge staff may accompany investigator(s) in the field.
- Any project proposed in wilderness areas must comply with provisions of an existing minimum requirements analysis (MRA). Investigators not acting as agents of Service and requesting to conduct projects in wilderness must prepare an MRA consistent with Service Policy and adhere to the requirements of the Wilderness Act of 1964 (16 U.S.C. 1131-1136).
- Investigator(s) and support staff will follow all Refuge-specific regulations that specify access and travel on the Refuge.

Justification

Research, scientific collecting, and surveys on Refuge lands are inherently valuable to the Service because they expand scientific information available for resource management decisions. In addition, only projects that directly or indirectly contribute to the enhancement, protection, use, preservation, and management of Refuge wildlife populations and their habitats generally will be authorized on Refuge lands. In many cases, if it were not for the Refuge staff providing access to Refuge lands and waters along with some support, the project will never occur and less scientific information will be available to the Service to aid in managing and conserving the Refuge resources. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species that could be disturbed during the use will find sufficient food resources and resting places so their abundance and

use will not be measurably lessened on the Refuge. Additionally, it is anticipated that monitoring, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects will not materially interfere with or detract from fulfilling the Refuge's purposes (including wilderness); contributing to the mission of the NWRS; and maintaining the biological integrity, diversity, and environmental health of the Refuge.

Mandatory Reevaluation Date

__2025__ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

__X__ Environmental Impact Statement and Record of Decision

Compatibility Determination for Research (B.8)

Use is compatible with stipulations.

Project Leader Approval:	Lacey Goodman (Signature)	4/1/15 (Date)

Concurrence:

Refuge Supervisor:	Acting Robert L Pettit (Signature)	4/1/15 (Date)
Regional Chief, National Wildlife Refuge System:	Kevin S Foerster (Signature)	4/1/15 (Date)

B.9 Compatibility Determination for Sailing Regattas

RMIS Database Use: Sailing Regattas

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge (NWR or Refuge) was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (Executive Order [E.O.] 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416 to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge, respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat NWR. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat NWR assume the purposes for which that Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "To further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "For use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "Suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Sailing regattas currently take place in the center of the West Pool of the Lake Lowell Unit during April and May. Sailing regattas occur by SUP on opposite weekends of bass tournaments. Southern Idaho Sailing Association is the only group actively sponsoring regattas at this time.

The race course is set the morning of the regatta by the race committee. On Saturday, at approximately 9:30 a.m., regatta participants meet at the Lower Dam Recreation Area to set up and launch their boats, parking them on the outside of the docks. A "skippers' meeting" is held adjacent to the docks at approximately 11:00 a.m., where boats are registered, safety is stressed, and guests are paired up with boats for the day. Regatta participants then motor out to the start line in preparation for the 12:00 start of the first race. Each race starts approximately 15 minutes after the end of the last race. No races start after 4:00 p.m. The first race starts at 10:00 a.m. on Sunday with no race starting after 3:00 p.m.

The race course is designated by three race buoys and a starting buoy. The starting line is designated by the area between the starting buoy and the race committee boat. The committee boat selects the course (or manner that the sailors will navigate the race buoys) and posts this selection on placards visible to the participants. Sailors begin at the starting line and then race to and around the race buoys according to the selected course. The starting line is also the finish line. At the end of the day's racing, participants return to the ramp and pull their boats out of the water.

These regattas are governed by the "International Sailing Federation rules" and boating rules set forth by the U.S. Coast Guard and the State of Idaho. The race committee normally requires all participants to wear personal flotation devices (PFDs) when whitecaps are present (wind approximately 10 knots). Races are postponed or abandoned by the race committee when winds are in excess of 20 knots (approximately 23 mph). Twenty or fewer boats have competed in all recent sailing regattas at Lake Lowell.

Changes to the Use

Sailing regattas will take place in the West Pool of the Lake Lowell Unit with the issuance of an SUP. The regattas will be required to launch from the Lower Dam Recreation Area. The course will be set in water that is 15 feet deep or greater.

To reduce impacts to other Refuge visitors, regattas will launch from the Lower Dam Recreation Area. Twenty-five or fewer boats will be allowed at each regatta to provide adequate parking and dock space for other users. The first 60 feet on the inside of each dock at the Lower Dam Recreation Area must be available for non-regatta users at all times. Regatta participants may dock their boats on the rest of the dock during the morning briefing and retrieval of vessels at the end of the day.

Because large groups and high speeds impact wildlife more than individuals traveling at low speeds, sailing vessels that have a hull shape and/or sail configuration that will allow them to reach speeds greater than 20 mph for the wind conditions will not be allowed to compete in the regatta.

To decrease the exclusion of the general public to large areas of the Refuge, which often occurs with competitive events, the course must remain open to other Refuge users during the racing activities. Because most sailing vessels are large and highly visible, and the course has large amounts of open area, safety issues should not arise from the dual use of the race area. If the use of the racing area

does create a safety issue in the future, this use will need to be reevaluated. The opportunity that is provided to the general public to be passengers on sailing vessels that are participating in sailing regattas is appreciated and encouraged.

All regattas must follow the International Sailing Federation rules, any boating rules set forth by the U.S. Coast Guard and the State of Idaho, as well as all Refuge rules and regulations. Races will be postponed or abandoned when winds are in excess of 20 knots (approximately 23 mph).

Availability of Resources

The following funding for annual costs will be required to administer and manage sailing regattas. Because sailing regattas use the same facilities as other on-water users, participants and will need to have a full understanding of the no-wake zones, closure areas, and all other Refuge-specific regulations, the costs associated are very similar to those associated with all other recreational boating activities. Most of the costs associated with allowing sailing regattas are one-time expenses (see Table B-8). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Currently, most on-water law enforcement and boating-related dock maintenance is provided by the Canyon County Sheriff's Office. If the County discontinued this assistance, there would be additional costs associated with the Refuge maintaining this use, and the ability of the Refuge to provide it may be impaired. Because the Sheriff's Office is not currently able to provide law enforcement for Refuge-specific regulations, it will be important for the Refuge to increase its law enforcement presence and/or work with Canyon County to enforce these regulations.

Table B-8. Costs to Implement Improvements to the Recreational Boating Program

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install new kiosks and signs at access points and maintain signs	$60,000	$100
*Visitor contact station	$480,000	$1,600
*Install and maintain comfort station and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Print/reprint general Refuge brochures	$3,200	$800
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	$5,200
*Install and maintain buoys for seasonal closures and permanent no-wake areas	$4,300	$500
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$996,700**	**$73,600**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource. For example, rehabilitating the LDRA will benefit boaters, and also picnickers, swimmers, fisherman, and other visitors. The same cost has been shown in all CDs that may use the LRDA.

Funding will be sought through the Service budget process. Other sources will be sought through strengthened partnerships, grants, coordination with law enforcement agencies, and additional Refuge operations funding to support a safe, quality public use program. Increased volunteer assistance, strengthened partnerships, and new partnerships will be sought to support these programs

in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts. When provided appropriate training, Refuge volunteers, interns, and various user groups can assist with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Anticipated Impacts of Uses

The discussion below analyzes the impacts of the use as it is described in the CCP.

General Impacts to Wildlife

Disturbance Effects: Both motorized and nonmotorized boating have been shown to change wildlife distribution and use of particular habitats, alter feeding behavior and nutritional status, and cause premature departure from desirable habitat (Bouffard 1982; Kaiser and Fritzell 1984; Korschgen et al. 1985). Studies have also shown that boating disturbance may cause increased flight time and flushing distances in waterfowl species (Havera et al. 1992; Kahl 1991; Kenow et al. 2003; Knapton et al. 2000). Wildlife species that are more sensitive to recreation-related disturbances (e.g., bald eagles, shorebirds, grebes) may find it increasingly difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented by disturbance (Burger 1997; Pfister et al. 1992; Skagen et al. 1991).

Restricting sailing regattas to speeds of less than 20 mph and to an area within the middle of the West Pool should reduce some of the disturbance that is seen by vessels using shallow waters and traveling at high rates of speed. The regatta course will be greatly removed from bald eagle, heron, and grebe nesting areas.

Effects to Water Quality

In addition to noise and speed, motorized boats pollute waters with gas and oil. Older two-stroke engines, in which the gas and oil are combined, can discharge as much as 25 percent of the unspent fuel mixture directly into the water. Hydrocarbons in gas and oil float on the water's surface and bioaccumulate in the food web posing a threat to sensitive shallow lacustrine habitats (Tjarnlund et al. 1995). Hoffman (1998) reviewed several studies, concluding that petroleum hydrocarbons can be transferred to eggs from the plumage of incubating birds, and can be toxic even in small amounts.

There is a possibility of boats aiding in the spread of aquatic invasive species into the waters of the Refuge. Informational media in hunting brochures, placards at launch sites (including Refuge launches), registration requirements, systematic and periodic inspections, and early detection monitoring help reduce the likelihood of infestation. The ISDA is at the forefront of preventing the spread of aquatic invasive species into the waters of Idaho and works in concert with various agencies including the Service.

Because sailing regatta participants only use their motors to reach the start line from the dock and to return to the dock at the end of the day, these effects will be less than those created by general motorized boat users.

Refuge-specific Impacts

This section evaluates the likely impact at the Refuge, considering the scientific studies discussed above and considering the uses within the context of the Refuge.

Vegetation, Soil, and Water Impacts: As described above, the potential for water quality impacts and contaminants in the food web stemming from the release of gas and oil hydrocarbons into Refuge waters will continue to exist. The Refuge will promote the use of CARB star-rated motors at the level of two stars and above to reduce impacts from petroleum hydrocarbons. A total maximum daily load (TMDL) assessment for the Lake Lowell watershed was prepared by the Idaho Department of Environmental Quality (IDEQ) that explored water quality concerns in Lake Lowell. Petroleum hydrocarbon pollution from boats was not explored in the TMDL because the focus was on pollution loads associated with agriculture runoff and other nonpoint sources. Even though oil and grease are listed as pollutants of concern in the Boise River (Lower) Subbasin Hydrologic Subunit, dissolved oxygen, sediment, and nutrients are the focus of the TMDL, because the presence of these pollutants at current levels likely render hydrocarbon levels insignificant (IDEQ 2010).

Disturbance Effects to Wintering and Migrating Wildlife: The wintertime closure is expected to adequately protect wintering and migrating birds using Lake Lowell. It is critical for waterfowl to conserve energy during migration and the cold winter months. Closed areas provide unmolested space for birds as they are resting and refueling for the journey ahead of them.

Disturbance Effects to Colonial-nesting Birds: Colonial-nesting birds at Lake Lowell may be among the most sensitive species subjected to potential disturbance from boating. Lake Lowell is one of only three lakes in Idaho that routinely hosts colonies of nesting western and Clark's grebes, whose breeding population is considered imperiled in the state (IDFG 2005). IDFG has printed pamphlets for public distribution that provide information on conflicts between boaters and grebes, and the importance of responsible boating. High-speed boating displaces grebes from preferred habitats, disrupts nesting and feeding, and even causes loss of young (Burger 1997). Grebe adults and chicks are often killed by boats (Ivey 2004; Shaw 1998), and small chicks can become separated from their parents and die of exposure if adults have to dive to avoid motorboats (Storer and Nuechterlein 1992).

Restricting sailing regattas to the middle of the West Pool and to speeds of less than 20 mph should reduce disturbance to colonial nesting birds.

Disturbance Effects to Other Species: The Lake Lowell Unit includes riparian forest, emergent vegetation, and open water habitats that are used extensively by a variety of bird species. The disturbance effects to wildlife described in the General Impacts section above apply to the anticipated effects to wildlife on Deer Flat NWR. It is anticipated that wildlife species using the open water and emergent plant habitats of the Refuge will benefit from restricting sailing regattas to the middle of the West Pool and to speeds of less than 20 mph.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species, only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American

wolverine, greater sage-grouse). It is anticipated that impacts from boating will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impacts to Priority Public Uses

Boating, whether motor-, wind-, or human-powered, may provide additional wildlife-dependent recreational opportunities. However, as described above, given the tendency of birds to flush when subjected to a high intensity of disturbance, wildlife viewing opportunities are expected to be poor within the portions of the race course that are occupied by up to 25 sailing vessels at one time.

The restriction of sailing regattas to the middle of the West Pool will allow wildlife-dependent users to use the vast majority of the lake without any impacts from this activity. The ability of wildlife-dependent users to cross the race course to reach their destination also reduces any impacts to these users. If safety within the race course becomes an issue in the future, the course may need to be closed to other users, which will create undue impacts to wildlife-dependent and other user groups.

The restriction of sailing regattas to the months of April and May will reduce impacts to wildlife-dependent users because refuge visitation is low during that time. The further restriction of 25 sailing vessels will also reduce impacts by ensuring adequate parking and docking availability.

Determination

_____ Use is Not Compatible
____X____ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Cooperative land management agreements will contain the following special conditions to ensure compatibility.

Sailing Regatta Stipulations

- Sailing regattas are required to comply with International Sailing Federation rules, boating rules set forth by the U.S. Coast Guard and the State of Idaho, and all Refuge rules and regulations.
- Sailing regattas are allowed only by SUP.
- Sailing regattas are allowed only during the months of April and May.
- Sailing regattas are allowed only on weekends that are not being used for bass tournaments (i.e., every other weekend).
- Sailing regattas must be postponed or abandoned when winds are in excess of 20 knots (approximately 23 mph).
- No sailing vessel with a hull shape and/or sail configuration designed to reach speeds greater than 20 mph in certain wind conditions, will be allowed to compete in the regatta.
- Non-regatta visitors must be allowed to enter into and cross the regatta race course.
- The 30 boat trailer parking spots closest to the ramp will be marked and made available to the Refuge's non-regatta visitors.

- The first 60 feet on the inside of each dock at the Lower Dam Recreation Area must be available for the Refuge's non-regatta visitors at all times. Regatta participants may dock their boats on the remaining dock during the morning briefing and afternoon retrieval.
- Only 25 or fewer sailing vessels are allowed in each regatta.
- Race course buoys must be highly visible to other boaters.
- The race course must be set in waters that reach a depth of 15 feet or greater.

Justification

There are several concerns that must be addressed before any type of competitive group event is allowed on the Refuge.

Safety

Due to the size of the vessels and the height of their sails, sailboats are highly visible to other users. This reduces the likelihood of collisions with other Refuge visitors and allows the area within the racing buoys to be open to other users. Safety is also increased by following all International Sailing Federation rules, boating rules set forth by the U.S. Coast Guard and the State of Idaho, and all Refuge rules and regulations. The speed restriction of 20 mph or less will also help reduce potential safety issues with other sailors or non-regatta users.

Impacts to Wildlife-dependent Users

The exclusion of other users from the area in which a competitive activity is occurring can negatively impact other Refuge users. Because sailing vessels are not greatly impacted by wake and because they are very visible to other users, it is not necessary to close their racing course to other Refuge users. Other users can boat within or through the course as needed. If the course were required to be closed in the future, the lack of use of a large area of the lake will be an undue burden for other users.

Use of the docks and parking area could exclude other users. The small number of sailing vessels that will be allowed in each regatta (25) and the requirement to provide the first 60 feet of the inside of each dock for non-regatta users and to provide the 30 boat trailer parking spots closest to the ramp for non-regatta participants should reduce impacts to wildlife-dependent users wanting to launch at the Lower Dam Recreation Area. The requirements to hold regattas only in April and May when visitation is low and to hold them only when no bass tournaments are occurring should also reduce the likelihood of excluding other users through lack of parking or launch spaces.

Impacts to Wildlife

High-speed boating can increase disturbance for many wildlife species. Because sailing regattas by nature require that a large group of boats all travel in close proximity to one another for at least a portion of the race, the ability of wildlife to retreat from regatta participants may be hindered by the sheer number of vessels and the area that they cover. Restricting the speed of regattas to 20 mph or less will increase the time provided for wildlife to respond to approaching vessels.

Open water habitats at Lake Lowell are highly used by a variety of bird species for mating displays, feeding, and loafing, and may be impacted by activities taking place in the middle of the lake. Restricting regattas to April and May allows the use to occur during lower visitation periods. Because visitation is lower, there is more open water available outside of the racing area than there

will be later in the summer. The reduced use of these other areas allows adequate open water habitat for wildlife during sailing regattas.

Wildlife is especially vulnerable to disturbance during the nesting period, which for many species occurs during the months of April and May. Requiring sailing regattas to use the middle of the West Pool and keeping boats in water 15 feet or deeper should remove them from any potential nesting areas. Because the course is open to use by other boaters, there is no concern that the regatta will push other users to the periphery and increase disturbance.

Conclusion

Because sailing regattas are able to occur with an open race course, at speeds of 20 mph or less, in water that is 15 feet or deeper, and at a time of year when visitation is low, the impacts to wildlife and wildlife-dependent users, as well as safety concerns, are adequately addressed. Although sailing regattas can result in disturbance to wildlife, disturbance is expected to be intermittent, short term, and limited in time and space. There is an adequate amount of undisturbed habitat available to most wildlife for escape and cover.

It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from this activity. The relatively limited number of individuals expected to be adversely affected due to this use will not cause wildlife populations to materially decline, the physiological condition and production of species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing sailing regattas to occur with stipulations will not materially detract from or interfere with the purposes for which the Refuge was established or the Refuge System mission.

This compatibility determination is specific to sailing regattas at Deer Flat NWR and does not create a precedent for any other competitive group activities.

Mandatory Reevaluation Date

__2025___ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

__X___ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Sailing Regattas (B.9)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FOERSTER (Signature) 4/1/15 (Date)

B.10 Compatibility Determination for Swimming, Beach Use, and Picnicking (including Lower Dam Recreation Area Use)

RMIS Database Use: Swimming, Beach Use, and Picnicking

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations

of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Swimming, sunbathing, and picnicking on easily accessible beaches are popular activities during the summer months at the Lake Lowell Unit. There are two designated, buoyed swimming areas: at the east end of the Upper Dam and at the Lower Dam Recreation Area. At the Upper Dam designated swimming area, the buoy line is stretched between two docks used by swimmers and sunbathers. There is a buoy line running parallel to the beach at the Lower Dam Recreation Area as well. Swimming is common at both of these areas but also occurs from any open shoreline. Visitors also regularly swim from and sunbathe on boats in the open water and at Gotts Point and at Parking Lot 7.

The most popular swimming areas at the Upper and Lower Dams are in close proximity to the dams and water control structures associated with those dams. Signs and buoys are posted near these structures to warn swimmers about the dangers of swimming near the outlets or jumping off the control structures.

Changes to Refuge Uses

In the CCP, swimmers and beach users will be directed to the existing designated swimming areas near the Upper Dam and at the Lower Dam Recreation Area. This will reduce potential disturbance from swimmers and beach users to anglers, who are to be given priority under the National Wildlife Refuge Administration Act of 1966, as amended, and to improve emergency response to swimming-related incidents. There have been several near-drowning incidents and a few fatalities at Lake Lowell in the past few years, and the Refuge is hopeful that directing shoreline swimmers to designated areas that are easily accessible to rescue personnel will help to minimize swimming safety issues. There will be no lifeguards stationed at the swimming areas.

Efforts will also be made at the Upper Dam swim area to further separate swimmers and beach users from anglers by strategic placement of docks and enforcement of designated areas. Swimming will also be allowed in the open water of Lake Lowell from boats outside of no-wake zones. Swimming will not be allowed around fishing or other wildlife-dependent facilities (e.g., docks), or immediately adjacent to boat launch areas. These changes will ensure that most highly used fishing areas will be free of swimming activity.

Picnicking will be allowed in designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area. Nonwildlife-dependent group events (e.g., weddings, reunions, birthday parties, and other gatherings) will be allowed only at the Lower Dam Recreation Area because of the availability of parking, restroom, picnic, and trash facilities. Such group events must comply with the stipulations listed below to reduce impacts to visitor safety or the ability of other visitors to use the Refuge in an unobstructed and undisturbed way.

Availability of Resources

Most swimming at Deer Flat NWR will take place at the Upper Dam East and Lower Dam Recreation Areas. Most of the costs associated with carrying out improvements are one-time expenses (Table B-9). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to

implement these projects, including partnership efforts. Increased volunteer assistance, strengthened existing partnerships, and new partnerships will be sought to support these programs in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts. When provided the appropriate training, Refuge volunteers, interns, and various user groups can assist with monitoring, education and interpretation programs, and maintenance projects. The Canyon County Sheriff's Office currently purchases, installs, and maintains the swimming buoys. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Currently, most maintenance of recreational facilities at the Lower Dam Recreation Area (e.g., irrigating and mowing lawns, cleaning restrooms, and maintaining buoys) is provided by the Canyon County Department of Parks, Recreation, and Waterways and the Canyon County Sheriff's Office. If the County ever decided to discontinue this assistance, additional costs will be associated with maintaining this use.

Table B-9. Costs to Implement Improvements for Lower Dam Recreation Area Users, Swimmers, and Beach Users

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Print/reprint general Refuge brochures	$3,200	$800
*Construct and maintain a visitor contact station	$480,000	$1,600
*Install and maintain comfort station at Lower Dam Recreation Area (LDRA)	$150,000	$1,500
*Rehabilitate LDRA parking area	$50,000	
*LDRA site plan	$40,000	
*Construct and maintain a nature play area	$40,000	
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Volunteer coordinator to manage enough volunteers for additional outreach at LDRA		$51,000
*Law enforcement officer		$62,400
Total	**$1,024,200**	**$120,000**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource. For example, rehabilitating the LDRA will benefit swimmers and picnickers, and also boaters, fisherman, and other visitors. This same cost has been shown in all CDs that may use the new docks.

Anticipated Impacts of the Use

The discussion below analyzes impacts of the use as it is described in the CCP.

General Response of Wildlife to Disturbance

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits, to physiological changes such as elevated heart rates, increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the

disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife will respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Burger (1999 as cited by Oberbillig 2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of 330 feet will minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommended buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails.

Although swimming areas often include erratic movement and elevated human noise levels, the designated swimming areas on Lake Lowell are not of great concern for wildlife concentrations. Keeping most shoreline swimming contained to designated areas will reduce the amount of wildlife disturbance associated with the activity. The park-like features of the Lower Dam Recreation Area as well as the open water of the Lake Lowell attract wintering and migrating geese in the fall, winter, and early spring. In order to eliminate impacts to wintering and migrating waterfowl in both of these areas, the lake and Lower Dam Recreation Area are closed to all activities October 1 through April 14, with the exception of hunting and fishing within 200 yards of certain shoreline areas during a portion of the closure.

Impacts to Habitat

With use directed to designated beaches, there will be only minimal disturbance to habitat. However, illegal activities on designated beaches do pose threats to wildlife. Litter and human waste are expected problems as well as trespass in the form of visitors violating the daylight-hours-only regulation. Wildfires resulting from beach users are another threat, with fire ignitions potentially resulting from campfires, fireworks, or other sources. Campfires and use of fireworks, although prohibited, have historically occurred on the beaches and pose a significant threat to habitat and wildlife resources.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of

these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from swimming and beach use will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Human Health

Although there have been several near-drowning incidents and a few fatalities at Lake Lowell in the past few years, the Refuge is hopeful that directing swimmers to two designated areas that are easily accessible to rescue personnel will help to minimize safety issues. There will be no lifeguards stationed at the swimming areas.

There are human health concerns related to swimming in Lake Lowell. Under certain conditions, levels of blue-green algae, fecal coliform, and parasites causing swimmer's itch, can exceed State health standards. The Refuge will work with the Idaho Department of Environmental Quality (IDEQ) and Southwest District Health (SDH) to monitor water quality and, if necessary, close the swimming beaches. When testing at the swimming beach indicates health concerns, testing will also be conducted at other sites around the lake, and the Refuge will work with IDEQ and SDH to institute warnings and closures about water contact at other locations around the lake.

Impact to Priority Public Uses

Swimming and beach use are not wildlife-dependent or priority public uses as designated by the National Wildlife Refuge Administration Act of 1966, as amended. In areas where swimming and beach use occur regularly, fishing is essentially precluded by the noise and commotion, which are not conducive to catching fish or a quality fishing experience. Wildlife observation, education, and interpretation are priority uses that can also be negatively impacted by the presence of swimmers and other beach users.

Determination

_____ Use is Not Compatible
___X___ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Visitors engaged in beach activities, including swimming and picnicking, will be directed to two designated areas at the east end of the Upper Dam and at the Lower Dam Recreation Area from April 15 through September 30.
- Shoreline swimming will be allowed in these designated areas and elsewhere, with the exception of around fishing or other wildlife-dependent facilities (e.g., docks) or immediately adjacent to boat launch areas.

- Swimming will be allowed in the open waters of Lake Lowell from boats outside of no-wake zones.
- Designated swim beaches will be monitored for water quality affecting human health.
- Nonwildlife-dependent noncompetitive group events (e.g., weddings, birthday parties, reunions, memorial services, retreats, and other gatherings) with 20 or more participants will be allowed only at the Lower Dam Recreation Area with the following stipulations.
    - Events are first come, first served. Facilities cannot be reserved in advance or by posted notice.
    - Tent size cannot exceed a total of 20 feet by 20 feet to allow access for general visitors.
    - Group events cannot exceed 50 participants to allow access and parking facilities for general visitors.
    - Use of audio devices (e.g., radios, recording and playback devices, loudspeakers, television sets, public address systems, and musical instruments) cannot cause unreasonable disturbance to others in the vicinity, and must comply with 50 C.F.R. 27.72.
    - Participants may not be under the influence of alcohol to a degree that may endanger themselves or other persons or property or unreasonably annoy persons in the vicinity. They must comply with 50 CFR 27.81.
    - Participants must place all event trash into the dumpster provided or remove it from the site. No glass containers will be allowed.
    - No portable recreational equipment (e.g., inflatable bounce houses, on-water trampolines, zip lines, etc.) will be allowed.
    - Participants must park in designated spaces or in a single layer along the cable barrier to ensure that emergency personnel can access the area in case of emergency.
- Use will be restricted to daylight hours only.
- Open fires and fireworks will be prohibited.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests within and especially on the periphery of a colony using a GPS unit capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a georeferenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100–150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, closure will be based on nests established early in the nesting season. In the second year of grebe nesting, closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1

  - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
  - Wildlife closure at Gotts Point from October 1 through January 31.
  - Wildlife closure at Murphy's Neck from October 1 through March 15.
  - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff will monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, and conflicts between user groups. Monitoring data will be used to modify these stipulations or remove the use if necessary to ensure continued compatibility.

Justification

Swimming and beach use are not priority public uses as defined by the National Wildlife Refuge System Administration Act of 1966, as amended. Due to the limited area where most swimming and beach use will occur, these uses are expected to result in a low impact to wildlife and wildlife habitat. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing swimming to occur under the prescribed conditions.

The relatively limited number of individual wildlife species expected to be adversely affected due to swimming will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, under these conditions, we do not expect the use to materially interfere with or detract from the mission of the Refuge System, diminish the purposes for which the Refuge was established, pose significant adverse effects on Refuge resources, or cause any undue administrative burden.

Visitor safety will be increased by directing shoreline swimmers to designated beaches. For many visitors, swimming and beach use at Lake Lowell may provide an introduction to a national wildlife refuge and good opportunity to reach out to them.

Mandatory Reevaluation Date

__2025___ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

___X____ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Swimming, Beach Use, and Picnicking (including Lower Dam Recreation Area Use) (B.10)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4-1-2015 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FOERSTER (Signature) 6/10/15 (Date)

B.11 Compatibility Determination for Walking with Pets (other than hunting dogs)

RMIS Database Use: Pets

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations

of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

The Refuge currently allows leashed dogs at the Lake Lowell Unit. This use occurs primarily at the Lake Lowell Unit on all Refuge roads and trails, as well as off-trail in the North Side, East Side, and South Side Recreation Areas. For information about use of dogs while hunting, see the Hunting Compatibility Determination.

The Code of Federal Regulations states that no dog shall be permitted to roam at large on refuge lands (50 C.F.R. 26.21(b)). Refuge regulations will also be consistent with the following local municipal codes for Canyon County that require a dog that is off the property of the owner to be on a physical leash of 6 feet or less. One end of the leash must be attached to the dog, and the other end must be in the hand of a person capable of controlling the dog. (Ord. 83-006, 6-30-83, eff. 7-11-83; Ord. 91-004, 6-24-91). No person owning, harboring, controlling or keeping any dog shall permit the dog to deposit fecal material on any public property without the owner or custodian immediately bagging and removing the material and disposing of it in a proper trash receptacle (City of Nampa Municipal Code 9-5-9).

Changes to the Use

Under the CCP, the Refuge will allow people walking with leashed pets to use designated multi-use trails and the Lower Dam Recreation Area during daylight hours and at times of the year when walking access is allowed. Visitors walking with their pets will be required to remove feces from the Refuge. This public use will be monitored to ensure it does not interfere with wildlife-dependent uses or impact wildlife resources. If Refuge personnel observe that visitors with pets are routinely not complying with the above requirements, the Service will evaluate the possibility of prohibiting pet walking. This CD will be revised in 10 years or possibly sooner to incorporate additional data and new information.

Availability of Resources

Most of the costs associated with carrying out the improvements are one-time expenses (see Table B-10). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts. Increased volunteer assistance, strengthened existing partnerships, and new partnerships will be sought to support these programs in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts. When provided the appropriate training, Refuge volunteers, interns, and various user groups can assist with monitoring, education and interpretation programs, and maintenance projects. With additional assistance as described above, staffing and funding is expected to be sufficient to manage these uses.

Most maintenance of recreational facilities at the Lower Dam Recreation Area (e.g., irrigating and mowing lawns and cleaning rest rooms) is provided by Canyon County's Department of Parks, Recreation, and Waterways. If the County ever decided to discontinue this assistance, there will be additional costs associated with maintaining this facility to the current quality.

Table B-10. Costs to Implement Improvements Necessary to Allow Pet Walking on Designated Trails and in the Lower Dam Recreation Area

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Install multiple-use trail regulation signs	$7,800	$300
*Upgrade fire break	$37,000	$800
Pet feces removal station	$400	$500
*Print/reprint general Refuge brochures	$3,200	$800
*Human/wildlife interaction disturbance studies	$140,000	
*Law enforcement officer		$62,400
Total	**$188,400**	**$64,800**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource. For example, upgrading the fire break to a multiuse trail will benefit people walking with pets, but the trail could also be used by visitors engaged in wildlife observation, photography, and interpretation. This same cost has been shown in all CDs that will use the new trail facility.

Anticipated Impacts of the Use

The discussion below analyzes the impacts of this use as it is described in the CCP.

Authors of many wildlife disturbance studies conclude that dogs with people, on-leash dogs, or loose dogs provoked a more pronounced disturbance reactions from wildlife than humans alone (Sime 1999). The disturbance effects of human intrusion increased when people were accompanied by dogs in studies of different species including shorebirds (Hoopes 1993; Yalden and Yalden 1989, 1990), passerines (Knight and Miller 1996), upland game birds (Baydack 1986) and small mammals (Mainini et al. 1993). Another study suggests that harassment of wildlife by domestic dogs is opportunistic and is associated with the concentration of wildlife in a given area (Jones & Stokes 1977). A follow-up study suggests that dog-induced wildlife flushes increase with the increased density of dogs (Abraham 2001). Free-running and feral dogs have been known to kill quail, rabbits, and deer (Bowers 1953; Lowry and McArthur 1978; Nelson and Woolf 1987). Pure-bred dogs trained to hunt can also ferret out ground-nesting birds and small game animals when left to roam free (Bowers 1953).

Domestic dogs can introduce diseases like parvovirus, canine distemper, and plague to wildlife populations. Diseases like giardia infection and rabies can be transmitted to wildlife and to humans. Muscle cysts can be transmitted through dog feces to ungulate species including mule deer (Sime 1999). Dog waste is also known to host endo- and ecto-parasites and wildlife can contract diseases from contact with dogs or dog wastes (Sime 1999). To reduce this effect on wildlife and people, pet owners will be required to pick up their pet's feces and dispose of it properly, as is also required by local county and city ordinances.

Nussear et al. (2008) inadvertently showed that unleashed dogs increase the zone of coverage (or zone of influence) beyond what it will be solely by the handler, thereby increasing the potential to disturb or harm wildlife. When wildlife react by moving away from the disturbance or alter behavior by hiding they will be less likely to be observed. Users of a national wildlife refuge should be able to expect to see wildlife during their visit. Because expectations of seeing wildlife and the amount of wildlife actually seen factor into the quality of experience for wildlife-dependent users (Hammitt et al. 1993), the reduction in observable wildlife that will be caused by allowing nonwildlife-dependent uses could result in avoidance of the Refuge by wildlife-dependent users. To reduce this potential negative effect on wildlife and wildlife-dependent visitors, dogs will still be required to be leashed on the Refuge. The National Wildlife Refuge System Administration Act, as amended, requires that

priority consideration be given to wildlife-dependent users, and the presence of dogs is not necessary for nonhunting, wildlife-dependent recreational activities.

These studies are important when considering human/dog disturbance on refuges that have a high concentration of wildlife. Because Deer Flat NWR is an urban refuge with potentially high concentrations of dogs, people walking with dogs will only be allowed to use designated trails and the Lower Dam Recreation Area to reduce their interactions with high concentrations of wildlife and to provide ample quantities of sanctuary where wildlife can find cover.

Although Refuge regulations and Canyon County municipal codes require dogs to be under complete control by an adequate leash, it is common to see unleashed dogs on Deer Flat NWR trails. In fact, the most common violation noted in the Refuge law enforcement logs is "dog(s) off leash."

The potential adverse effects associated with pet/wildlife interactions will be minimized by requiring dogs to be on leashes and to remain on multiuse trails or in the Lower Dam Recreation Area. Visitor safety should be increased and dog fighting and negative pet/visitor interactions should be reduced by requiring that pets be on leash at all times. In addition, pet feces will be required to be removed. Impacts from pets will be monitored and enforced by Refuge staff to ensure it does not interfere or have any undue negative impacts to wildlife resources or compatible, wildlife-dependent uses.

To reduce impacts to visitors engaging in wildlife-dependent activities, especially those involved in environmental education and interpretive programs, pets will not be allowed on the Nature, Centennial, Murphy's Neck, or Boardwalk Trails. These trails are, for the most part, narrower than the patrol road trails (East Dike, Kingfisher, Gotts Point, and Observation Hill Trail System), and therefore do not lend themselves to multiple uses. The Centennial and Nature Trails are currently used for environmental education and interpretive programs. To reduce disturbance to these programs and provide adequate space for multiple uses, on-leash pets will only be allowed on the entrance road and the East Dike, Kingfisher, and Gotts Point Trails; the Observation Hill Trail System; and in the Lower Dam Recreation Area. Keeping pets on designated trails and in the Lower Dam Recreation Area will allow wildlife-dependent visitors the opportunity to use several trails without having to interact with pets.

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from pet walking will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Determination

_____ Use is Not Compatible
____X____ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Pets will be required to stay on designated multiuse trails and in the Lower Dam Recreation Area, in personally owned vehicles, and in parking lots only. Designated multiuse trails consist of:
    - Observation Hill Trail System in the North Side Recreation Area;
    - East Dike and Kingfisher Trails in the East Side Recreation Area; and
    - Gotts Point Trail.
- Pets will be required to be on a physical leash (6 feet or less) at all times. One end of the leash must be attached to the pet and the other in the hand of a person capable of controlling the pet.
- Other than what is compliant with stipulation above, training of pets will not be allowed on the Refuge.
- Visitors walking with leashed pets on designated trails, and in the Lower Dam Recreation Area will be required to immediately bag and remove fecal material and dispose of it in the proper trash receptacles.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests in and especially on the periphery of a colony using a GPS unit capable of sub-meter accuracy as part of the regular colony studies. These data points will be exported to a georeferenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100-150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of grebe nesting, closure will be based on the full extent of the colony in the first year.
    - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
    - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
    - Wildlife closure at Gotts Point from October 1 through January 31.
    - Wildlife closure at Murphy's Neck from October 1 through March 15.
    - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Use will be restricted to daylight hours only.

Justification

Walking with pets is not generally considered a wildlife-dependent use of a refuge as defined by statute (16 U.S.C. 668dd et seq.). However, this use on Deer Flat NWR facilities is secondary and conducted in conjunction with wildlife-dependent uses like wildlife observation, photography, and interpretation. Potential for wildlife disturbance is minimal when the use is conducted as required by the stipulations, including restricting the use to designated trails and the Lower Dam Recreation Area, requiring pets to be on-leash, and mandating the removal of pet waste.

Potential for wildlife and habitat disturbance is minimal given the indirect approach of this activity, the enforcement of the short leash rule, and the mandatory removal of pet feces. Restricting the disturbance to established trails and the Lower Dam Recreation Area will increase the predictability of public use on the Refuge, allowing wildlife to habituate to nonthreatening activities. These impacts will be monitored and if they, or other impacts, are discovered, this CD will be reevaluated.

We anticipate that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened from allowing pet walking on designated trails and in the Lower Dam Recreation Area. The relatively limited number of individuals expected to be adversely affected due to pet walking will not cause wildlife populations to materially decline, the physiological condition and production of wildlife species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted.

Refuge users with pets provide the opportunity for the Refuge to reach out to nontraditional Refuge user groups and to encourage people walking their pets to observe wildlife and to learn about the NWRS. Due to the close proximity of Deer Flat NWR to the cities of Nampa and Caldwell, the number and variety of users to this urban refuge is expected to grow. For many of these people, using the multiple-use trails and Lower Dam Recreation Area may provide an introduction to a national wildlife refuge.

By enforcing Refuge regulations that are consistent with local municipal codes, as well as designating appropriate facilities, this use will not interfere with fulfilling the purposes of Deer Flat National Wildlife Refuge. The potential for minimal impacts to Refuge resources from this use, when carried out as specified in the stipulations above, will not detract from fulfilling the Refuge purposes, vision, and goals or the NWRS mission.

Mandatory Reevaluation Date

__2025__ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

__X__ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Walking with Pets (other than hunting dogs) (B.11)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: KEVIN S FORESTER (Signature) 4/1/15 (Date)

B.12 Compatibility Determination for Wildlife Observation, Photography, Interpretation, and Environmental Education

RMIS Database Use: Wildlife Observation, Photography (wildlife), Interpretation and Environmental Education (teaching students)

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette, and Washington Counties, Idaho, and Malheur County, Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655). Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuges' names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

- "to further the purposes of the Migratory Bird Conservation Act" and "as a refuge and breeding grounds for migratory birds and other wildlife" (E.O. 7655)
- "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" (Migratory Bird Conservation Act [16 U.S.C. 715d])
- "suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species" (16 U.S.C. 460k-1) and "the Secretary … may accept and use … real … property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors" (16 U.S.C. 460k-2) (Refuge Recreation Act [16 U.S.C. 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations

of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee et seq.]).

Description of Use

Four nonconsumptive wildlife-dependent recreational activities are defined as priority public uses under the National Wildlife Refuge Administration Act of 1966, as amended: wildlife observation, photography, interpretation, and environmental education. These activities can enhance the users' appreciation of the Refuge, the NWRS, wildlife, their habitats, and the human environment. Because of its proximity to urban areas, Deer Flat NWR is considered an urban refuge and provides an opportunity for many nontraditional refuge users to be exposed to wildlife, habitat, and the NWRS.

Deer Flat NWR is a popular destination for local visitors as well as tourists from outside the area. In FY11, total Refuge visitation was estimated at 228,000, with the majority of visitation occurring during the summer months. Further broken down, visitation numbers for the four nonconsumptive wildlife-dependent recreational activities are as follows.

- Wildlife observation and photography: 23,900
- Interpretation: 21,000
- Environmental education: 11,000

The Snake River Islands Unit is also open to the public for wildlife observation and photography from June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands. Access to islands will be clearly delineated in the Refuge brochure. The only way to access these islands is with a boat and the amount of use for this activity is unknown.

Wildlife Observation and Photography

On the Lake Lowell Unit, a variety of trails and facilities provide opportunities for visitors who wish to view and photograph wildlife while minimizing disturbance to wildlife, including the East Dike and Kingfisher Trails in the East Side Recreation Area, the Gotts Point Trail, and the Observation Hill Trail System and Centennial and Nature Trails in the North Side Recreation Area. These hiking trails allow visitors to walk in close proximity to riparian, lake, wetland, and upland Refuge habitats.

There are wildlife viewing platforms on the Observation Hill Trail and on the Centennial Trail. There is also a bird viewing blind on the Nature Trail where visitors can photograph or observe wildlife. The Refuge also has a 29.5-mile driving tour that highlights birding stops and circumnavigates the Lake Lowell Unit, as well as a 47-mile driving tour that highlights wildlife viewing opportunities at both the Lake Lowell and Snake River Islands Units. When the lake is open to the public, visitors can also observe and photograph wildlife on the open water with the use of motorized and nonmotorized boats. During the winter, visitors can also observe and photograph wildlife from cross-country skis.

Interpretation and Environmental Education

Interpretation and environmental education (EE) opportunities are designed to increase the public's knowledge and understanding of wildlife and wildlife conservation. Many members of the public are not familiar with national wildlife refuges and confuse them with other Federal lands (e.g., National Parks, Bureau of Land Management lands) or with State and County parks. Locally, the Refuge is

commonly referred to as Lake Lowell, and much of the public does not know that it is a national wildlife refuge that is part of a nationwide system. Providing information through educational programs, written materials, and interpretive panels helps to build an understanding and appreciation of the unique purposes and activities of national wildlife refuges. Providing information regarding the mission of the Service and the purposes of the Refuge, along with specific resource information, to Refuge visitors may alleviate potential negative impacts of visitors on wildlife.

Most interpretive and EE activities occur at or near the Refuge Visitor Center. Guided activities include staff- and volunteer-conducted environmental education programs, teacher workshops, interpretive programs, and special events. Unguided activities include interpretive displays in the Visitor Center, interpretive panels along the Centennial Trail and at Snake River Islands Unit access points, and self-guided trail brochures. The Refuge offers a variety of both on- and off-site hands-on EE programs. The Refuge also puts on an annual BioBlitz festival celebrating biodiversity, a Creepy Critters Halloween event, and a monthly Wild About Life lecture series.

Changes to the Uses

The Refuge will improve and expand facilities and programming to enhance wildlife observation, photography, interpretation, and environmental education opportunities as follows.

Wildlife Observation and Photography

- Provide a visitor contact station at the Lower Dam Recreation Area to place a welcome/interpretive facility in an area that currently sees a majority of the Refuge's nonwildlife-dependent users.
- Provide an additional canoe/kayak launch site at Gotts Point to allow users access to an expanded no-wake zone.
- Provide additional trails, for example:
    - 2-mile ABA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3 to provide better access to riparian and lake habitat not only for people with impaired mobility but also for users requesting easier access through the thick riparian vegetation at Lake Lowell.
    - 0.65-mile ABA-accessible interpretive loop trail in riparian habitat between Lower Dam Recreation Area and Murphy's Neck.
    - 0.6-mile bike/walking path from the entrance to the Visitor Center along the entrance road to provide connectivity to possible bike paths.
    - Interpretive trail through restored native area at Lower Dam Recreation Area.
    - A trail between loops of the existing patrol road west of Visitor Center to provide a loop trail experience during eagle nesting season.
    - A trail or improved trail to the Observation Platform from the entrance road parking lot.
    - Additional trails from parking lots to the lakeshore on the south side of Lake Lowell and at Gotts Point to provide the public increased viewing and educational opportunities in riparian habitat types.
    - 1.5-mile self-guided on-water trail looping to the east from Parking Lot 1.
- Maintain existing observation facilities (e.g., towers, platforms) and develop new facilities, for example:
    - A fishing dock/observation platform at north end of Lower Dam Recreation Area near existing Environmental Education Building.

    - Multipurpose (i.e., Big Six) docks along planned 2-mile ABA-accessible interpretive elevated boardwalk between Parking Lots 1 and 3.
    - Seasonal shorebird observation/photography blind on the northern shoreline of the East Pool east of Tio Lane access for reservation with an SUP. Implement a fee for use comparable to fees at other refuges.
    - Photography blind at Upper Dam Marsh for reservation with an SUP. Implement a fee for use comparable to fees at other refuges.
- Provide observation opportunities through wildlife webcams, for example:
    - Maintain existing osprey nest webcam; and
    - Add grebe, heron, or eagle webcams.

Environmental Education and Interpretation

- Increase interpretation opportunities for visitors at high-use access points, for example:
    - Use staff and volunteers to facilitate guided/roving interpretive programs (e.g., bird walks, nocturnal walks, canoe/kayak paddles); and
    - Develop a nature play area at Lower Dam Recreation Area.
- Update and replace Visitor Center interpretive materials, for example:
    - Develop Refuge video to show at Visitor Center; and
    - Update and replace existing Visitor Center interpretive signs.
- Provide at least 4 on-site outreach events (e.g., BioBlitz, Creepy Critters, National Wildlife Refuge Week) annually to expand public awareness of interpretive themes.
- Update EE program to match themes identified in the CCP.
- Work with local teachers to identify target grades for Refuge EE programs.
- Focus on moving from off-site to on-site EE programs.

Access

- To improve the quality of the nonconsumptive wildlife-dependent recreational activities provided at the Refuge and reduce disturbance to wildlife, the following changes will be made to Refuge access.
- Access to Snake River Islands Unit is restricted to June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands.
- Access to Lake Lowell Unit:
    - Wildlife-dependent users will be allowed off-trail in the East Side Recreation Area all year.
    - Wildlife-dependent users will be allowed off-trail at Gotts Point from February 1 through September 30.
    - To protect nesting birds, access will be allowed only on maintained roads and trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel will be allowed August 1 through January 31.
    - Seasonal closures will be in place surrounding important wildlife areas, such as eagle and osprey nests, grebe colonies, heron rookeries, and shorebird feeding areas.

Availability of Resources

Deer Flat NWR is open to all of the Refuge System's priority, wildlife-dependent recreational activities. Most of the nonstaff costs associated with carrying out the improvements are one-time expenses (see Table B-11). Because the Service has limited capacity to staff and maintain facilities and provide law enforcement, the Service will explore all available options to obtain funding to implement these projects, including partnership efforts.

Increased volunteer assistance, strengthened partnerships, and new partnerships will be sought to support these programs in an effective, safe, and compatible manner. Refuge staff will increase volunteer recruitment efforts. When provided the appropriate training, Refuge volunteers, interns, and various user groups can assist with monitoring, education and interpretation programs, and maintenance projects. With assistance, staffing and funding is sufficient to manage these uses.

Mowing and irrigation of the EE building lawn at the Lower Dam Recreation Area is conducted by Canyon County Department of Parks, Recreation, and Waterways. If the County did not provide this assistance, there will be additional Refuge costs for maintaining this facility to the current quality.

Table B-11. Costs to Administer and Manage Updates to Public Use Programs

Refuge Activity Required to Allow Use	Estimated One-time Cost	Estimated Annual Cost
*Provide and maintain season off-trail use signs	$1,400	$400
*Provide 4.5 miles of new trails for pedestrian access	$396,800	
*Provide and maintain interpretive and directional signage for new trails	$28,900	$1,600
Provide and maintain interpretive and directional signage for new observation/photography blinds	$2,900	$500
*Provide and maintain signs for public use in hunt areas	$1,100	$300
Provide and maintain directional signage	$6,500	
*Install and maintain new docks and buoys	$69,600	$7,400
Install new observation/photography blinds	$120,000	
*Install new kiosks and signs at access points and maintain signs	$261,000	$2,700
*Seasonal nesting closure signs (Lake Lowell and Snake River Islands Units)	$11,000	$5,200
*Maintain new trails and blinds		$4,000
Covered learning facilities	$135,600	
*Construct and maintain visitor contact station	$480,000	$1,600
*Install and maintain comfort stations and vault toilet at Lower Dam Recreation Area (LDRA) and Parking Lot 1	$208,200	$3,000
*Create LDRA site plan	$40,000	
*Rehabilitate LDRA parking area	$50,000	
*Print/reprint general Refuge brochures	$3,200	$5,200
Update/rehabilitate Visitor Center	$425,000	
Structural evaluation of Visitor Center	$25,000	
*Nature play area	$40,000	
*Volunteer coordinator		$51,000
Environmental education specialist		$51,000
*Law enforcement officer		$62,400
Total	**$2,306,200**	**$196,300**

* Costs marked with an asterisk (*) represent costs that are also entered into other CDs for activities using the same resource. For example, rehabilitating the LDRA will benefit wildlife-dependent visitors, and picnickers, swimmers, and other visitors. This same cost has been shown in all CDs that may use the LDRA.

Anticipated Impacts of Uses

A primary concern for allowing any public use on Deer Flat NWR is to ensure that impacts to wildlife and habitat are maintained within acceptable limits and potential conflicts between user groups are minimized. The following discussion analyzes the impacts of the uses.

General Impacts to Wildlife

After a review of 536 references, Boyle and Sampson (1985) concluded that nonconsumptive outdoor recreation activities often have negative impacts to wildlife and their habitat. Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment, altered nest placement, and change in food habits to physiological changes such as elevated heart rates and increased energetic costs due to flight or flushing, or even death (Belanger and Bedard 1990; Kight and Swaddle 2007; Knight and Cole 1995a; Miller and Hobbs 2000; Miller et al. 1998; Morton et al. 1989; Smith-Castro and Rodewald 2010). The long-term effects are more difficult to assess but may include altered behavior, vigor, productivity, or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interactions.

Human activities along trails disturb wildlife, often resulting in flushing from roosting, feeding, nesting, or resting areas. Flushing may result in expenditure of energy reserves, abandonment of preferred habitat, and increased exposure to predation during relocation. Wildlife photographers tend to have significant disturbance impacts because they may remain close to wildlife for prolonged periods (Klein 1993). Casual photographers with low-power lenses may approach wildlife closer than other users. Cole (2004) suggests the following factors as most important in determining recreation impacts: amount of use, type and behavior of use, timing of use, resistance and resilience of the environment, and spatial distribution of use. Specialized wildlife viewers, particularly birders, seek out specific and often rare species. Because these activities may occur during sensitive times of the year (e.g., nesting), and because they often involve close approaches to wildlife for purposes of identification or photography, there is a potential for negative effects (Knight and Cole 1995b).

According to Knight and Cole (1991), there are three wildlife responses to human disturbance: avoidance, habituation, and attraction. The magnitude of the avoidance response may depend on a number of factors including the type, distance, movement pattern, speed, and duration of the disturbance; the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernández-Juricic et al. 2007; Gabrielsen and Smith 1995; Knight and Cole 1991).

Habituation is defined as a form of learning in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife will respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will habituate to and accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct (and repeated) path.

Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance. Burger (1999 as cited by Oberbillig 2000) suggests that viewing distances can serve as useful guides for managers lacking good site-specific

information and serve as a starting point in determining what is appropriate elsewhere. Some factors that affect viewing distances include the numbers of viewers, the time of day, and noise level. When exposing nonbreeding waterbirds to four types of human disturbances (walking, all-terrain vehicle, automobile, and boat), Rodgers and Smith (1997) concluded that a buffer zone of 330 feet will minimize flushing of foraging or loafing waterbirds. Vos et al. (1985) recommended buffer zones of 820 feet on land and 490 feet over water for great blue herons. Miller et al. (1998) found that the trail zone of influence for forest and grassland birds appears to be approximately 250 feet. Beyond this distance, bird abundance, species composition, and nest predation was not affected by even heavily used recreational trails.

Refuge-specific Impacts

Refuge visitation that has an emphasis on wildlife observation, photography, education, and interpretation are projected to increase in the CCP, therefore, disturbance effects are likely to be somewhat higher than present. However, it is anticipated that the design of Refuge facilities and the stipulations associated with these uses will be sufficient to mitigate the impacts.

People who visit Deer Flat NWR and engage in wildlife observation, photography, environmental education and/or interpretation typically access the Refuge by motorized vehicles using the surrounding public roads and Refuge parking lots. Because of the close proximity to houses and an urban setting, some visitors can easily access the Refuge by walking or biking from their place of residence.

Once on the Refuge, visitors have access to a variety of multiuse trails on which to participate in these nonconsumptive wildlife uses. Foot travel can create disturbance in or near any habitat and result in vegetation trampling as noted above. The current and planned trails system has been designed to minimize disturbance to wildlife and habitat and the stipulations presented below are intended to further mitigate any potential impacts stemming from these uses. Restricting the disturbance to an established trail during the nesting season will increase predictability of public use patterns on the Refuge, allowing nesting wildlife to habituate to nonthreatening activities. Providing seasonal closures around sensitive wildlife areas will reduce impacts to wildlife while providing recreational opportunities in these areas when the wildlife is less vulnerable.

Under the CCP, two photography/wildlife observation blinds and associated access trails will be built, one in the Upper Dam Marsh area and the other near the New York Canal. The construction of these blinds may cause a temporary, short-term impact on wildlife species in the immediate area. Minimal long-term effects are expected to occur as a result of construction. Increased use of the blind areas is expected to occur adding to the likelihood of disturbance but should be compensated for by the creation of predictable and concentrated visitation. Educational materials that inform visitors of ethical use could reduce impacts and careful placement and camouflaging of blinds will reduce disturbance from this user group.

Most of Deer Flat NWR's education and interpretation programs are large, organized special events that differ from informal day-to-day observation and interpretive activities in that they take place at the existing Visitor Center. These programs have the can overfill parking facilities to the point where parking lots fill and off-site parking and shuttle service is necessary to avoid safety issues. The disturbance associated with these programs are restricted to the area surrounding the Visitor Center and are kept in check by Refuge staff or volunteer leaders who are vigilant about minimizing undue disturbances.

Although disturbance to wildlife from these activities will be higher than at present, the overall effect to Refuge wildlife is expected to be minor. In addition, if disturbance to wildlife or damage to habitat reaches unacceptable levels, the Refuge will limit access to areas where unacceptable impacts occur (see Stipulations section).

Impacts to Listed Species

There are no listed species known to occur on the Refuge. The counties that surround both units of the Refuge have a variety of listed species historically or currently occurring within each county. Of these species only the yellow-billed cuckoo has ever been documented on Deer Flat NWR, and it is currently considered a vagrant because sightings are highly unusual. The Columbia spotted frog could conceivably exist on the Refuge but has not been documented. The condition of habitat for both of these species is either unknown or marginal. The likelihood of any other of the listed species that occur in the surrounding counties existing on the Refuge is slim. Most of these other species have known populations that occur off-Refuge (e.g., Bruneau hot springs snail, Packard's milkvetch) or roam great distances and/or will not find suitable habitat on the Refuge (e.g., North American wolverine, greater sage-grouse). It is anticipated that impacts from nonconsumptive, wildlife-dependent recreation will be negligible. If any use results in unacceptable adverse effects to candidate species or habitats, the Refuge will impose restrictions to mitigate disturbance.

Impact to Habitat

Miller et al. (1998) showed that bird species composition was altered near trails in both forested and grassland ecosystems. Unpaved or unsurfaced trails are susceptible to a variety of trail impacts including vegetation loss and compositional changes to soil structure including compaction and erosion (Adkison and Jackson 1996; Dale and Weaver 1974; Leung and Marion 2000). Trail widening and creation of side trails (social trails) increase the area of disturbed land (Liddle 1975). Impacts that are commonly noted on trails like vegetation damage and soil erosion are unlikely to occur on the well-defined, gravel surface of the East Dike, Kingfisher, Gotts Point, Observation Hill, and Nature Trails or the concrete surface of the Centennial Trail. Allowing off-trail use may cause trampling of plants and disturbance of wildlife. Even though this user group will be required to remain on designated trails during sensitive seasons, some users may disturb wildlife by wandering off to access the lakeshore or a scenic vista or in pursuit of observational/photographic quarry.

Control of invasive plant species on the Refuge is a difficult and never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Benninger-Truax et al. 1992; Hansen and Clevenger 2005). Refuge visitors can inadvertently carry propagules from invasive plants on clothing or equipment, spreading those plants to new areas. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. Invasive plants on or near these trails will be controlled and monitored as part of the Refuge's IPM Plan (Appendix G).

Providing and maintaining access points and trails indirectly impacts wildlife by creating barriers to movement through vegetation removal and abrupt edge creation, which may lead to increased predation (Ratti and Reese 1988).

Determination

_____ Use is Not Compatible
___X___ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

- Changes to boating regulations and facilities are described in the Recreational Boating Compatibility Determination.
- To minimize disturbance to wildlife during the nesting season, pedestrian travel will be restricted to designated trails from February 1 through July 31 in the North Side and South Side Recreation Areas and at Murphy's Neck. During these months, lakeshore access is restricted to 100 meters on either side of trails accessing the lakeshore. Off-trail travel will be allowed August 1 through January 31.
- In the East Side Recreation Area, off-trail travel will be allowed all year because it is a less biologically sensitive area.
- In the Gotts Point area, off-trail travel will be allowed February 1 through September 30.
- Cross-country skiing access will be allowed only on land. Skiing on ice will be prohibited.
- Walking on ice for wildlife observation, photography, interpretation, and environmental education opportunities will be prohibited. Ice access will be allowed only to access ice-fishing opportunities in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by Reclamation.
- Lower Dam Recreation Area is open from April 15 through September 30.
- On the Snake River Islands Unit, off-trail travel will be allowed from June 15 through January 31 on goose-nesting islands and from July 1 through January 31 on heron- and gull-nesting islands.
- Recreational access to closed areas will be allowed only under provisions of an SUP with stipulations set by the Refuge manager.
- Use will be restricted to daylight hours only.
- Open fires will be prohibited.
- Pedestrians should yield right of way to equestrians.
- Collection of plants and animals will be prohibited unless an SUP is obtained from the Refuge (except fish captured while engaged in recreational fishing).
- The Refuge will require an SUP for wildlife-dependent groups of over 20 people to avoid conflicts with other users and management activities.
- Seasonal closures will be implemented as necessary to protect sensitive wildlife habitat. For example:
    - Up to 300-yard buffer around eagle nests from February 15 through July 15.
    - Up to 150-yard seasonal closure around osprey nests from March 15 through August 1.
    - Up to 500-yard closure around grebe colonies (Berg et al. 2004) until July 15 of the following year. If the birds have not renested in the closed area by July 15 of the following year, the closure will be removed. Upland portions of the closures will be open to use from October 1 through January 31.
        - To determine grebe colony boundaries, the staff biologist will mark nests in and especially on the periphery of a colony using a GPS unit capable of sub-meter accuracy as part of the regular colony studies. These data points will be

exported to a georeferenced mapping system, and a 500-yard buffer will be drawn around the colony. Buoy locations will then be mapped every 100– 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure will be based on nests established early in the nesting season. In the second year of grebe nesting, closure will be based on the full extent of the colony in the first year.

  - Up to 250-yard buffer around heron rookeries from February 1 through July 1.
  - Up to 100-yard closure around shorebird feeding and resting areas from July 15 through September 30 during years when the lake level elevation is lower than 2,522 feet.
  - Wildlife closure at Gotts Point from October 1 through January 31.
  - Wildlife closure at Murphy's Neck from October 1 through March 15.
  - Wildlife closure at Lower Dam Recreation Area from October 1 through April 14.
- Refuge staff will monitor impacts of these activities annually to assess compliance with these stipulations, impacts to wildlife and wildlife habitat, conflicts between user groups, and user satisfaction. Monitoring data will be used to modify these stipulations if necessary to ensure continued compatibility of these activities.

Justification

Wildlife photography, observation, interpretation, and environmental education, when compatible, are wildlife-dependent recreational activities considered priority public uses for the NWRS. Although these activities can result in disturbance to wildlife, disturbance will be intermittent and short-term when activities are conducted according to the stipulations described above. It is anticipated that wildlife populations will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably reduced from allowing these activities to occur. The relatively limited number of individual animals and plants expected to be adversely affected will not cause wildlife populations to materially decline, the physiological condition and production of Refuge species will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall welfare will not be negatively impacted. Thus, allowing wildlife photography, observation, interpretation and environmental education to occur under the stipulations described above will not materially detract or interfere with the purposes for which the Refuge was established or the mission of the NWRS.

Mandatory Reevaluation Date

__2030__ Mandatory 15-year Reevaluation (for priority public uses)

NEPA Compliance for Refuge Use Decision

__X__ Environmental Impact Statement and Record of Decision

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Compatibility Determination for Wildlife Observation, Photography, Interpretation, and Environmental Education (B.12)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: Acting _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: _____ (Signature) 4/1/15 (Date)

B.13 Compatibility Determination for Mosquito Management

RMIS Database Use: Mosquito management

Refuge Name: Deer Flat National Wildlife Refuge

Location: Canyon, Owyhee, Payette and Washington counties in Idaho, and Malheur County in Oregon

Date Established: 1909

Establishing and Acquisition Authorities

Deer Flat National Wildlife Refuge was originally established in 1909 by President Theodore Roosevelt as Deer Flat Bird Reservation as a "preserve and breeding grounds for native birds" (E.O. 1032). In 1937, President Franklin D. Roosevelt revoked Executive Order 1032 and reestablished the Refuge as the Deer Flat Bird Reservation to "further the purposes of the Migratory Bird Conservation Act" and, "as a refuge and breeding ground for migratory birds and other wildlife" (E.O. 7655) . Also in 1937, 36 islands in the Snake River were designated as the Snake River Migratory Bird Refuge (E.O. 7691).

In 1940, the Refuge names were changed by Presidential Proclamation No. 2416, to Deer Flat National Wildlife Refuge and Snake River National Wildlife Refuge respectively. In 1963, Public Land Order 3110 transferred all lands of the Snake River National Wildlife Refuge (consisting of 74 islands) to the direct jurisdiction of Deer Flat National Wildlife Refuge. Any lands (including those in the Snake River Islands National Wildlife Refuge) that were added to Deer Flat National Wildlife Refuge assume the purposes for which Deer Flat National Wildlife Refuge was established as well as keeping any individual purposes that were provided at the time of their establishment or acquisition.

Refuge Purposes

"…to further the purposes of the Migratory Bird Conservation Act" and as a refuge and breeding grounds for migratory birds and other wildlife…" E. O. 7655

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-1 and "... the Secretary...may accept and use...real...property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors..." 16 U.S.C. §§ 460k-2 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

National Wildlife Refuge System Mission

The mission of the Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant

resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C. 668dd-668ee]).

Description of Use

This use is not a priority public use as defined by the National Wildlife Refuge System Improvement Act. Mosquito monitoring and treatment on the Lake Lowell Unit of the Refuge will be conducted by the Canyon County Mosquito Abatement District (CCMAD). The mosquito species documented to be breeding on, or residing on the Refuge, and targeted for monitoring and treatment, are *Culex inornata, Culex pipiens, Culex tarsalis, Culex ervthrothorax, Ochlerotatus nigromaculus, Aedes vexans,* and *Anopheles freebornii*.

The Refuge will allow the CCMAD to continue access to the Refuge for monitoring and controlling mosquitoes to address human health concerns in neighboring communities wherever it does not directly conflict with resource protection needs. The Lake Lowell sector of the Refuge is located in Canyon County near the communities of Nampa and Caldwell, Idaho. CCMAD has been managing the mosquito population around the Lake Lowell Sector of the Refuge since 1998. The presence of Western Equine Encephalitis (WEE) was detected in cattle on ranch property that borders the south boundary of the Refuge in 1999. Active arbovirus surveillance in the adult mosquito population was initiated in 2000. In 2006 there was a West Nile Virus outbreak in Idaho. The Lake Lowell Unit accounted for 40% of the positive West Nile pools detected and tested in Canyon County during the 2006 epidemic. In 2010 and again in 2011 there was no disease activity noted in the mosquito population on the Refuge.

CCMAD utilizes Integrated Pest Management principles in controlling mosquito population levels on Deer Flat National Wildlife Refuge and only uses *Bacillus thuringiensis israelensis* (Bti) within Refuge boundaries. CCMAD bases all its mosquito abatement decisions on a comprehensive inspection and surveillance program. Both the larval and adult populations are monitored daily during the mosquito production season. Treatments to the mosquito larvae population are made when dip counts of *Culex tarsalis* reach five mosquito larvae per dip/10 dips. Only those areas where monitoring has shown that larval mosquito populations have reached or exceeded predetermined species-specific thresholds will be targeted for treatment.

Mosquito Monitoring

To determine pesticide use on the Refuge, larval surveillance is first conducted. Larval surveillance locations are throughout the Refuge in both open areas and areas closed to the public. Thresholds are determined by standard mosquito dipping techniques done in open water, along banks, under vegetation, in flooded areas, in standing water pools that are shallow, in catch basins, and on shoreline habitat.

A two-person inspection team is assigned to the Refuge to monitor mosquito population densities. Inspections are conducted on a daily basis starting in late March or early April, depending on springtime weather conditions. CCMAD monitors larval stage mosquito populations and identifies species using the dipper method, which entails use of a long-handled ladle dipper to collect water samples from pools potentially serving as mosquito sources. Dipping occurs about every 1-2 weeks, wherever there are pools of standing water. Dip counts are used to estimate the numbers of immature mosquitoes and to determine the need for mosquito control.

The monitoring activities described above are conducted under an annual SUP granted by the Service to CCMAD. The Refuge proposes to allow the CCMAD to continue these activities under special conditions set forth in the annual SUP. Post treatment monitoring to determine efficacy of control is conducted in the same way; using dip method for larval counts and mosquito light traps for adults, but more frequently and at and around the specific treatment sites.

Density determinations for *Culex* species (primary disease vectors):
Low: 1-4 larvae per dip.
Medium: 5-10 larvae per dip.
High: > than 10 larvae per dip.

The larvae density action level can be used to determine how much, if any, larval control product is to be used. The following is the Action Level Threshold used by CCMAD on the Refuge:

Low population density: No action taken.
Medium population density: Use 5-7 lbs. per acre of Bti.
High population density: Use 7-10 lbs. per acre of Bti.

Mosquito Control

Currently the only biological control agents used on the Refuge are *Bacillus thuringiensis israelensis* and *B. sphaericus*. Bti/Bs agents used:

- VectoMax FG. EPA reg. no 73049-429
- Vectobac GR. EPA Reg. No. 73049-486
- Teknar CG. EPA Reg. No. 73049-19
- Aquabac G. EPA Reg. No. 62637-3

1. Bti liquid products are applied by backpack sprayer or hydraulic power spray equipment if large areas are treated.

2. Before aerial applications are conducted, CCMAD will notify the Refuge manager with action threshold data and a mapped location of proposed aerial application.

3. Treatment site will be posted 24 hours before aerial application is made, with the following information, and, when feasible, applications will be scheduled at sunrise.

- Date and approximate time of application.
- Pesticide used.
- Contact telephone number of CCMAD for any questions.
- Method of application (example): Low-flying aircraft dropping granular product.

Mosquito Treatment (Larvicides/Pupacides)

There are currently five general categories of larvicides/pupacides used for mosquito control in the United States: biological, organophosphate, insect growth regulator, oil, and monomolecular film. Temephos is an organophosphate insecticide with broad-spectrum activity and high toxicity toward birds and fish, and will therefore not be considered further. Methoprene and diflubenzuron are insect growth regulators. Methoprene poses reduced ecological risk and equivalent efficacy compared to diflubenzuron. Therefore, diflubenzuron will not be considered further. GB 1111 is a petroleum distillate, categorized as an oil. Monomolecular films are an isostearyl alcohol compound.

Larvicides (Bti). Bti is a microbial insect pathogen used to control larval stages of mosquitoes and black flies. It is a naturally occurring, anaerobic, spore-forming bacteria, mass produced using modern fermentation technology. Formulated Bti products contain bacterial spores and protein endotoxins that are activated in the alkaline mid-gut of insect species and subsequently bind to protein-specific receptors of susceptible insect species, resulting in the lethal response (Lacey and Mulla 1990). Therefore, Bti must be ingested by the target insect to be effective; mosquito pupa and adults are not affected. Bti is available in granular and liquid formulations. The granular formulations are applied at rates of 5-20 pounds of formulated product per acre. The liquid formulations are applied at rates of 0.25-2.0 pints of formulated product per acre.

Larvicides (Bsp). Like Bti, Bsp is a microbial insect pathogen with a similar mode of action (Walton et al. 1998). Formulated Bsp products used as mosquito larvicides consist of bacterial spores and protein endotoxins. Bsp is available in two granular formulations, Vectolex CG and Vectolex WDG. Vectolex CG is applied at rates of 5-20 pounds of formulated product per acre. Vectolex WDG is applied at rates of 0.5-1.5 pounds of formulated product per acre. Both Bti and Bsp may be applied as a spot treatment to small areas or broadcast over larger areas by ground (e.g., backpack, truck mounted broadcasters) and/or aerial (fixed-wing or helicopter) equipment.

Description of Use

The Refuge will allow the CCMAD to continue access to the Refuge for monitoring and controlling mosquitoes to address human health concerns in neighboring communities wherever it does not directly conflict with resource protection needs. The Lake Lowell sector of the Refuge is located in Canyon County near the communities of Nampa and Caldwell. The Canyon County Mosquito Abatement District has been managing the mosquito population around the Lake Lowell Sector of the Refuge since 1998.

Availability of Resources

Refuge staff responsibilities for projects by non-Service entities will primarily be limited to the following: review of proposals, preparation of SUPs, and monitoring of projects to ensure that impacts and conflicts remain within acceptable levels. Administrative, logistical, and operational support may be provided within the station's general operating budget.

Anticipated Impacts of the Use

Specific areas treated as well as the aerial extent of treatment will vary from year to year, depending on mosquito populations and environmental conditions. Although most disturbances will be confined to the targeted wetland, some disturbance related to accessing the monitoring and treatment sites is expected to occur in upland and riparian areas. A primary concern for allowing any use to occur on Deer Flat NWR is to ensure that impacts to wildlife and habitat are maintained within acceptable limits, and potential conflicts between user groups are minimized. The discussion below analyzes impacts of the use as it is described in the CCP.

Researchers and scientists are not exempt from the negative impacts that human presence has on wildlife and wildlife habitat. Even death of animals due to the use of lethal collection methods as well as accidental death and injury from trapping, handling, and other invasive procedures (pit-tagging, force feeding, and blood collection) can occur. During duck banding efforts, it is not uncommon for the rocket nets to kill a few (>5) ducks when deployed. In an extreme example, a

study conducted in Utah looking at pronghorn fawn mortality noted that 20% of the fawns died due to abandonment as a result of researcher handling (Beale and Smith 1973). Some level of disturbance is expected with the monitoring and treatment of mosquitos on the Refuge because some of these activities will be conducted in areas that are normally closed to the public. These impacts to Refuge wildlife and habitats will be minimized because SUPs will include conditions to ensure that impacts to wildlife and habitats are kept to a minimum.

The mere presence of humans can cause disturbance to wildlife. The magnitude of the avoidance response may depend on a number of factors, including the type, distance, movement pattern, speed, and duration of the disturbance as well as the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Fernandez-Juricic 2007; Gabrielsen and Smith 1995; Knight and Cole 1991). Knight and Cole (1991) suggest that sound may elicit a much milder response from wildlife if animals are visually buffered from the disturbance.

Habituation is defined as a form of learning, in which individuals stop responding to stimuli that carry no reinforcing consequences for the individuals that are exposed to them (Alcock 1993). A key factor for predicting how wildlife will respond to disturbance is predictability. Often, when a use is predictable—following a trail or boardwalk or at a viewing deck—wildlife will accept human presence (Oberbillig 2000). Gabrielsen and Smith (1995) suggest that most animals seem to have a greater defense response to humans moving unpredictably in the terrain than to humans following a distinct path.

Some effects will occur through disturbance that is expected with some activities, especially where researchers are entering sanctuaries or sensitive island habitat with colonial nesting birds. Disturbance to breeding, resting, and feeding wildlife and their habitats may occur through frequent contact with technicians performing monitoring activities. Results of disturbance could include the abandonment of nests as a result of frequent visitation to nest or breeding sites. Staff (and contracted professionals) conducting research also have the propensity to disturb wildlife with equipment used in current and future inventory and monitoring surveys. Grebes are particularly vulnerable to boats, which are used extensively when studying them. Trucks and high-powered spotlights may disrupt and confuse nocturnal feeding deer as well as foraging owls during spotlight surveys. Low-flying aircraft toting FLIR surveying equipment may also cause a disturbance to Refuge wildlife.

Control of invasive plant species on the Deer Flat NWR is a difficult and never-ending battle. Roads and trails often function as conduits for movement of plant species, including nonnative, invasive species (Hansen and Clevenger 2005). Invasive plants on or near these trails will be controlled as part of the Refuge's noxious-weed abatement program. Monitoring of invasive species will also be a part of this plan, reducing the potential for invasive species to become newly established on the trail. Introduction of invasive plants is possible from ground disturbance associated with the transportation of source seed on equipment and personnel.

Most negative impacts associated with mosquito abatement at this station will be offset by the positive effects of a strong and viable mosquito control program. Health and human safety both on the Refuge and in the surrounding community are a necessary part of this plan. The mosquito abatement program is an important tool in maintaining environmental health as well as for ensuring the quality of wildlife-dependent recreation opportunities.

Determination

___ Use is Not Compatible
_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility

Mosquito monitoring and abatement activities have the potential to disturb wildlife as well as the habitat upon which they rely. To minimize impacts to the greatest extent possible, the following stipulations will be put in place to ensure compatibility:

- The minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, and vertebrates) will be collected for any project.
- Mosquito abatement will be conducted under an SUP that will have additional project-specific stipulations. All SUPs will have a definite termination date in accordance with 5 RM 17.11. Renewals will be subject to Refuge manager review of research data, status reports, compatibility determination compliance, SUP stipulations, and other permits.
- All chemicals used for mosquito abatement activities must be presented as part of the annual SUP and approved by USFWS personnel prior to use.
- CCMAD are responsible for acquiring and/or renewing any necessary state and federal permits prior to beginning or continuing their project.
- A Section 7 consultation under the ESA is required for activities that may affect a federally threatened, endangered, or proposed species.
- If monitoring or spraying can only be conducted during a sensitive or critical time (i.e., the breeding season), it will only be permitted where there are specific protocols to minimize disturbance.
- If unacceptable impacts or issues arise or are noted by Refuge staff, the Refuge manager can suspend/modify conditions/terminate on-Refuge activities that are already permitted and in progress.
- Status updates and situation reports are required at least annually, and final reports are due within one year of the completion of the seasonal abatement efforts, unless negotiated otherwise.
- At any time, Refuge staff may accompany the mosquito abatement technicians.
- Highly intrusive or manipulative activities are generally not permitted in order to protect wildlife populations and habitat.
- Mosquito abatement or monitoring activities in sensitive areas may be denied, depending on the specific circumstances.
- All Refuge rules and regulations (CFR 50) must be followed unless otherwise accepted in writing by Refuge management.

- Extremely sensitive wildlife habitat areas will be avoided unless sufficient protection is implemented to limit the area and/or wildlife potentially impacted by activities.

- Research activities will be modified to avoid harm to sensitive wildlife and habitat when unforeseen impacts arise, such as a wildfire altering landscape conditions or large declines in a population.

- All samples and specimens collected from the Refuge are Refuge property. Service personnel shall be provided access to the samples and specimens at any time at no cost (unless arrangements are made to the contrary).

- The Refuge biologist will review all research proposals and identify any conditions of the research permits that eliminate or minimize negative impacts to any one area, species, or habitat of the Refuge. The Refuge biologist will make a recommendation to the Refuge manager on whether the research should occur based on weighing the benefits and impacts.

- Research requiring the collection of animals will only be authorized after careful consideration by the Refuge biologist and Refuge manager as to the importance of Refuge populations to the conservation of the species, the possible adverse impacts to the Refuge populations, and the humaneness of the collection methodology.

- Refuge staff will monitor mosquito abatement projects to ensure that on-going research is not causing long term habitat damage or impacting any animal populations.

Justification

Mosquito inventory/monitoring and abatement efforts on refuge lands are inherently valuable to the Service because they will expand scientific and environmental health information available for resource management decisions. By allowing the use to occur under the stipulations described above, it is anticipated that wildlife species that could be disturbed during the use will find sufficient food resources and resting places outside of disturbed areas, so their abundance and use will not be measurably lessened on the Refuge.

Refuge monitoring and research can contribute to improved management of fish, wildlife, plants and their habitats, visitor services programs, and cultural resources through the application of knowledge gained. Biological integrity, diversity, and environmental health will benefit from scientific research conducted on natural resources at the Refuge as provided in the 1997 Improvement Act. It is anticipated that monitoring of research projects, as needed, will prevent unacceptable or irreversible impacts to wildlife and their habitats, and therefore these projects will not materially interfere with or detract from fulfilling Refuge purposes; contributing to the mission of the Refuge System; and maintaining the biological integrity, diversity, and environmental health of the Refuge or the NWRS.

The Refuge manager and biologist will ensure that monitoring and research investigations will contribute to the enhancement, protection, conservation, and management of native wildlife populations and their habitats on the Refuge, thereby helping the refuges fulfill the purposes for which they were established, as well contributing to the mission of the Refuge System.

Mandatory Reevaluation Date

_X_ Mandatory 10-year Reevaluation (for all uses other than priority public uses)

NEPA Compliance for Refuge Use Decision

_X_ Environmental Impact Statement and Record of Decision

References

Alcock, J. 1993. Animal behavior: an evolutionary approach. Fifth ed. Sinauer Assoc., Sunderland, MA. 625pp.

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Knight, R. L. and D. N. Cole. 1991. Effects of recreational activity on wildlife in wildlands *in* Transactions of the North American Wildlife and Natural Resources Conference. 56:238-247.

Oberbillig, D.R. 2000. Providing positive wildlife viewing experiences. Deborah Richie Communications, Missoula, MT.

Compatibility Determination for Mosquito Management (B.13)

Use is compatible with stipulations.

Project Leader Approval: _____ (Signature) 4/1/15 (Date)

Concurrence:

Refuge Supervisor: _____ (Signature) 4/1/15 (Date)

Regional Chief, National Wildlife Refuge System: _____ (Signature) 4/1/15 (Date)

Appendix C. Implementation

C.1 Overview

Implementation of the comprehensive conservation plan (CCP) will require increased funding for some projects, which will be sought from a variety of sources. This plan will depend on additional Congressional allocations, partnerships, and grants. There are no guarantees that additional Federal funds will be made available to implement any of these projects. Other sources of funds will need to be obtained (both public and private). Activities and projects identified will be implemented as funds become available.

Many of the infrastructure and facility projects (i.e., Refuge roads) will be eligible for funding through construction or Federal Lands Highway Program funds.

The CCP proposes several projects to be implemented over the next 15 years. All of these projects will be included in Service databases that are used to request funding from Congress. Currently, a large backlog of maintenance needs exists on Deer Flat National Wildlife Refuge (Deer Flat NWR or the Refuge). An attempt at reducing this backlog needs to be made and is included here in the analysis of funding needs.

Annual revenue sharing payments will continue to Canyon, Payette, Owyhee, and Washington Counties in Idaho, and Malheur County in Oregon. At this time, no expansions are planned through the purchase of inholdings or through an expanded Refuge boundary.

Monitoring activities will be conducted on a percentage of all new and existing projects and activities to document wildlife populations and changes across time, habitat conditions, and responses to management practices. Actual monitoring and evaluation procedures will be detailed in step-down management plans.

C.2 Costs to Implement CCP

The following sections detail both one-time and recurring costs for various projects. One-time costs reflect the initial costs associated with a project, such as the purchase of equipment, contracting services, construction, and the like. Recurring costs reflect the future operational and maintenance costs associated with the project. Costs have been summarized by their association with either public use programs, or wildlife and habitat management. All costs were calculated in 2011.

C.2.1 One-time and Recurring Costs for Current and Future Management

Some projects, programs, and maintenance will occur under current and future management. These costs are already covered by the current Refuge budget and are included in the tables below. The current funding that is received by the Refuge was used as a baseline to start from for future management. Some of the programs and projects paid for by this funding are listed below.

The 2011 budget for nonstaff costs was approximately $204,700. Examples of projects, programs, and maintenance that are covered by this budget include the following:

- Current maintenance of existing trails
- Current maintenance of existing observation facilities
- Current maintenance of existing buildings
- Permitting for bass tournaments
- Current hunting programs on Lake Lowell and Snake River Islands Units (including youth waterfowl hunt)
- Maintenance of existing signage
- Maintenance of the Lower Dam Recreation Area (if Canyon County partnership continues)
- Winter wildlife closures of Gotts Point, Lake Lowell, and the Lower Dam Recreation Area.
- Current wildlife and administrative closures on the southeast end, the northwest end, and around the shop complex
- Seasonal closures around current eagle and osprey nests
- Partnership with Idaho Department of Fish and Game for carp removal
- Invasive species control at current acreage
- One volunteer recognition event per year
- Current volunteer projects
- Current events
- Utilities for existing facilities

Some programs, projects, and maintenance that are currently paid for by the operational budget of the Refuge will be reduced to increase alternative programs without an increase in cost.

Environmental Education versus Interpretation. For future management, on-site interpretive programs will be emphasized over traditional environmental education (EE) programs. These interpretive programs could include guided walks, on-water kayak/canoe trips, and guided walks at night or into closed areas. In these programs, Refuge staff and volunteers will aim to interact with visitors at high-use access points to increase awareness of the Refuge and its wildlife and habitats. In order to provide an increase in interpretive programs, the EE program (especially from April 15 through September 30) will need to be reduced. Scout Days, day camps, off-site programs, and the on-site Discover Wildlife Journeys program may be reduced or restructured in order to allow enough staff and volunteer time to provide for increased on-site interpretation. By shifting focus from EE to interpretation, no extra cost is anticipated for the increase in interpretive programs.

The following descriptions summarize the costs that will be required for future management per area above and beyond the current base operations budget.

C.2.2 New One-time Costs Related to Public Use

One-time costs are project costs that have a startup cost associated with them, such as purchasing a new vehicle for wildlife and habitat monitoring or designing and installing an interpretive sign. Some are full project costs for those projects that can be completed in three years or less. One-time costs can include the cost of temporary or term salary associated with a short-term project. Salary for new positions and operational costs are reflected in operational or recurring costs. Funds for one-time costs will be sought through increases in Refuge base funding, special project funds, grants, and the like. The majority of new one-time costs are associated with the upgrade and enhancement of facilities, signage, and programs for the visiting public.

Boardwalk. A trail on the south side of the Refuge was suggested by several members of the public during the scoping phase of the CCP's development. Any ground-level trail will be inundated by irrigation water for much of the winter, spring, and fall, which will cause major maintenance issues and likely result in the trail being unavailable to Refuge visitors. Because of these issues, any trail in the riparian zone on the south side of the Refuge will need to be elevated. Cost projections were made based on engineering cost estimates and previously constructed boardwalks. Due to the projected cost for the 2-mile boardwalk between Parking Lots 1 and 3, it was not proposed for future management. Instead, a trail will be evaluated to determine if a lower cost option is available.

New Trails and Signage. Because current management takes into account public use at its current trajectory, some trail upgrades will need to occur. There are currently no trailheads or maps designating trails. This has led to confusion over the distinction between trails and firebreaks. Visitors currently use a firebreak by the Refuge entrance as a trail, but other firebreaks were not meant to be used as trails. In order to eliminate this confusion, the firebreak that stretches from the entrance parking area to the observation blind will be turned into a trail even under current management. Signage will also be upgraded to ensure that users know when they are on a designated trail and what regulations exist. Because of the multiple-use nature of all trails for current management, signs will also be needed to address right-of-way and expected behavior for different types of uses. Although no new alterations will be made to increase access for nonwildlife-dependent users, alterations to the current horse walk-through will need to be made to ensure the safety of riders. Confusion about on- and off-trail uses has existed for many years. Although the last compatibility determination requires on-trail travel, most visitors are unaware of this regulation. Costs associated with a varying number of regulatory signage for trail use are also needed . Costs for both interpretive and regulation signs have been accounted for.

Changes to public use within the hunt areas, as well as a current need to improve safety along the Lake Lowell Unit boundary, will also require new signs in the hunt area. These signs will remind hunters not to fire over or toward the Refuge boundary, and remind hunters and other users to be aware of each other.

In an attempt to address scoping comments that took issue with pet feces on the trails, the Refuge will require visitors walking pets to pick up their pet's feces for future management. Given the current trajectory of use by visitors with pets, and the complaints that the Refuge has already received, the Refuge will supply feces removal bags under current management and future management. Because pets are allowed in more areas under current management, more bag dispensers will be needed. An overview of the costs for new trails and signage is in Table C-1.

Table C-1. New One-time Costs for New Trails and Signage ($ in thousands)

New Trails	Miles of Trail	Cost	Priority
Ground-level trails	4.5	$397	M
Signs for trails and boardwalk		$29	H
Alterations to allow dogs and horses		$1	H
Hunting area signs		$1	H
Multiuse trail signs		$8	H
Total Cost for Trails and Signs		**$436**	

Dock and Blinds. In order to provide additional opportunities for fishing, wildlife observation, and photography, new docks and blinds will be installed at the Refuge for future management. During the scoping period, commenters requested additional access to the shoreline for these types of activities. Because the Refuge currently does not offer waterfowl hunting opportunities that are accessible to

people with physical disabilities, an ADA-accessible hunting blind will be installed. An overview of the number of docks and blinds, as well as the associated costs for current and future management, can be found in Table C-2.

Table C-2. New One-time Costs for New Docks and Blinds ($ in thousands)

New Docks and Blinds	Quantity	Cost	Priority
Docks	2	$45	M
Blinds and signage	2	$123	L
Accessible hunting dock	1	$25	H
Total for Docks and Blinds		**$193**	

Kiosks. Many visitors to Lake Lowell do not know that they are visiting a national wildlife refuge. In an attempt to address this concern, the Refuge will install kiosks at high-use areas of the Lake Lowell Unit and add one additional kiosk at a boat ramp along the Snake River. Both kiosk construction and interpretive signage were accounted for in the cost analysis (see Table C-3).

Table C-3. New One-time Costs for New Kiosks and Associated Signage ($ in thousands)

New Kiosks	Quantity	Cost	Priority
Kiosks for access points at Lake Lowell and Snake River Islands Units	5	$207	M
Signs for new kiosks	42	$55	M
Total for Kiosks		**$262**	

Environmental Education (EE) and Interpretation Facilities. The Refuge currently uses the Environmental Education Building at the Lower Dam Recreation Area to provide opportunities for self-service environmental education activities for groups. Scout groups are the most frequent users of this facility. During a recent facilities condition assessment, regional Service staff identified cracking in the exterior walls of both the Visitor Center and the Environmental Education Building. Regional staff suggested that the Environmental Education Building be tested for structural soundness and updated as needed. For future management, this building will be removed or renovated to create a visitor contact station to support the increased interpretive programs at the Lower Dam Recreation Area. Therefore, an estimated cost for testing and rehabilitation of the Environmental Education Building is included for current management.

Comments during the scoping process identified the lack of visitor knowledge of the Refuge. In order to address this issue, a small visitor contact station will be established at the Lower Dam Recreation Area. Providing volunteer and staff contact at this high-use area will increase the ability of the Refuge to provide information on its purpose and the importance of its wildlife and habitats. The contact station should help increase the enjoyment of visitors by providing information about recreational opportunities around the Refuge. This contact station could also act as a base of operations for the roving interpreters.

Covered learning facilities will be constructed for future management. These structures will provide covered areas to gather schoolchildren during EE programs. Currently, children have no cover from weather during the outdoor portions of their field trips. Because field trips are scheduled mostly in the spring and fall, weather can reach extremes of intense sunshine and pouring rain. In an attempt to give children a dynamic opportunity to experience nature, the Refuge will install a nature play area for future management. The cost of this area includes design. See Table C-4 for analysis of the future of environmental education and interpretation facilities.

Table C-4. New One-time Costs for EE and Interpretation Facilities ($ in thousands)

EE and Interpretation Facilities	Cost	Priority
2 covered learning facilities	$136	L
Structural evaluation of Visitor Center	$25	H
Update/rehabilitate Visitor Center	$425	M
Structural evaluation and update/rehab of Environmental Education Building	-	H
Visitor contact station at Lower Dam Recreation Area	$480	M
Nature play area	$40	M
Total EE and Interpretation Facilities	**$1,106**	

Other Facilities. Two new facilities have been suggested for future management. The Lower Dam Recreation Area is in need of renovation. It is currently partially paved, and in disrepair. Parking and access for boat launches, buildings, and beaches are extremely restricted on busy weekends. A new site plan will also be created to improve functionality, traffic flow, and safety at the Lower Dam Recreation Area. Until the site plan is completed, the cost of renovation of the Recreation Area is unknown. At a minimum, the beach parking area and road leading to it will need to be rehabilitated. Table C-5 presents analysis of these facilities.

Table C-5. New One-time Costs for Other Facilities ($ in thousands)

Other New Facilities	Cost	Priority
1 comfort station and 1 vault toilet	$208	L
Lower Dam Recreation Area redesign site plan	$40	H
Rehabilitation of beach access/parking	$50	M
Total Other New Facilities	**$298**	

Interpretive and Educational Projects. Changes to the general brochure will be required to keep it updated. It is anticipated that a new brochure will need to be created to update maps and text. The projected cost is listed in Table C-6.

Table C-6. New One-time Costs for Interpretive and Educational Projects ($ in thousands)

Interpretive/ Educational Projects	Cost	Priority
Wildlife webcam	$10	L
Refuge video	$30	L
General brochure	$3	H
Total for Projects	**$43**	

Wildlife Disturbance Reduction Signs. No-wake zones, closed areas, and/or seasonally closed areas are used to reduce disturbance to wildlife and habitats. Signs providing a boundary of the zone or area as well as information about why there is a restriction to access will be installed. Given that the goose-nesting closure on the islands will continue, and that island signage is limited at this time, a cost associated with continuing the current closure is represented under current management. Table C-7 shows the costs associated with providing such signage under future management.

Table C-7. New One-time Costs for Signs Reducing Wildlife Disturbance ($ in thousands)

Signs	Cost	Priority
Seasonal nesting closures at Lake Lowell Unit	$1	H
Seasonal nesting closures on Snake River Islands Unit	$11	H
Wintering goose closure on Leavitt Tract	-	H
Total for Signs	**$12**	

Wildlife Disturbance Reduction Buoys. The Refuge and Canyon County Sheriff's Office currently deploy approximately 90 to 95 buoys in Lake Lowell to demarcate no-wake zones, closed areas, and swimming areas. For future management, these buoys will be reconfigured. The number of buoys needed was originally calculated (in the CCP) based on the requirements of the Service Sign Manual. This manual requires signage every 0.25 mile. To increase the public's understanding of the new closures, the number of buoys needed was recalculated at one buoy for every 100-150 yards. Table C-8 displays the additional cost required to mark no-wake zones and closures (seasonal or permanent) every 100-150 yards for future management.

Table C-8. New One-time Costs for Buoys Reducing Wildlife Disturbance ($ in thousands)

Wildlife Disturbance Reduction Buoys	Cost	Priority
Permanent no-wake zones, closed areas, seasonally closed areas, and swimming areas.	$18	H
Total for Buoys	**$18**	

Law Enforcement and Safety. Refuge visitors not following regulations will also be addressed through costs identified in the staffing section, but it is important to look at technologies to, that may also reduce the likelihood of illegal activity. Remote video cameras and electronic gates at the Refuge may decrease illegal activity, increase the likelihood of law enforcement personnel catching people engaged in illegal activity, and provide unobstructed use of the Refuge during daylight hours. There is a history of illegal activity on the Refuge (see Chapter 5), and these activities are expected to continue and perhaps even increase as the population surrounding the Refuge grows. Because of current and potential future illegal activities, the cost for technological solutions differs for current and future management.

Table C-9. New One-time Costs for Safety and Law Enforcement Improvements ($ in thousands)

Improved Safety and Law Enforcement	Cost	Priority
Cameras	$3	L
Electronic gates	$225	H
Total for Safety	**$228**	

Research and Monitoring Related to Public Use. There are two different types of research and monitoring programs related to public use. The first provides feedback on the quality of public use opportunities, and the second studies whether or not our public use programs are compatible with the Refuge's purpose. Deer Flat NWR does not have on-site research showing the interaction of public use programs and wildlife. In order to study whether our public use programs can be provided without substantially impacting wildlife and habitat, disturbance studies must be conducted. Many studies will not have large one-time costs associated with them and will be listed in the staffing needs section. The studies listed in Table C-10 will be contracted to outside entities.. Table C-11 summarizes the one-time costs needed to provide public uses at Deer Flat NWR.

Table C-10. New One-time Costs for Public Use Surveys and Research ($ in thousands)

Public Use Survey and Research Needs	Cost	Priority
Study to assess disturbance to grebes, shorebirds, herons and landbirds at Lake Lowell (2-year study)	$140	H
Quality of wildlife-dependent public uses	$75-$80	M
Total for Research and Monitoring	**$215-$220**	

Table C-11. Summary of New One-time Costs Related to Public Use ($ in thousands)

Public Use Improvements	One-time Cost
Providing Recreation While Minimizing Impacts to Wildlife and Habitats	
Buoys	$18
Signs	$12
Subtotal	**$30**
Public Use Enhancements	
Boardwalk	-
Trails and signs	$436
Docks and blinds	$193
Kiosks	$262
Environmental education and interpretation facilities	$1,106
Other new facilities	$298
Environmental education and interpretation projects	$43
Subtotal	**$2,338**
Establish a Fee Program	
Subtotal	**$0**
Enhance Safety and Law Enforcement	
Technology	$228
Subtotal	**$228**
Studies, Research, and Monitoring Related to Public Uses	
Human-wildlife interaction	$140
Quality of recreation	$75-$80
Subtotal	**$215-$220**
Total Public-use-related One-time Costs	**$2,811-$2,816**

C.2.3 New One-time Costs for Wildlife and Habitat Management

Habitat management can be achieved in a variety of ways, which makes estimating costs for individual projects difficult before a habitat management plan has been created. For example, the treatment of invasive species can be accomplished chemically (with herbicides), mechanically (e.g., mowing, discing, chipping), through the use of fire or goats, or by hand. Each of these different treatments requires different equipment and staffing to achieve. Because of the variety of ways that management can be accomplished, the costs listed in all of the tables below are estimates that will be refined as projects are planned and implemented.

Mudflats. Additional areas of mudflats will be created adjacent to current mudflats by removing vegetation removal through discing, burning, and or other mechanical control methods. Mudflats will be enhanced by using a disc to create scours to hold pools of water. The projects will occur within the life of the CCP.

Table C-12. New One-time Costs for Mudflat-related Projects ($ in thousands)

Project	Acres	Cost	Priority
Create and enhance mudflats	5-25	$1-$6	L
Total	**5-25**	**$1-$6**	

Riparian Areas at Lake Lowell. Riparian zone fragmentation will be reduced by relocating firebreaks to coincide with Board of Control drainage and canals. The riparian areas will also be enhanced and maintained by reducing nondesirable plants and hazardous fuels, planting desirable trees, shrubs and grasses (to replace nondesirables); and enhancing nesting habitat. Because the enhancements can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical

removal), costs will differ depending on which tools are used. The estimates below reflect some of the most expensive methods in order to capture the highest estimated costs.

Table C-13. New One-time Costs for Lake Lowell Riparian Projects ($ in thousands)

Project	Acres	Cost	Priority
Remove undesirable vegetation	1,200	$210	H
Plant desirable vegetation	10-15	$5-$7	H
Relocate fire breaks	100	$18	M
Total		**$233-$235**	

Riparian Areas at Snake River Islands. The size of the islands in the Snake River Islands Unit varies from 1 to 40 acres. Because the prioritization of island enhancement and protection will occur after the CCP is completed, an average size of 20 acres was used to create the cost estimates in Table C-14. The same theory was used for fencing islands and adjacent lands. An average shoreline size was established and used to create the cost estimates. The projects will occur over 15 years.

Table C-14. New One-time Costs for Snake River Islands Riparian Projects ($ in thousands)

Project	Number of Islands	Cost	Priority
Remove undesirable vegetation and plant desirable vegetation	2-10	$60-$300	H
Reduce cattle trespass	2-10	$6-$30	M
Total	**2-10**	**$66-$330**	

Wetlands. Emergent wetlands will be enhanced by removing undesirable vegetation, planting desirable vegetation, and recontouring. Because some of these enhancements can be achieved using various tools (e.g., prescribed fire, herbicide, mechanical removal), the costs will differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects will occur throughout the life of the CCP.

Table C-15. New One-time Costs for Wetlands Projects ($ in thousands)

Project	Acres	Cost	Priority
Remove undesirable vegetation	82	$18	M
Plant desirable vegetation	82	$25	M
Re-contour wetlands	82	$7	L
Total	**82**	**$50**	

Shrub-steppe Habitat at Lake Lowell. Shrub-steppe habitat will be enhanced by removing undesirable vegetation, planting desirable vegetation, and removing unnecessary internal firebreaks. Because some of these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of enhancement will differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects will occur throughout the life of the CCP.

Table C-16. New One-time Costs for Lake Lowell Shrub-Steppe Projects ($ in thousands)

Project	Acres	Cost	Priority
Remove undesirable vegetation	300	$38	H
Plant desirable vegetation	150	$36	H
Remove unnecessary internal firebreaks	4	$1	M
Total		**$75**	

Shrub-steppe Habitat at Snake River Islands. The size of the islands within the Snake River Islands Unit varies from 1 acre to 40 acres. Because the prioritization of island enhancement and protection will occur after the CCP is completed, an average size of 20 acres was used to create the cost estimates in Table C-17. The projects will occur over the life of the CCP.

Shrub-steppe habitat will be enhanced through removal of undesirable vegetation, planting of desirable vegetation, and removal of unnecessary internal firebreaks. Because some of these enhancement goals can be attained through numerous means (e.g., prescribed fire, herbicide, mechanical removal), the actual costs of enhancement will differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. The projects will occur throughout the life of the CCP.

Table C-17. New One-time Costs for Snake River Islands Shrub-steppe Projects ($ in thousands)

Project	Acres	Cost	Priority
Remove undesirable vegetation	40-200	$14-$70	H
Plant desirable vegetation	40-200	$60-$300	H
Total	**40-200**	**$74-$370**	

Agriculture. Enhancement of the agricultural program will occur through installation of a new well, creating better growing conditions.

Table C-18. New One-time Costs for Agricultural Projects ($ in thousands)

Project	Cost	Priority
Install well	$80-$100	L

Grasslands. Maintenance of the goose browse in the Leavitt Tract will occur by updating the irrigation system and reestablishing goose pasture. Efficient and effective irrigation is also part of the cooperative land management program at Lake Lowell Unit. In order to provide an adequate amount of water to the Refuge's managed grasslands, the irrigation system will need to be improved.

Table C-19. New One-time Costs for Grasslands Projects ($ in thousands)

Project	Acres	Cost	Priority
Update irrigation		$12	M
Interseed grass	80	$48	M
Total		**$60**	

Research, Surveys, and Assessments of Wildlife and Habitat. Table C-20 provides costs for research, surveys, and assessments that will be contracted. It is important to understand the baseline structure of habitats and wildlife so that future changes can be monitored.

Table C-20. New One-time Costs for Surveys and Research ($ in thousands)

Public Use Survey and Research Needs	Cost	Priority
Prioritization of Refuge islands for wildlife value	$30	H
Analyze historic biological data to assess long-term population trends	$30	M
Contaminants study of DDT in Lake Lowell	$250	M
Contaminants investigation of Leavitt Tract	$200	M
Mule deer study at Lake Lowell Unit (3-year vegetation and population study)	$60	M
Mule deer study at Snake River Islands Unit (3-year vegetation and population study)	$80	M
Cheatgrass removal study (4 years of study and monitoring)	$110	H
Soil survey of shrub-steppe and GIS layer	$40	M

Public Use Survey and Research Needs	Cost	Priority
Surveys of wetland topography	$20	M
Total for Research and Monitoring	**$820**	

Table C-21 summarizes the one-time costs that are needed to provide wildlife and habitat management at both Refuge units.

Table C-21. Summary of New One-time Costs for Wildlife and Habitat Management ($ in thousands)

Actions	Costs
Enhance Habitat	
Mudflats	$1-6
Riparian at Lake Lowell	$233-$235
Riparian at Snake River Islands	$66-$330
Wetlands	$50
Shrub-steppe at Lake Lowell	$75
Shrub-steppe at Snake River Islands	$74-$370
Agriculture	$80-$100
Grasslands	$60
Subtotal	**$639-$1,226**
Studies, Research, and Monitoring	
Wildlife and habitat research	$820
Subtotal	**$820**
Total Wildlife and Habitat Management One-time Costs	**$1,459-$2,046**

C.2.4 Summary of One-time Costs

Table C-22. Summary of One-time Costs ($ in thousands)

Cost Category	Cost Per Year
Public use	$2,798-$2,803
Wildlife and habitat	$1,459-$2,046
Total One-time Costs	**$4,257-$4,849**

C.2.5 Nonstaff Recurring Costs Related to Public Use

Facilities: Trails, Boardwalk, Kiosks, Blinds, Environmental Education and Interpretation Facilities, and Other Facilities (costs for maintaining docks are discussed under Buoys, Docks, and Signs). With new trails, signs, and other public use facilities comes an increase in associated maintenance and operations. The following are estimated maintenance costs per year for the new trails. In Fiscal Year (FY) 2011, approximately $28,000 was spent on maintaining Refuge buildings. It is estimated that $10,000 per year is spent to maintain the current trail system (including herbicide treatment, grading, and adding gravel), the observation blind, and platforms. Special maintenance projects in 2011 on the Kingfisher Trail and the observation blind cost the Refuge an additional $10,000. These expenditures were used as a baseline to estimate new funding needs for the maintenance of new facilities. If the visitor contact station replaces the Environmental Education Building, the cost of building maintenance should not rise.

The Refuge currently pays for waste removal in the Gotts Point and Upper Dam Recreation Area vault toilets. These vault toilets are currently only pumped, on average, once every two years. Visitors have complained about the condition of restrooms, which may be alleviated, in part, by

monthly pumping. Therefore, monthly pumping, from April through September, has been factored into current and future management. The Canyon County Parks, Recreation, and Waterways Department maintains the vault toilets in the Lower Dam Recreation Area. If Canyon County decides not to continue maintenance at the Lower Dam Recreation Area, the Refuge would have to fund restroom maintenance.

Table C-23. New Recurring Costs for Facilities ($ in thousands)

Facilities	Timing	Cost	Priority
Utilities	Every year	$2	M
Restroom maintenance	Every year	$3	L
Other facilities maintenance	Every year	$4	M
Dog feces disposal bags	Every year	$1	H
Total	**Every year**	**$10**	

Buoys, Docks and Signs. Due to vandalism, theft, and regular use, some of the Refuge's signs and buoys will have to be replaced annually. It was estimated that 25 percent of the regulation and directional signs will need to be replaced yearly, and half of the interpretive signs will need to be replaced during the life of the CCP. According to the Canyon County Sheriff's office, between $10,000 and $20,000 per year is spent on maintaining the boat launching docks and buoys on the Refuge. The additional funds needed to maintain new buoys and docks were estimated based on an average annual maintenance cost of $15,000 for the six docks that are currently maintained by Canyon County. Two other docks are maintained by the Refuge using the Refuge's base funding. The funding needed to maintain the current docks will increase if Canyon County discontinues their maintenance. Table C-24 captures this cost.

Table C-24. New Recurring Costs for Buoys, Docks, and Signs ($ in thousands)

Buoys, Docks, and Signs	Timing	Cost	Priority
Buoy and dock maintenance	Every year	$7	H
Replace 25% of regulatory and directional signs	Every year	$5	H
Replace 50% of interpretive signs	Every 10 years	$56	M
Total	**Every year**	**$12**	
Total	**Every 10 years**	**$56**	

Environmental Education and Interpretation Projects. Many of the current recurring costs are above and beyond the Refuge's base budget because they have been funded by grants. The grants may not always be available, so these costs must be accounted for in recurring costs to maintain the program. Costs include but are not restricted to printing of materials, equipment, volunteer awards, scholarships for buses, and presenter costs.

Table C-25. Recurring Costs for New Environmental Education and Interpretation Projects ($ in thousands)

Project	Timing	Cost	Priority
Teach the teacher	Every year	$1	M
EE program	Every year	$4	M
Volunteers	Every year	$1	H
On-site events	Every year	$2	H
Webcam	Every year	$1	L
Brochure reprint	Every 3 years	$3	H
Total	**Every year**	**$9**	
Total	**Every 3 years**	**$3**	

Table C-26 summarizes the recurring costs that are needed to provide public uses at Deer Flat NWR.

Table C-26. Summary of New Recurring Costs Related to Public Use ($ in thousands)

Public Use Recurring Costs	Timing	Cost
Buildings and trail maintenance	Every year	$10
Signs, docks and buoy, maintenance	Every year	$12
Environmental education, volunteers, and interpretation	Every year	$9
Brochures	Every 3 years	$3
Interpretive signs	Every 10 years	$56
Total	**Every year**	**$31**
Total	**Every 3 years**	**$3**
Total	**Every 10 years**	**$56**

C.2.6 Nonstaff Recurring Costs Related to Wildlife and Habitat Management

As explained in Section C.2.3 New One-time Costs for Wildlife and Habitat Management, habitat management can be achieved in a variety of ways, which makes estimating costs difficult before a habitat management plan has been created. The costs listed below are estimates based on the most expensive method of treatment. Because the most expensive method of treatment was used to estimate cost, the actual cost of implementation should be lower. These costs will be refined as projects are planned and implemented.

Emergent Beds. Enhancement of emergent habitat will occur through soil disturbance, invasive species control, and the seeding/planting of moist soil plants. These efforts are above and beyond invasive species control that is currently occurring.

Table C-27. New Recurring Costs for Emergent-bed Habitat Projects ($ in thousands)

Project	Timing	Acres	Cost	Priority
Maintain and enhance emergent beds	Every year	20	$4	H
Total	**Every year**	**20**	**$4**	

Shrub-steppe Habitat at Lake Lowell. Shrub-steppe habitat will be maintained through removal of undesirable vegetation in areas that have been restored. The cost estimated below will not be realized until after an area has been rehabilitated. The cost estimate is based on having to use herbicide to control nondesirable species on 25 percent of the total restored acreage each year. The per-year estimate will be excessive because the entire 300 acres will not be restored within the first year.

Table C-28. New Recurring Costs for Lake Lowell Shrub-steppe Projects ($ in thousands)

Project	Timing	Acres	Cost	Priority
Remove undesirable vegetation	Every year	75	$23	H
Total	**Every year**	**75**	**$23**	

Shrub-steppe Habitat at Snake River Islands. Shrub-steppe habitat will be maintained in restored areas by removing undesirable vegetation. The cost estimated will not be realized until an area is rehabilitated. The cost estimate is based on using herbicide to control nondesirable species on 25 percent of the total restored acreage each year. The per-year estimate is excessive because the entire 40-200 acres will not be restored in the first year. Costs per acre are more expensive for shrub-steppe maintenance on the islands because of the logistical challenges in bringing herbicide to the islands.

Table C-29. New Recurring Costs for Snake River Islands Shrub-steppe Habitat Projects ($ in thousands)

Project	Timing	Acres	Cost	Priority
Remove undesirable vegetation	Every year	10-50	$4-$18	H

Agriculture. Enhancement of the agricultural program will include annually planting crops along the lake's shoreline. Because the cost of the new plantings will vary depending on the type of crop, the most expensive crops were used for the estimate in order to capture the highest estimated cost.

Table C-30. New Recurring Costs for Agricultural Projects ($ in thousands)

Project	Timing	Acres	Cost	Priority
Plant crops on shoreline	Every year	25	$7	L
Total	**Every year**	**25**	**$7**	

Grasslands. Maintenance of desirable short grasses for goose browse in the Leavitt Tract will occur through the use of prescribed fire, herbicide, and/or mechanical control. The actual costs of maintenance will differ depending on the tools that are utilized. The estimates below used some of the most expensive methods in order to capture the highest estimated costs. These projects will occur throughout the life of the CCP.

Table C-31. New Recurring Costs for Grasslands Projects ($ in thousands)

Project	Timing	Acres	Cost	Priority
Manage short grasses	Every year	80	$12	M
Total	**Every year**	**80**	**$12**	

Table C-32 summarizes recurring costs needed to implement wildlife and habitat maintenance projects at Deer Flat NWR.

Table C-32. Summary of New Recurring Costs for Wildlife and Habitat Management ($ in thousands)

Projects Maintaining Wildlife Habitats	Timing	Cost
Emergent beds	Every year	$4
Shrub-steppe at Lake Lowell Unit	Every year	$23
Shrub-steppe at Snake River Islands Unit	Every year	$4-$18
Agriculture	Every year	$7
Grasslands	Every year	$12
Total	**Every year**	**$50-$64**

C.2.7 Summary of All Recurring Costs

Table C-33. Summary of Recurring Costs ($ in thousands)

Recurring Costs	Timing	Cost
Public use	Every year	$31
Public use	Every 3 years	$3
Public use	Every 10 years	$56
Wildlife and habitat	Every year	$50-$64
Total	**Every year**	**$81-$95**
Total	**Every 3 years**	**$3**
Total	**Every 10 years**	**$56**

C.2.8 Staffing Costs

Table C-34. Current Permanent Staffing ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
Refuge Manager	PFT	GS-0485-12
Assistant Refuge Manager	PFT	GS-0485-11
Visitor Services Manager	PFT	GS-0025-11
Wildlife Biologist	PFT	GS-0486-09
Maintenance Worker	PFT (vacant)	WG-4749-08
Administrative Assistant	PFT (vacant)	WG-0303-06
Total Positions and Salary	**6**	**$448**

Table C-35. Current Temporary Staffing ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
Office Aide	STEP	GS-0303-4
Youth Conservation Corps Leader	TEMP	GS-0186-05
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Youth Conservation Corps	TEMP	Minimum wage
Total Positions and Salary	**6**	**$47**

Table C-36. Current Operations Funded Interns ($ in thousands)

Interns	Status	Series, Position, and Grade
Environmental Education Specialist	TERM	Intern
Volunteer Coordinator	TERM	Intern
Biological Science Technician	SEASONAL	Intern
Total Positions and Salary	**3**	**$30**

Table C-37. Additional Staff Needed to Implement CCP ($ in thousands)

Staff: Refuge Operations	Status	Series, Position, and Grade
*Biological Science Technician	PFT	GS-0400-07
*Environmental Education Specialist	PFT	GS-1750-07
*Volunteer Coordinator	PFT	GS-0025-07
Law Enforcement Officer	PFT	GS-0025-09
Total Positions and Salary	**4**	**$217**

*If these positions were funded, the current interns will not be necessary.

C.3 Step-down Plans

The CCP is one of several plans necessary for Refuge management. The CCP provides guidance in the form of goals, objectives, and strategies for several program areas but may lack some of the specifics needed for implementation. Step-down management plans will be developed for individual program areas within approximately five years of the CCP's completion. All step-down plans require appropriate National Environmental Policy Act (NEPA) compliance, and implementation may require additional permits. Step-down plans for the Refuge follow. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down plans.

Table C-38. Status of Step-down Plans

Step-down Plans	Status
Safety Plan	Revised 2012
Integrated Pest Management Plan	Created 2012, included as CCP Appendix G
Fire Management Plan	Revised 2012, included as CCP Appendix K
Habitat Management Plan	Within 2 years of CCP completion
Visitor Services Plan	Within 5 years of CCP completion
Fisheries Management Plan	Within 5 years of CCP completion
Inventory and Monitoring Plan	Within 2 years of CCP completion
Hunt Plan(s) for new hunts	Within 3 years of CCP completion

Document continues on next page.

Appendix D. Wilderness Review

D.1 Introduction

The Deer Flat National Wildlife Refuge (Refuge) comprises two units, the 10,500-acre Lake Lowell Unit, which includes the 9,000-acre Lake Lowell, and the Snake River Island Unit, which comprises 104 islands totaling about 1,060 acres (as calculated using GIS). The islands stretch along the Snake River for 113 river miles in Idaho and Oregon.

The Lake Lowell Unit supports several habitat types including riparian forest, shrub-steppe, and managed agricultural lands. Lake Lowell itself is an irrigation project managed by the Bureau of Reclamation, which operates the lake's water for agricultural purposes; the U.S. Fish and Wildlife Service (Service) manages the surface uses. The Snake River islands also support riparian and shrub-steppe/grassland habitats. Both units of the Refuge receive substantial and varied public use, while the islands are further influenced by river traffic, including all types of recreational boating.

D.2 Policy and Direction for Wilderness Reviews

Service policy (602 FW 3.4 C.(1)(c)) requires that wilderness reviews be completed as part of the comprehensive conservation planning process. This review includes the re-evaluation of Refuge lands existing during the initial 10-year review period of the Wilderness Act of 1964, as amended (16 U.S. Code [U.S.C.] 1131-1136), as well as new lands and waters added to the National Wildlife Refuge System (NWRS) since 1974. A preliminary inventory of the wilderness resources is to be conducted during pre-acquisition planning for new or expanded refuges (341 FW 2.4 B., Land Acquisition Planning). NWRS policy on Wilderness Stewardship (610 FW 1-5) includes guidance for conducting wilderness reviews (610 FW 4, Wilderness Review and Evaluation).

A wilderness review is the process of determining whether the Service should recommend NWRS lands and waters to U.S. Congress for wilderness designation. The wilderness review process consists of three phases: wilderness inventory, wilderness study, and wilderness recommendation.

D.2.1 Wilderness Inventory

The inventory is a broad look at a refuge to identify lands and waters that meet the minimum criteria for wilderness: size, naturalness, and outstanding opportunities for solitude or primitive and unconfined type of recreation. All areas meeting the criteria are preliminarily classified as Wilderness Study Areas (WSAs). If WSAs are identified, the review proceeds to the study phase.

D.2.2 Wilderness Study

During the study phase, WSAs are further analyzed

- For all ecological, recreational, cultural, economic, and symbolic values;
- For all resources, including wildlife, vegetation, water, minerals, and soils;
- For existing and proposed public uses;
- For existing and proposed refuge management activities within the area; and

- To assess the refuge's ability to manage and maintain the wilderness character in perpetuity, given the current and proposed management activities. Factors for evaluation may include, but are not limited to, staffing and funding capabilities, increasing development and urbanization, public uses, and safety.

We evaluate at least an All Wilderness Alternative and a No Wilderness Alternative for each WSA to compare the benefits and impacts of managing the area as wilderness as opposed to managing the area under an alternate set of goals, objectives, and strategies that do not involve wilderness designation. We may also develop Partial Wilderness Alternatives that evaluate the benefits and impacts of managing portions of a WSA as wilderness.

In the alternatives, we evaluate:

- The benefits and impacts to wilderness values and other resources;
- How each alternative will achieve the purposes of the Wilderness Act and the NWRS;
- How each alternative will affect achievement of refuge purpose(s) and the refuge's contribution toward achieving the Refuge System mission;
- How each alternative will affect maintenance and, where appropriate, restoration of biological integrity, diversity, and environmental health at various landscape scales;
- Other legal and policy mandates; and
- Whether a WSA can be effectively managed as wilderness by considering the effects of existing private rights, land status and service jurisdiction, refuge management activities and refuge uses, and the need for or possibility of eliminating Section 4(c) prohibited uses.

D.2.3 Wilderness Recommendation

If the wilderness study demonstrates that a WSA meets the requirements for inclusion in the National Wilderness Preservation System, a wilderness study report should be written that presents the results of the wilderness review, accompanied by a Legislative Environmental Impact Statement (LEIS). The wilderness study report and LEIS that support wilderness designation are then transmitted through the Secretary of the Interior to the President of United States, and ultimately to the U.S. Congress for action. Refuge lands recommended for wilderness consideration by the wilderness study report would retain their WSA status and be managed as "wilderness according to the management direction in the final CCP [comprehensive conservation plan] until Congress makes a decision on the area or we amended the CCP to modify or remove the wilderness recommendation" (610 FW 4.22 B). When a WSA is revised or eliminated, or when there is a revision in "wilderness stewardship direction, we include appropriate interagency and tribal coordination, public involvement, and documentation of compliance with NEPA [National Environmental Policy Act]" (610 FW 3.13).

The following constitutes the inventory phase of the wilderness review for Deer Flat National Wildlife Refuge.

D.3 Previous Wilderness Review

On June 21, 1972, the Director of the Bureau of Sport Fisheries and Wildlife sent a cover memo, draft wilderness study report, and mock-up brochure with a map to the Assistant Secretary of Fish, Wildlife, and Parks. The memo states that, with the Assistant Secretary's concurrence, the Bureau

would conduct a public hearing recommending that 68 islands, constituting approximately 734 acres within the Snake River Unit of the Deer Flat National Wildlife Refuge, qualify for wilderness designation within the National Wilderness Preservation System. (At the time the memo was written, the Snake River Islands Unit included 73 islands along 110 miles of the lower Snake River.) The Assistant Secretary signed his concurrence on June 21, 1972.

The draft wilderness study report, titled "Snake River Islands Wilderness Proposal, Snake River Unit, Deer Flat National Wildlife Refuge, Idaho-Oregon," states:

> This report was prepared pursuant to the Wilderness Act, Public Law 88-577. Publication of the findings and recommendation herein should not be construed as representing either the approval or disapproval of the Secretary of the Interior. The purpose of this report is to provide information and alternatives for further consideration by the Bureau of Sport Fisheries and Wildlife, Secretary of the Interior, and other Federal agencies.

The draft wilderness study report states in its conclusion:

> These refuge islands are mostly undeveloped and appear to be largely unaffected by man's works. However, the bordering riverbanks and adjacent lands are developed and intensively cultivated. Few islands are out of sight of some sort of man-made disturbance. Developments include irrigation pumping stations, power lines, towns, bridges, industrial plants, farm buildings and feed lots which in many cases extend to the water's edge. Since the river is relatively narrow with many of the islands in close proximity to the shore, man's presence is clearly visible and his activity can be heard from nearly every island in the complex. Hence the opportunity for solitude is diminished, yet the value of these islands as wilderness is not invalidated by sights and sounds from outside the proposed wilderness. Rather the value of these islands is commensurately enhanced by their mere existence amidst an area where man and his works dominate the landscape. Therefore, 68 islands containing approximately 734 acres in the Snake River Unit of the Refuge are considered suitable for inclusion in the National Wilderness Preservation System.

Now, more than 16 years later, during the December 2008 preplanning phase of the Deer Flat National Wildlife Refuge CCP, the Service conducted a wilderness review of Refuge lands at Deer Flat, both the Lake Lowell and Snake River Units, including re-evaluating the findings and conclusions of the 1972 draft wilderness study report.

D.4 Lands Considered Under This Wilderness Review

All Service-owned lands and waters within the Deer Flat National Wildlife Refuge approved boundary were considered during this review of potential wilderness areas. For purposes of the review, the Refuge's two units are analyzed separately: (1) the Lake Lowell Unit and (2) the Snake River Unit, including 104 islands (1,200 acres) along 113 river miles from the Canyon-Ada County line, Idaho, to Farewell Bend, Oregon.

D.5 Wilderness Inventory

D.5.1 Criteria for Evaluating Lands for Possible Inclusion in the National Wilderness Preservation System

The Wilderness Act of 1964, as amended (16 U.S.C. 1131-1136), provides the following description of wilderness:

> A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act as an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions.

The following criteria for identifying areas as wilderness are outlined in Section 2(c) of the Wilderness Act and are further expanded upon in NWRS policy (610 FW 4). The first three criteria are evaluated during the inventory phase; the fourth criterion is evaluated during the study phase.

- Generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- Has at least five thousand acres of land or is of a sufficient size as to make practicable its preservation and use in an unimpaired condition; and
- May also contain ecological, geological, or other features of scientific, educational, scenic, or historic value.

Criterion 3 is further defined in Section 3(c) of the Wilderness Act as (1) a roadless area of 5,000 contiguous acres or more, or (2) a roadless island. "Roadless" is defined as the absence of improved roads suitable and maintained for public travel by means of four-wheeled, motorized vehicles that are intended for highway use.

D.5.2 Process of Analysis

The following evaluation process was used in identifying the suitability of Refuge units for wilderness designation:

- Determination of Refuge unit sizes;
- Assessment of the units' capacity to provide opportunities for solitude or primitive and unconfined recreation; and
- Assessment of "naturalness" of Refuge units.

More detail on the actual factors considered and used for each assessment step follows.

D.5.2.1 Unit Size

Roadless areas meet the size criteria if any one of the following standards applies:

- An area with over 5,000 contiguous acres solely in the Service's ownership.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or an area that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous Federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition, and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous Federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another Federal wilderness managing agency such as the Forest Service, National Park Service, or Bureau of Land Management.

D.5.2.2 Outstanding Solitude or Primitive or Unconfined Recreation

A designated wilderness area must provide outstanding opportunities for solitude, or a primitive and unconfined type of recreation. Possession of only one of these outstanding opportunities is sufficient for an area to qualify as wilderness, and it is not necessary for one of these outstanding opportunities to be available on every acre. Furthermore, an area does not have to be open to public use and access to qualify under these criteria.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means nonmotorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. Primitive recreation activities may provide opportunities to experience challenge and risk, self-reliance, and adventure.

D.5.2.3 Naturalness and Wildness

The naturalness and wildness criterion states that the area must generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable. This criterion must be evaluated in the context of current natural conditions and societal values and expectations without compromising the original intent of the Wilderness Act. It is well recognized that there are few areas remaining on the planet that could be truly classified as primeval or pristine, with even fewer, if any, existing in the conterminous United States. Likewise, few areas exist that do not exhibit some impact from anthropogenic influences, be it noise, light, or air pollution; water quality or hydrological manipulations; past and current land management practices; road or trails; suppression of wildfires; invasions by nonnative species of plants and animals; or public uses. While allowing for the near-complete pervasiveness of modern society on the landscape, the spirit of the Wilderness Act is to protect lands that still retain the wilderness qualities of (1) natural, (2) untrammeled, and (3) undeveloped. These three qualities are cornerstones of wilderness character. For areas proposed or designated as wilderness, wilderness character must be monitored to determine baseline conditions and must thereafter be periodically monitored to assess the condition of these wilderness qualities. Proposed and designated wilderness areas by law and policy are required to maintain wilderness character through management and/or restoration in perpetuity.

Defining the first two qualities (natural and untrammeled) requires a knowledge and understanding of the ecological systems that are being evaluated as potential wilderness. Ecological systems have three primary attributes—composition, structure, and function. Composition refers to the components that make up an ecosystem, such as the habitat types, native species of plants and animals, and

abiotic (physical and chemical) features. These contribute to the diversity of the area. Structure is the spatial arrangement of the components that contributes to the complexity of the area. Composition and structure are evaluated to determine the naturalness of the area. Function refers to the processes that result from the interaction of the various components both temporally and spatially, and the disturbance processes that shape the landscape. These processes include but are not limited to predator-prey relationships, insect and disease outbreaks, nutrient and water cycles, decomposition, fire, wind storms, flooding, and both general and cyclic weather patterns. Ecological functions are evaluated to determine the wildness or untrammeled quality of the area.

The third quality assessment is whether an area is undeveloped. Undeveloped refers to the absence of permanent structures such as roads, buildings, dams, fences, and other human-made alterations to the landscape. Exceptions can be made for historic structures or structures required for safety or health considerations, providing they are made of natural materials and are relatively unobtrusive on the landscape.

General guidelines used for evaluating areas for wilderness potential during this wilderness inventory process include:

- The area should provide a variety of habitat types and associated abiotic features, as well as a nearly complete complement of native plants and wildlife indicative of those habitat types. Nonnative and invasive species should constitute a negligible portion of the landscape.
- The area should be spatially complex (vertically and/or horizontally) and exhibit all levels of vegetation structure typical of the habitat type, have an interspersion of these habitats, and provide avenues for plant and wildlife dispersal.
- The area should retain the basic natural functions that define and shape the associated habitats, including but not limited to flooding regimes, fire cycles, unaltered hydrology and flowage regimes, and basic predator-prey relationships including herbivory patterns.
- Due to their size, islands may not meet the habitat guidelines in the first two points above. Islands should, however, exhibit the natural cover type with which they evolved, and should continue to be shaped and modified by natural processes. Islands should be further analyzed during the study portion of the review, if they provide habitat for a significant portion of a population or key life cycle requirements for any resources of concern or listed species.
- Potential wilderness areas should be relatively free of permanent structures or human-made alterations. Areas may be elevated to the study phase if existing structures or alterations can be removed or remediated within a reasonable time frame, and prior to wilderness recommendation to the Secretary of the Interior.

D.5.2.4 Supplemental Values

The Wilderness Act states that an area of wilderness may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. Supplemental values of the area are optional, but the degree to which their presence enhances the area's suitability for wilderness designation should be considered. The evaluation should be based on an assessment of the estimated abundance or importance of each of the features.

D.6 Inventory Summary and Conclusion

Based on this inventory, the Lake Lowell Unit does not meet any of the basic criteria for inclusion in the National Wilderness Preservation System. The islands within the Snake River Unit meet the size criterion but do not meet the criteria for naturalness and wildness, nor do they provide outstanding opportunities for solitude or primitive or unconfined recreation. Based on this summary and conclusion, further evaluation of these lands under the wilderness study phase is unwarranted. Table D-1 summarizes the evaluation and conclusion for each unit.

Table D-1. Results of Wilderness Inventory for Deer Flat National Wildlife Refuge

Refuge Unit	Lake Lowell Unit	Snake River Islands Unit
(1) Unit Size: has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unconfined condition, or is a roadless island	No	Yes
(2) Naturalness and wildness: generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable	No	No
(3a) Outstanding opportunities for solitude	No	No
(3b) Outstanding opportunities for primitive and unconfined recreation	No	No
(4) Contains ecological, geological, or other features of scientific, educational, scenic, or historical value	N/A	N/A
Area qualifies as a wilderness study area (meets Criteria 1,2, and 3a, or 3b)	No	No

Document continues on next page.

Appendix E. Biological Resources of Concern

E.1 Introduction

Early in the planning process, the planning team cooperatively identified species, species groups, and communities of concern for Deer Flat National Wildlife Refuge (NWR or Refuge). A comprehensive list of these resources was compiled based upon review of numerous plans (see Section 1.8 of the Final Comprehensive Conservation Plan/Environmental Impact Statement [CCP/EIS]), many of which highlight priority species or habitats for conservation. The comprehensive list of potential resources of concern is contained in Table E-3. In addition, a table of species and species groups specifically identified in establishing documents for the Refuge was compiled (Table E-1). A complete list of current species known to occur on the Refuge is located in Table E-5.

The table identifying our comprehensive resources of concern was further culled in developing a more targeted assemblage of priority resources of concern. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources. Table E-4 contains the priority resources of concern identified for the Refuge. Definitions for the column headings in Table E-4 are as follows:

- **Focal Species:** Species selected as representatives or indicators for the overall condition of the conservation target. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal species may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Management will be focused on attaining conditions required by the focal species. Other species using the conservation target will generally be expected to benefit as a result of management for the focal species.
- **Habitat Type:** The general habitat description utilized by the focal species.
- **Habitat Structure:** The specific and measurable habitat attributes considered necessary to support the focal species.
- **Life History Requirement:** The general season of use for the focal species.
- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal species. The list is not comprehensive; see Table E-3 for the Refuge for a more complete list.

Table E-1. Summary of Species and Habitats Identified in Refuge Purposes

Conservation Target (species/species group or habitat)	Supporting Habitat Type	Life History Requirement	Supporting Documentation
Migratory birds	Open water, mudflats, and emergent plant beds for the reservoir	Breeding	Executive Order (E.O.) BIDEH 1032 (February 25, 1909)
Migratory birds and other wildlife	Open water, mudflats, and emergent plant beds for the reservoir	Breeding and wintering	E.O. 7655 "Establishing Deer Flat Migratory Waterfowl Refuge, Idaho" (Franklin D. Roosevelt; July 12, 1937)
Migratory birds and other wildlife	Island habitats: riparian and shrub steppe	Breeding and wintering	E.O. 7691 "Establishing the Snake River Migratory Waterfowl Refuge, Idaho" (Franklin D. Roosevelt; August 17, 1937)
Waterfowl (ducks and geese): migratory feeding/resting areas Geese: wintering	Migration and wintering habitat	Feeding, resting, and wintering	Migratory Bird Conservation Commission Memorandum No. 9 (February 20, 1951)
Mallard and western Canada geese: wintering (500,000-800,000 ducks and geese annually; terminus of flight from prairie provinces of Canada)	Marshland for nesting and for foraging, specifically smartweed and dwarfish "tealgrass"	Food for waterfowl	Migratory Bird Conservation Commission Memorandum No. 8 (February 15, 1955)

E.2 Biological Integrity, Diversity, and Environmental Health

Natural Plant and Waterfowl Populations with Natural Processes and Limiting Factors

Table E-2 provides an overview of habitats with the plant communities and animals typically associated with that habitat type. Not all of the species presented in this table have been documented on Deer Flat NWR.

Table E-2. Summary of Biological Integrity, Diversity, and Environmental Health (BIDEH)

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
Alkaline wetlands	Seasonal; semipermanent; flat basin characterized by high annual/seasonal variability in water and salinity levels; mosaic, ephemeral layers of wet grasslands, shrubs, perennial forbs; fine sandy loam/silt loam alkaline soils. Layers of vegetation include • Reed, sedge, rush spp., Sandberg's bluegrass, Nevada bluegrass, redtop, common spikerush, inland saltgrass, foxtail barley, Nuttall's alkaligrass, alkali sacaton, duckweed, rough bugleweed, willowherb, alkali mallow, milkweed spp., sumpweed, and common cattail; and • Sand dropseed, beardless wildrye, mugwort, western wheatgrass, greasewood spp., yarrow, gray/green rabbitbrush, and golden currant. *Potential conservation species: migrating, wintering, breeding waterfowl species, American avocet, Wilson's phalarope, dunlin, sandpiper, green-backed heron, long-billed curlew, killdeer, black-necked stilt, snowy egret, peregrine falcon, northern harrier, sandhill crane, mallard, and Great Basin spadefoot toad.*	Seasonal and annual levels of precipitation and water levels; low/flat land areas developed with intermittent natural springs. Seasonal drying with poorly drained soils. Broad natural channel basin area possibly formed from glacial flood drainage.	Currently nonexistent; Lake Lowell reservoir created in 1906 by damming three low areas in a natural broad channel of Deer Flat region. Altered hydrology.
Shrub-steppe	Semiarid; characterized by three layers of vegetation: • Dominant sagebrush (*Artemisia* spp.) <2 m including bitterbrush, fourwing saltbush, gray/green rabbitbrush, greasewood, spiny horsebrush, and spiny hopsage;	Periodic fire; shallow well-drained soils.	Loss of perennial grasses; invasive species encroachment including cheatgrass, Canada thistle, broadleaved pepperweed, hoary cress, rush skeletonweed, jointed

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	• Understory of native bunch grasses and forbs including bluebunch wheatgrass, Indian ricegrass, squirreltail bottlebrush, steppe bluebunch, Idaho fescue, Great Basin wildrye, Sandberg's bluegrass, perennial bunchgrasses, perennial and annual herbs, perennial forbs; and • Microbiotic crust composed of algae, lichens, and mosses. *Potential conservation species: peregrine falcon, ferruginous hawk, Swainson's hawk, American kestrel, horned lark, grasshopper sparrow, meadowlark, loggerhead shrike, burrowing owl, northern pygmy-owl, pygmy rabbit, western longnose snake, black-throated sparrow, sage sparrow, sage thrasher, black-collared lizard, and southern Idaho ground squirrel.*		goatgrass, Scotch thistle, and nonnative grasses. Altered fire regime/return interval; past grazing/soil disturbance; loss of native habitat; fragmentation. Widespread presence of cheatgrass may cause unnatural and severe fires to sagebrush-steppe habitat.
Emergent wetlands • Riverine • Palustrine • Persistent • Nonpersistent	Seasonal; semipermanent; developing and varying according to seasonal natural spring inflow, river flow, and soil texture/ permeability. Diversity of hydric vegetation includes sedge, rush, reed spp., flatsedge, mannagrass, rough bentgrass, bulrush, stinging nettle, common cattail, water plantain, milkweed spp., smartweed, yellowcress, goldenrod, smooth sumac, wood's rose, and peachleaf willow. *Potential conservation species: migrating, wintering, breeding waterfowl species, cinnamon teal, northern pintail, lesser scaup, Canada geese, white pelican, western grebe, tundra swan, shorebird species, red-necked phalarope, American bittern, long-billed curlew, violet-green swallow, marsh wren, snowy egret, and northern leopard frog.*	Periodic flooding; seasonal fluctuations/drying but more permanent water situation than typical seasonal wetlands; natural springs.	Invasive species including Russian olive, salt cedar, purple loosestrife, poison hemlock, Bohemian knotweed, Japanese knotweed, houndstongue, and white bryony. Flood depth and duration; habitat loss; altered water regimes. Water quality issues include pollution, temperature, and contaminants. Disturbance from public uses. Trophic bioaccumulation of chemical contaminants and heavy metals.
Riverine islands • Shrub-scrub	Seasonal; semipermanent; permanent, developing, and varying according to seasonal river flow. Native canopy and shrub layer dominates include poplar, willow, sagebrush, rabbitbrush, hawthorn,	Periodic, seasonal flood events; riparian habitat connectivity; submergent vegetation, upland scrub. Spring	Encroachments of invasive plant species include salt cedar, Russian olive, poison hemlock, cheatgrass, and nonnative grasses.

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	wheatgrass, reedgrass, reed, and sedge defined by >30% canopy cover of shrubs or small trees <6 m (20 feet) high. *Potential conservation species: bald eagle, osprey, white-throated swift, Barrow's goldeneye, bufflehead, white-winged scoter, western grebe, red-breasted merganser, canyon wren, sage thrasher, snowy egret, double-crested cormorant, beaver, river otter, Canada goose, bank swallow, mourning dove, black-crowned night-heron, yellow-breasted chat, green-tailed towhee, white pelican, black rosy-finch, gray rosy-finch, trumpeter swan, and shining flatsedge.*	flows create scours and cut new channels that isolate islands.	Pollution; species predation. Nonfunctioning floodplain; dams reduce/alter flood events on Snake River; altered water/channel regimes. Past grazing and invasive species produce competition and soil binding; lack of silt deposition; loss of habitat.
Riverine channel • Lower perennial	Open, generally flowing water; potentially supporting rearing anadromous fish; supports resident fish, affording fish passage throughout watershed. *Potential conservation species: Canada goose, tundra swans, American coot, osprey, bald eagle, double-crested cormorant, pied-billed grebe, western grebe, caspian tern, resident fish, white sturgeon, and Idaho springsnail.*	Periodic flooding with flood energy variable depending on location of stream/river in landscape, perennial water flows, open water, submergent vegetation.	Agriculture ad open pasture; excess nutrients and pollutants. Contaminants, siltation, water quality, and increased temperature. Altered hydrology; lack of adequate flows to maintain dynamic river channel morphology. Encroachment of invasive species includes salt cedar and Russian olive. Encroachment of residential and commercial development.
Large flocks of migrating/ wintering waterfowl	Snake River Islands; Great Basin wetlands. *Potential conservation species: most waterfowl species identified in Purpose documents and table of potential resources of concern.*	Historical, predominant, Pacific population of western Canada geese and waterfowl species. Riparian habitats of river islands, emergent wetlands, alkaline marsh, and natural springs provide migratory connectivity; regions of critical breeding and wintering areas.	Seasonal drawdown of lake for agriculture irrigation reduces wetland area. Damming; manipulated river hydrology. Lack of periodic fire. Residential and commercial development within floodplain. Water quality issues; pollution, contaminants; increased temperature.

Habitats (plant communities that represent existing BIDEH)	Population/Habitat Attributes (age class, structure, serial stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
		Periodic flooding of river plain and lowland areas naturally provides islands of refuge and forage.	Human disturbance from recreational activities.

Table E-3. Deer Flat National Wildlife Refuge Potential Resources of Concern

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
BIRDS *known to nest on Refuge																	
Migrating waterfowl	X	X		X	X												
Nesting waterfowl	X	X		X	X												
American avocet * (*Recurvirostra americana*)	X	X					23 H	5			G5, S5B, S3		X				
American bittern * (*Botaurus lentiginosus*)	X	X					19 M		M-10								
American coot * (*Fulica americana*)	X	X															
American golden plover (*Pluvialus dominica*)	X																
American kestrel * (*Falco sparverius*)	X	X															
American robin * (*Turdus migratorius*)		X															
American tree sparrow (*Spizella arborea*)		X															PR
American white pelican (*Pelecanus erythrorhynchos*)	X	X					24 H		H	X	G3, S1B	2				X	
American wigeon* (*Anas americana*)	X	X			X										X		
Ash-throated flycatcher (*Myiarchus tuberculifer*)							18 M										
Baird's sandpiper (*Calidris bairdii*)	X	X						1									
Bald eagle * (*Haleaeetus leucocephalus*)	X	X					19 M				G4, S3B, S4N, E	1				X	PR
Bank swallow * (*Riparia riparia*)		X															
Barrow's goldeneye (*Bucephala islandica*)	X	X			X	X	24 H					5					

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Belted kingfisher * (*Ceryle alcyon*)		X															
Black rosy-finch (*Leucosticte atrata*)		X					23 H				G4, S3						PR
Black tern (*Chlidonias niger*)	X	X					18 M		H	X	G4, S1B, S1	3				X	
Black-bellied plover (*Pluvialis squatarola*)	X							2									
Black-billed magpie * (*Pica hudsonia*)							19 H										
Black-capped chickadee * (*Poecile atricapillus*)							13 M										
Black-chinned hummingbird * (*Archilochus alexandri*)		X					23 H										
Black-crowned night heron * (*Nycticorax nycticorax*)	X	X							M-9	X	G5, S2B						
Black-necked stilt * (*Himantopus mexicanus*)	X	X					18 H	5			G5, S3B, S3						
Black-throated gray warbler (*Dendroica nigrescens*)							22 H										PR
Black-throated sparrow (*Amphispiza bilineata*)		X					21 M				S2B	4				X	MA
Blue-winged teal * (*Anas discors*)	X	X			X												
Bohemian waxwing (*Bombycilla garrulus*)																	PR
Bonaparte's gull (*Larus philadelphia*)	X									X							
Brewer's blackbird * (*Euphagus cyanocephalus*)							15 M					5					
Brewer's sparrow (*Spizella breweri*)							24 H				G5, S3B	3	X	X			MA
Broad-tailed hummingbird * (*Selasphorus platycercus*)		X															
Brown creeper (*Certhia americana*)							18 H										
Bufflehead (*Bucephala albeola*)	X	X			X		18 M										
Bullock's oriole * (*Icterus bullockii*)							19 M										
Burrowing owl (*Athene cunicularia*)		X	SOC				19 M				G4, S2B, S2	5	X	X			

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Bushtit * (*Psaltriparus minimus*)							18 M										
California gull * (*Larus californicus*)	X						19 M		M-10	X	G5, S2B, S3N						
Calliope hummingbird (*Stellula calliope*)							23 H					3					PR
Canada goose * (*Branta canadensis*)	X	X		X	X												
Canvasback (*Aythya valisineria*)	X				X		20 M				S2N				X		
Canyon wren * (*Catherpes mexicanus*)		X					18 M										
Caspian tern * (*Sterna caspia*)	X	X					17 M		M-10	X	G5, S2B						
Cassin's finch (*Carpodacus cassinii*)							19 M					5					MA
Cassin's vireo (*Vireo cassinii*)							X										
Cattle egret (*Bubulcus ibis*)	X									X	G5, S2B						
Chipping sparrow (*Spizella passerina*)							16 M										
Cinnamon teal * (*Anas cyanoptera*)	X	X			X	X	21 H										
Clark's grebe (*Aechmophorus clarkii*)	X						20 M		M-10	X	G5, S2B						
Clark's nutcracker (*Nucifraga columbiana*)																	
Common goldeneye (*Bucephala clangula*)	X	X			X												
Common grackle (*Quiscalus quiscula*)	X	X															
Common loon (*Gavia immer*)	X						X		H		G5, S1B, S2N						
Common merganser * (*Mergus merganser*)	X	X			X												
Common poorwill (*Phalaenoptilus nuttallii*)							21 M										
Common redpoll (*Carduelis flammea*)	X																
Common snipe * (*Gallinago gallinago*)	X							3									
Common tern (*Sterna hirundo*)	X								M-10	X				X			
Cooper's hawk (*Accipiter cooperii*)	X																

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Dark-eyed junco (*Junco hyemalis*)							13 M										
Double-crested cormorant * (*Phalacrocorax auritus*)	X	X								X							
Dunlin (*Calidris alpina*)	X	X						2									
Eared grebe * (*Podiceps nigricollis*)	X						15 M		H-9	X							
Ferruginous hawk (*Buteo regalis*)	X	X					23 H				G4, S3B	3	X	X		X	
Forster's tern (*Sterna forsteri*)	X						20 M		H-10/ M-9	X	G5, S1B, S1					X	
Fox sparrow (*Passerellailiaco*)																	
Franklin's gull (*Larus pipixcan*)	X						24 H		H	X	G4G5 , S2B					X	
Gadwall* (*Anas strepera*)	X				X	X	17 M										
Glaucous gull (*Larus hyperboreus*)	X									X							
Golden eagle (*Aquila chrysaetos*)	X						19 H						X				
Golden-crowned kinglet (*Regulus satrapa*)	X																
Grasshopper sparrow (*Ammodramus savannarum*)		X					20 H				G5, S2B	5		X		X	MA
Gray flycatcher (*Empidonax wrightii*)	X						24 H										
Great blue heron * (*Ardea herodias*)	X									X							
Great egret (*Ardea alba*)	X									X	G5, S1B						
Greater white-fronted goose (*Anser albifrons*)	X	X			X										X		
Greater yellowlegs (*Tringa melanoleuca*)	X							3									
Green heron * (*Butorides virescens*)	X	X								X							
Green-tailed towhee (*Pipilo chlorurus*)		X					19 M					5				X	PR
Green-winged teal * (*Anas crecca*)	X	X			X												
Gyrfalcon (*Falco rusticolus*)	X																PR
Harlequin duck (*Histrionicus histrionicus*)	X				X	X	20 M				G4, S1B	4			X		

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Harris' sparrow (*Zonotrichia querula*)														X			
Herring gull (*Larus argentatus*)	X									X							
Hooded merganser * (*Lophodytes cucullatus*)	X	X			X		22 H				G5, S2B, S3N						
Horned grebe (*Podiceps grisegena*)	X										S1						
Horned lark * (*Eremophila alpestris*)		X															
Indigo bunting (*Passerina cyanea*)																	PR
Killdeer * (*Charadrius vociferus*)	X	X					19 H	3									
Lapland longspur (*Calcarius lapponicus*)																	PR
Lark sparrow * (*Chondestes grammacus*)							20 H										
Lazuli bunting (*Passerina amoena*)		X					19 M										
Least bittern (*Ixobrychus exilis*)	X								M-9								
Least sandpiper (*Calidris minutilla*)	X	X						4									
Lesser scaup (*Aythya affinis*)	X	X			D		17 M				G5, S3				X		
Lesser yellowlegs (*Tringa flavipes*)	X							2									
Lewis's woodpecker * (*Melanerpes lewis*)		X					23 H				G4, S3B	3	X	X		X	MA
Lincoln's sparrow (*Melospiza lincolnii*)																	PR
Loggerhead shrike * (*Lanius ludovianus*)		X	SOC				20 H					3	X	X		X	
Long-billed curlew (*Numenius americanus*)	X	X	SOC				23 H	5			G5, S2B	5	X	X		X	
Long-billed dowitcher (*Limnodromus scolopaceus*)	X							5									
MacGillivray's warbler (*Oporornis tolmiei*)							21 H										
Mallard * (*Anas platyrhychos*)	X	X			X												
Marbled godwit (*Limosa fedoa*)	X							4			S2		X	X			
Marsh wren * (*Cistothorus palustris*)		X					20 M										

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Mountain bluebird (*Sialia currucoides*)							X										PR
Mountain chickadee (*Poecile gambeli*)							16 M										
Mourning dove * (*Zenaida macroura*)		X		X											X		
Nashville warbler (*Vermivora ruficapilla*)							20 M										
Northern flicker * (*Colaptes auratus*)		X					15 M										
Northern goshawk (*Accipiter gentilis*)	X		SOC				21 H					3				X	
Northern harrier * (*Circus cyaneus*)	X	X					18 M							X			
Northern pintail* (*Anas acuta*)	X	X			X D						G5, S5B, S2N				X		
Northern pygmy-owl (*Glaucidium gnoma*)		X					X					5					
Northern rough-winged swallow * (*Stelgidopteryx serripennis*)							19 M										
Northern shoveler * (*Anas clypeata*)	X	X			X						S2N						
Long-tailed duck – Oldsquaw (*Clangula hyemalis*)	X	X			X												
Olive-sided flycatcher (*Contopus cooperi*)							21 H					3		X			MA
Orange-crowned warbler (*Vermivora celata*)																	
Osprey * (*Pandion haliaetus*)	X	X					17 M										
Pectoral sandpiper (*Calidris melanotos*)	X							1									
Peregrine falcon (*Falco peregrinus*)	X	X					19 M				G4T3, S2B, E	3	X	X		X	PR
Pied-billed grebe * (*Podilymbus podiceps*)	X	X															
Pine siskin (*Carduelis pinus*)							14 M										
Plumbeous vireo (*Vireo plumbeus*)							22 H										
Prairie falcon (*Falco mexicanus*)	X	X					24 H					3	X	X			
Red knot (*Calidris canutus*)	X							1						X			
Red-breasted merganser (*Mergus serrator*)	X	X			X												

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Red-breasted nuthatch (*Sitta canadensis*)							14 M										
Redhead * (*Aythya americana*)	X	X			X	X	22 H										
Red-necked phalarope (*Phalaropus lobatus*)	X	X						4									
Red-tailed hawk * (*Buteo jamaicensis*)	X	X															
Ring-billed gull * (*Larus delawarensis*)	X						15 M			X							
Ring-necked duck (*Aythya collaris*)	X				X		20 M								X		
Rock wren * (*Salpinctes obsoletus*)							19 H										
Ross's goose (*Chen rossii*)	X	X			X												
Rough-legged hawk (*Buteo lagopus*)	X	X															PR
Ruddy duck* (*Oxyura jamaicensis*)	X				X	X	19 M				S2N						
Rufous hummingbird (*Selasphorus rufus*)							22 H							X			MA
Sabine's gull (*Xema sabini*)	X									X							
Sage sparrow (*Amphispiza belli*)		X					25 H					3	X			X	PR
Sage thrasher * (*Oreoscoptes montanus*)		X					22 H					5				X	PR
Sanderling (*Calidris alba*)	X							1					X				
Sandhill crane (*Grus canadensis*)	X	X		X			24 H				G5, S3B						
Savannah sparrow * (*Passerculus sandwichensis*)		X															
Semi-palmated plover (*Charadrius semipalmatus*)	X							3									
Semi-palmated sandpiper (*Calidris pusilla*)	X	X						1									
Sharp-shinned hawk (*Accipiter striatus*)	X	X					18 H										
Short-eared owl * (*Asio flammeus*)							23 H				G5, S4	5		X			MA
Snow bunting (*Plectrophenax nivalis*)																	PR
Snow goose (*Chen caerulescens*)	X	X			X										X		
Snowy egret (*Egretta thula*)	X	X					14 M		H-9/ M-10	X	G5, S2B					X	

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Snowy owl (*Nyctea scandiaca*)																	PR
Solitary sandpiper (*Tringa solitaria*)	X							2					X	X			
Song sparrow * (*Melospiza melodia*)		X															
Sora * (*Porzana carolina*)	X																
Spotted sandpiper * (*Actitus macularius*)	X	X						3									
Spotted towhee * (*Pipilo maculatus*)							17 M										
Stilt sandpiper (*Calidris himantopus*)	X	X						1						X			
Swainson's hawk * (*Buteo swainsoni*)	X	X					23 H				G5, S3B	5	X	X			MA
Swainson's thrush (*Catharus ustulatus*)																	
Townsend's solitaire (*Myadestes townsendi*)							19 M										
Townsend's warbler (*Dendroica townsendi*)							22 H										
Trumpeter swan (*Cygnus buccinator*)	X	X	SOC	X	X	X	26 H				G4, S1B, S2N	3			X	X	
Tundra swan (*Cygnus columbianus*)	X	X		X	X												
Varied thrush (*Ixoreus naevius*)							22 H										PR
Vaux's swift (*Chaetura vauxi*)	X						23 H					5					
Vesper sparrow * (*Pooecetes gramineus*)							16 M										
Violet-green swallow * (*Tachycineta thalassina*)		X					17 M										
Virginia rail * (*Rallus limicola*)	X																
Warbling vireo (*Vireo gilvus*)							18 M										
Western grebe * (*Aechmophorus occidentalis*)	X	X					22 H		H-9/ M-10	X	G5, S2B						
Western kingbird * (*Tyrannus jerticalis*)																	
Western meadowlark * (*Sturnella neglecta*)		X					18 H										
Western sandpiper (*Calidris mauri*)	X	X						4									
Western screech owl * (*Otus kennicottii*)		X															

Species/Species Groups/Communities	Refuge Purposes[a]	Biological Diversity, Integrity and Environmental Health	Federal T and E Species[b]	Pacific Flyway Waterfowl Plan[c]	N. American Waterfowl Management Plan (2004)[d]	Partners in Flight Priority WF Spp BCRs 9 and 10[e]	ID PIF BCRs 9 and 10[f]	IM West Reg. Shorebird Plan and U.S. Shorebird Cons. Plan[g]	IM West Reg. Shorebird Plan and BCR 9and10[h]	N. American Waterbird Conservation Plan[i]	Idaho CWCS Species of Greatest Conservation Need[j]	BLM Sensitive Species Type[k]	Birds of Cons. Concern 2002 (USFWS) BCR 9 and 10[l]	BCC National (Table 48)[m]	USFWS Gamebirds Below Desired Condition(GBBDC)	Columbia Plateau Ecoregional Assessment[n]	Landbird Conservation Strategy 2000[o]
Western tanager * (*Piranga cudoviciana*)							20 H										
Western wood-pewee (*Contopus sordidulus*)							17 M										
White-faced ibis (*Plegadis chihi*)	X	X	SOC				20 H		M	X	G5, S2B	4					
White-throated sparrow (*Zonotrichia albicollis*)																	PR
White-throated swift * (*Aeronautes saxatalis*)	X	X					18 M										MA
White-winged scoter (*Melanitta fusca*)	X	X			XD												
Willet (*Catoptrophorus semipalmatus*)	X						20 M	4									
Willow flycatcher (*Empidonax trailii*)							21 H					3					MA
Wilson's phalarope (*Phalaropus tricolor*)	X	X					21 M	5			G5, S3B	5	X	X			
Winter wren (*Troglodytes troglodytes*)																	
Wood duck * (*Aix sponsa*)	X				X		19 M								X		
Yellow warbler * (*Dendroica petechia*)							18 H										
Yellow-billed cuckoo* (*Coccyzus americanus*)		X	SOC				19 M				G5, S2B	1	C	LT /L E			
Yellow-breasted chat * (*Icteria virens*)		X															
Yellow-headed blackbird * (*Xanthocephalus xanthocephalus*)		X					18 M										PR
Yellow-rumped warbler (*Dendroica coronata*)							16 M										
MAMMALS																	
Pygmy rabbit (*Brachylagus idahoensis*)		X														X	
Southern Idaho ground squirrel (*Spermophilus brunneus endemicus*)		X	SOC														
AMPHIBIANS																	
Northern leopard frog (*Rana pipiens*)		X	SOC								G5, S2	2					
Western toad (*Bufo boreas*)		X	SOC														
REPTILES																	
Western longnose snake (*Rhinicheilus lecontei*)		X									G5, S2	3					

Table E-3 (continued). Category Codes: Deer Flat National Wildlife Refuge Potential Resources of Concern

Category Codes:	* known to nest on Refuge either Lake Lowell or Snake River Islands
Refuge Purposes:	X - species groups benefiting from waterfowl/Refuge management (1967 Refuge Prospectus)
Biological Diversity, Integrity, and Environmental Health:	X - Refuge-compatible species
Federal T and E:	LE - Endangered
	LT -Threatened
	SOC - Species of Concern
Pacific Flyway Waterfowl Plan:	X - species benefiting from waterfowl plan
North American Waterfowl Management Plan:	D - decreasing long-term trend
Idaho Partners in Flight:	Idaho Bird Conservation (Version 1.0 January 2000)
	H - High priority breeding
	M - Moderate priority in habitat management and monitoring plans/high responsibility
	Bold face - Primary breeding habitat available on Refuge
Intermountain West Regional Shorebird Plan:	5 - Critically important
	4 - Very important
	3 - Important
	2 - Slightly important
	1 - Unimportant
Idaho CWCS:	Species of Greatest Conservation Need
	S1- Critically imperiled in Idaho
	S2 - Imperiled in Idaho
	S3 - Vulnerable in Idaho
	S4 - Apparently secure in Idaho; some cause for long-term concern due to declines or other factors
	S5 - Secure in Idaho; common, widespread, abundant
	G4 - Apparently secure globally; some cause for long-term concern due to declines or other factors
	G5 - Secure globally; common, widespread, abundant
	N - Nonbreeding
	B - Breeding, conservation status refers to breeding populations of this species
	E - State Endangered
	SNR - Unranked: conservation status not yet assessed
BLM Sensitive Species List:	Type 1 - Threatened, endangered, proposed and candidate
	Type 2 - Rangewide/Globally imperiled
	Type 3 - Regional/State imperiled
	Type 4 - Peripheral
	Type 5 - Watch list
Birds of Conservation Concern: Region 1 USFWS	
BCR 9 and 10	X - Regional Birds of Conservation Concern
BCC/National:	X - National Birds of Conservation Concern
GBBDC:	X - Gamebirds below desired condition
The Nature Conservancy (TNC) Columbia Plateau Ecoregional Assessment:	X - Species/Habitats of concern
Landbird Conservation Plan:	IM - Immediate Action
	MA - Management
	PR - Long-term Planning and Responsibility
Other Plans:	Addressed in Plan, no specific category

Sources/Criteria for Potential Resources of Concern Table

[a] Deer Flat National Wildlife Refuge Purpose: E.O. 7655, July 12, 1937; 16 U.S.C. 715d (Migratory Bird Conservation Act); 16 U.S.C. 460k-1 (Refuge Recreation Act).

[b] USFWS Endangered Species Program.

[c] SPPCG (Subcommittee on Pacific Population of Canada Geese). 2000. Pacific Flyway management plan for the Pacific Population of Canada Geese (unpublished report). Pacific Flyway Study Committee, U.S. Fish and Wildlife Service. Portland, OR. 31 pp.

[d] NAWMPC (North American Waterfowl Management Plan Committee). 2004. North American waterfowl management plan. Implementation framework: strengthening the biological foundation. Canadian Wildlife Service, U.S. Fish and Wildlife Service, Secretaria de Medio Ambiente y Recursos Naturales. 106 pp.

[e] IWJV (Intermountain West Joint Venture) Idaho Steering Committee. 2005. Coordinated implementation plan for bird conservation in Idaho. Appendix A, pp. 34-42. Available at: http://saltshake.com.s50844.gridserver.com/?get=1.28.148. Accessed May 18, 2012.

[f] Idaho Partners in Flight 2000. Idaho Bird Conservation Plan, Version 1.0: Appendices 2 and 3 pp. 118-123. 166 pp.

[g] Brown, S., C. Hickey, B. Harington, and R. Gill, eds. 2001. United States shorebird conservation plan, 2nd ed. Manomet Center for Conservation Sciences. Manomet, MA. 64 pp.

[h] Oring, L.W., L. Neel, and K.E. Oring. 2000. U.S. shorebird conservation plan. Intermountain West regional shorebird plan version 1.0. Available at: shorebirdplan.fws.gov/RegionalShorebird/downloads/IMWEST4.doc. Accessed May 18, 2012.

[i] Kushlan, J.A., M. Steinkamp, K. Parsons, J. Capp, M.A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R.M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J.E. Saliva, B. Syderman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird conservation for the Americas: the North American waterbird conservation plan, version 1. Waterbird Conservation for the Americas. Washington, D.C. 84 pp.

[j] IDFG (Idaho Department of Fish and Game). 2005. Idaho comprehensive wildlife conservation strategy. Idaho Conservation Data Center, Idaho Department of Fish and Game. Boise, ID. Available at: http://fishandgame.idaho.gov/public/wildlife/cwcs/. Accessed May 18, 2012.

[k] BLM (Bureau of Land Management). 2011. BLM sensitive species. Available at: http://www.blm.gov/wy/st/en/programs/pcp/species/sensitive.html. Accessed May 25, 2012.

[l] USFWS (U.S. Fish and Wildlife Service). 2002c. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia. 99 pp. Available at: http://www.fws.gov/midwest/wind/references/BCC2002.pdf. Accessed June 11, 2012.

[m] USFWS Division of Migratory Bird Management. 2007. Gamebirds below desired condition (draft). Available at: http://library.fws.gov/bird_publications/gamebirds_conditions.pdf. Accessed June 11, 2012.

[n] Andelman S., K. Gillem, C. Groves, C. Hansen, J. Humke, T. Klahr, L. Kramme, B. Moseley, M. Reid, D. Vander Schaaf, M. Coad, C. Deforest, C. Macdonald, J. Baumgartner, J. Hak, C. Hansen, S. Hobbs, L. Lunte, L. Smith, and C. Soper. 1999. The Columbia Plateau ecoregional assessment: a pilot effort in ecoregional conservation. The Nature Conservancy. Available at: http://waconservation.org/projects/ecoregions/. Accessed May 25, 2012.

[o] Altman, B. and A. Holmes. 2000. Conservation strategy for landbirds in the Columbia Plateau of Eastern Oregon and Washington. Version 1.0. Oregon-Washington Partners in Flight. 97 pp.

Table E-4 includes focal species and habitat types and structures commonly associated with these species. Not all species listed in this table have been documented on the Refuge.

Table E-4. National Wildlife Refuge System Priority Resources of Concern at the Refuge

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
Riparian Forests: Lake Lowell and River Islands				
Yellow warbler *Dendroica petechia*	Deciduous forest and shrub	Mid- to late succession multilayered, varied forest >70% cover in shrub layer (<10 feet), subcanopy layer (>10 feet and below the canopy foliage) with subcanopy layer contributing >40% of the total cover, canopy tree closure >20% with native species including cottonwood, willow, ash, maple, red-osier dogwood, elderberry, golden currant.	Nesting, foraging, and migrating	Bald eagle, wood duck, Lewis's woodpecker, yellow-billed cuckoo, osprey, red-tailed hawk, northern goshawk, olive-sided flycatcher, belted kingfisher, great horned owl, mourning dove, mule deer, red fox
Song sparrow *Melospiza melodia*		Early succession, continuous mesic and patchy shrub layer (3-12 feet tall) with 30-80% cover with scattered herbaceous openings; canopy trees >12 feet covering <20%; near water. Dense underbrush and deep grass of native species including willows, elm, wild rose, golden currant, elderberry, Great Basin wildrye, and bluebunch wheatgrass.	Nesting, foraging, and migrating	White-crowned sparrow, California quail, western tanager, calliope hummingbird, black-throated sparrow, gray flycatcher, vesper sparrow, savannah sparrow, common yellowthroat, western terrestrial garter snake
Marsh Wetlands				
Mallard *Anas platyrhychos*	Palustrine emergent, freshwater marsh	Seasonally flooded shallow, marsh <4-36 inches deep; flooded by irrigation inflow April through October, seasonal precipitation November through March; 30%-70% cover of emergent vegetation, native seed bearing species including cattail, bulrush spp., reed spp., smartweed, and duckweed.	Nesting, foraging, and wintering	Wood duck, great blue heron, American wigeon, black-crowned night heron, marsh wren, red-winged blackbird, yellow-headed blackbird, western meadowlark, mourning dove, barn owl, pied-billed grebe, sora, American kestrel, painted turtle
Emergent Vegetation: Lake Lowell				
Western grebe ***Aechmophorus occidentalis***	Lacustrine, littoral	Shallow-flooded emergent community characterized by 50%-75% cover of moist-soil plants (e.g., smartweeds) interspersed	Nesting and loafing	Pied-billed grebe, Clark's grebe, eared grebe, canvasback, American coot

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
Canada goose ***Branta canadensis***		with Baltic rush, spikerush, bulrush, salt grass, bur-reed, and cattail. Minimal human disturbance during late spring and summer.	Foraging, migrating, and wintering	Tundra swan, double-crested cormorant, caspian tern, black tern, Bonaparte's gull, glaucous gull, Franklin's gull, Sabine's gull
Mallard ***Anas platyrhychos***			Foraging, migrating, and wintering	Blue-winged teal, canvasback, ruddy duck, American wigeon, gadwall, green-winged teal, northern shoveler, redhead, common merganser, northern pintail, northern leopard frog
Shoreline Mudflats: Lake Lowell				
Long-billed dowitcher ***Limnodromus scolopaceus***	Non-persistent; lacustrine	Sparse to no vegetation; shallow flooding (<4 inches) during winter/spring; exposed during summer/fall by water withdrawals; substrate of silt, sand, and gravel; minimal human disturbance during late spring and summer.	Foraging, loafing, and migrating	American avocet, virginia rail, sora, Baird's sandpiper, American bittern, great blue heron, killdeer, common snipe, greater yellowlegs, lesser yellowlegs, willet, least bittern, western sandpiper, semi-palmated plover, black-bellied plover, cattle egret, white-faced ibis, great egret, solitary sandpiper, Wilson's phalarope
Open Water: Lake Lowell				
American white pelican ***Pelecanus erythrorhynchos***	Lacustrine; limnetic	Unconsolidated, open deep water with abundant fish; open water adjacent to emergent vegetation; minimal human disturbance.	Foraging, loafing, and migratory	Osprey, bald eagle, common loon, Clark's grebe, common merganser, double-crested cormorant, Canada goose, mallard, California gull, caspian tern, ring-billed gull, black tern, common tern, tundra swan
Western grebe ***Aechmophorus occidentalis***				
Shrub-steppe: Lake Lowell and River Islands				
Sage thrasher ***Oreoscoptes montanus***	Reservoir uplands: shrub-steppe Tall mature sagebrush in	Unfragmented stands of sagebrush spp. >50 acres; mosaic open (5%) to moderate (25%) shrub cover; variety of ages and heights associated with patchy distribution including bitterbrush, saltbrush, rabbitbrush; open understory of bare ground, native perennial forbs	Nesting, foraging, and migrating	Swainson's hawk, northern harrier, ferruginous hawk, prairie falcon, long-billed curlew, killdeer, gray flycatcher, western meadowlark, sage sparrow, Brewer's sparrow, green-tailed

Suggested Focal Species	Habitat Type	Habitat Structure	Life History Requirement*	Other Benefiting Species
	relatively large patches	and bunchgrasses including bluebunch wheatgrass, Great basin wildrye, and Idaho fescue.		towhee, rock wren, vesper sparrow, horned lark, grasshopper sparrow, black-tailed jackrabbit, badger, yellow-bellied marmot, mountain cottontail
Loggerhead shrike ***Lanius ludovianus***		Open stands, 20-40 acres of sagebrush, bitterbrush, greasewood, native shrub, and small trees >50 inches with low ground cover; flat topography <10% grade; near thick patches of shrub; short native grassland.		
Canada goose ***Branta canadensis***	Riverine islands: shrub-steppe Permanent cover of sagebrush; semi-permanent, emergent willow	Tall shrub cover <3% consisting of dense residual vegetation; mix of tall native grasses, forbs, and low shrub cover; <50 m from wetlands/open water. Vegetation including sagebrush spp., fourwing saltbush, rabbitbrush spp., golden currant, wild rose, willow spp., Great basin wildrye, bluebunch wheatgrass, Indian ricegrass, western wheatgrass, and smooth brome.	Nesting, wintering, and migrating	Black rosy-finch, gray rosy-finch, green-tailed towhee, yellow-breasted chat, rock wren, canyon wren, vesper sparrow, cliff swallow, chukar, red-tailed hawk, golden eagle, bank swallow, white-throated swift, raccoon, mink
Mallard ***Anas platyrhychos***				
Agricultural				
Canada goose ***Branta canadensis***	Agricultural pastures, croplands	Short grass/alfalfa (<6 inches); winter wheat/barley (4-6 inches average winter vegetation height), ryegrass preferred (>30%), small pastures <100 acre patch size adjacent to wetlands. Residual crops of corn; cropland area buffered by at least 250 meters to minimize human disturbance.	Foraging, wintering, and migrating	Greater white-fronted goose, Ross's goose, common goldeneye, great blue heron, American wigeon, barn owl, short-eared owl, Swainson's hawk, red-tailed hawk, coyote, montane vole, mule deer, red fox, mountain cottontail
Mallard ***Anas platyrhychos***				

*"Life History Requirement" column only reflects focal species.

Table E-5. Current List of Wildlife and Plants of Deer Flat National Wildlife Refuge

Common Name	Family	Genus	Species
Silver maple	Aceraceae	*Acer*	*saccharium*
Water plantain	Alismataceae	*Alisma*	sp.
Tumble pigweed	Amaranthaceae	*Amaranthus*	*albus*
Palmer amaranth pigweed	Amaranthaceae	*Amaranthus*	*palmeri*
Redroot pigweed	Amaranthaceae	*Amaranthus*	*retroflexus*
Smooth sumac	Anacardiaceae	*Rhus*	*glabra*
Skunkbush sumac	Anacardiaceae	*Rhus*	*trilobata*
Poison ivy	Angcardiaceae	*Rhus*	*radicans*
Water hemlock	Apiaceae	*Cicuta*	*douglasii*
Poison hemlock	Apiaceae	*Conivum*	*maculatum*
Fern-leaved desert parsley	Apiaceae	*Lomatium*	*dissectum*
Indian hemp dogbane	Apocynaceae	*Apocynum*	*cannabinum*

Common Name	Family	Genus	Species
Showy milkweed	Asclepiadaceae	*Ascelepias*	*speciosa*
Mexican whorled milkweed	Asclepiadaceae	*Asclepias*	*fascicularis*
False dandelion	Asteraceae	*Agoseris*	*glauca*
Common burdock	Asteraceae	*Arctium*	*minus*
Silver sage	Asteraceae	*Artemisia*	*cana*
Basin big sagebrush	Asteraceae	*Artemisia*	*tridentata trindentata*
Wyoming sagebrush	Asteraceae	*Artemisia*	*tridentata wyomingensis*
Musk thistle	Asteraceae	*Carduus*	*nutans*
Spotted knapweed	Asteraceae	*Centaurea*	*stoebe*
Rush skeletonweed	Asteraceae	*Chondrilla*	*juncea*
Gray rabbitbrush	Asteraceae	*Chrysothamnus*	*nauseosus*
Green rabbitbrush	Asteraceae	*Chrysothamnus*	*viscidiflorus*
Canada thistle	Asteraceae	*Cirsium*	*arvense*
Bull thistle	Asteraceae	*Cirsium*	*vulgare*
Hawskbeard	Asteraceae	*Crepis*	*acumenata*
Curlycup gumweed	Asteraceae	*Grindelia*	*squarrosa*
Snakeweed	Asteraceae	*Gutierrezia*	*sarothrae*
Common sunflower	Asteraceae	*Helianthus*	*annuus*
Poverty weed	Asteraceae	*Iva*	*axillaris*
Marsh elder	Asteraceae	*Iva*	*xanthifolia*
Prickly lettuce	Asteraceae	*Lactuca*	*serriola*
Purple aster	Asteraceae	*Machaeranthera*	*canescens*
Scotch thistle	Asteraceae	*Onopordum*	*acanthium*
Goldenrod	Asteraceae	*Solidago*	spp.
Common sowthistle	Asteraceae	*Sonchus*	*oleraceus*
Dandelion	Asteraceae	*Taraxacum*	*officinale*
Spiny horsebrush	Asteraceae	*Tetradymia*	*spinosa*
Western yellow salsify	Asteraceae	*Tragopogon*	*dubius*
Common cocklebur	Asteraceae	*Xanthium*	*strumarium*
Fiddleneck	Boraginaceae	*Amsinckia*	*menziesii*
Fiddleneck	Boraginaceae	*Amsinckia*	*retrorsa*
Wintercress	Brassicaceae	*Barbarea*	*orthoceras*
Shepherd's purse	Brassicaceae	*Capsella*	*bursa-pastoris*
Hoary cress	Brassicaceae	*Cardaria*	*draba*
Blue mustard	Brassicaceae	*Chorispora*	*tenella*
Pinnate tansy mustard	Brassicaceae	*Descurainia*	*pinnata*
Spring draba	Brassicaceae	*Draba*	*verna*
Whitetop	Brassicaceae	*Lepidium*	*draba*
Broadleaved pepperweed	Brassicaceae	*Lepidium*	*latifolium*
Clasping pepperweed	Brassicaceae	*Lepidium*	*perfoliatum*
Yellowcress	Brassicaceae	*Rorippa*	sp.
Tumblemustard	Brassicaceae	*Sisymbrium*	*altissimum*
Field pennycress	Brassicaceae	*Thlaspi*	*arvense*
Prickly pear cactus	Cactaceae	*Opuntia*	*polycantha*
Blue elderberry	Caprifoliaceae	*Sambucus*	*nigra* ssp. *Cerulea*
Jagged chickweed	Caryophyllaceae	*Holosteum*	*umbellatum*
Fourwing saltbush	Chenopodiaceae	*Atriplex*	*canescens*
Kochia	Chenopodiaceae	*Bassia*	sp.
Common lambsquarter	Chenopodiaceae	*Chenopodium*	*album*
Spiny hopsage	Chenopodiaceae	*Grayii*	*spinosa*
Russian thistle	Chenopodiaceae	*Salsola*	*kali*
Greasewood	Chenopodiaceae	*Sarcobatus*	*Nees*

Common Name	Family	Genus	Species
Field bindweed	Convolvulaceae	*Convolvulus*	*arvensis*
White bryony	Cucurbitaceae	*Bryonia*	*alba*
Annual wild cucumber	Cucurbitaceae	*Echinocystis*	*lobata*
Western wild cucumber	Cucurbitaceae	*Marah*	*oreganus*
Sedge	Cyperaceae	*Carex*	spp.
Spikerush sp.	Cyperaceae	*Eleocharis*	sp.
Hard-stem bulrush	Cyperaceae	*Schoenoplectus*	*acutus*
River bulrush	Cyperaceae	*Schoenoplectus*	*fluviatilis*
Soft-stem bulrush	Cyperaceae	*Schoenoplectus*	*tabernaemontani*
Bulrush	Cyperaceae	*Scirpus*	sp.
Common teasel	Dipsacaceae	*Dipsacus*	*fullonum*
Russian olive	Elaeagnaceae	*Elaeagnus*	*angustifolia*
Small matted sandmat	Euphorbiaceae	*Chamaesyce*	*serpens*
Turkey mullein	Euphorbiaceae	*Eremocarpas*	*setigerus*
Leafy spurge	Euphorbiaceae	*Euphorbia*	*esula*
False indigo bush	Fabaceae	*Amorpha*	*fruticosa*
Packard's milkvetch	Fabaceae	*Astragalus*	*Cusickii var. packardiae*
Hermit milkvetch	Fabaceae	*Astragalus*	*Eremiticus*
Woollypod milkvetch	Fabaceae	*Astragalus*	*purshii ophiogenes*
Black medic	Fabaceae	*Medicago*	*Lupulina*
Alfalfa	Fabaceae	*Medicago*	*Sativa*
White sweet clover	Fabaceae	*Melilotus*	*Albus*
Yellow sweet clover	Fabaceae	*Melilotus*	*Officinalis*
Strawberry clover	Fabaceae	*Trifolium*	*Fragiferum*
White clover	Fabaceae	*Trifolium*	*Repens*
Storksbill	Geraniaceae	*Erodium*	*Cicutarium*
Golden currant	Grossulariaceae	*Ribes*	*Aureum*
Eurasian watermilfoil	Haloragaceae	*Myriophyllum*	*Spicatum*
Hydrilla	Hydrocharitaceae	*Hydrilla*	*Verticillata*
Yellow flag	Iridaceae	*Iris*	*Pseudacorus*
Black walnut	Juglandaceae	*Juglans*	*Nigra*
Catnip	Lamiaceae	*Nepeta*	*Cataria*
Duckweed	Lemnaceae	*Lemna*	*Minor*
Taper-tip onion	Liliaceae	*Allium*	*Acuminatum*
Asparagus	Liliaceae	*Asparagus*	*Officinalis*
Sego lily	Liliaceae	*Calochurtus*	*Nuttallii*
Purple loosestrife	Lythraceae	*Lythrum*	*Salicaria*
Common mallow	Malvaceae	*Malva*	*neglecta*
Gooseberryleaf globemallow	Malvaceae	*Sphaeralcea*	*grossulariifolia*
Munro's globemallow	Malvaceae	*Sphaeralcea*	*munroana*
White mulberry	Moraceae	*Morus*	*alba*
White ash	Oleaceae	*Fraxinus*	*americana*
Green ash	Oleaceae	*Fraxinus*	*pennsylvanica*
Tall annual willow herb	Onagraceae	*Epilobium*	*paniculatum*
Lewis's mockorange	Philadelphaceae	*Philadelphus*	*lewisii*
Broad leafed plantain	Plantaginaceae	*Plantago*	*major*
Jointed goatgrass	Poaceae	*Aegilops*	*cylindrica*
Crested wheatgrass	Poaceae	*Agropyron*	*cristatum*
Intermediate wheatgrass	Poaceae	*Agropyron*	*intermedia*
Siberian wheatgrass	Poaceae	*Agropyron*	*siberiuim*
Bluebunch wheatgrass	Poaceae	*Agropyron*	*spicata*
Rough bentgrass	Poaceae	*Agrostis*	*Scabra*

Common Name	Family	Genus	Species
Wild oat	Poaceae	*Avena*	*Fatua*
Smooth brome	Poaceae	*Bromus*	*inermis*
Japanese brome	Poaceae	*Bromus*	*japonicus*
Cheatgrass	Poaceae	*Bromus*	*tectorum*
Orchard grass	Poaceae	*Dactycis*	*glomerata*
Salt grass	Poaceae	*Distichlis*	*spicata*
Barnyardgrass	Poaceae	*Echinochloa*	*crus-galli*
Great basin wildrye	Poaceae	*Elymus*	*cinereus*
Bottlebrush squirreltail	Poaceae	*Elymus*	*elimoides*
Tall wheatgrass	Poaceae	*Elytrigia*	*pontica*
Tall fescue	Poaceae	*Festcua*	*arundinaceae*
Six week fescue	Poaceae	*Festcua* (*Vulpia*)	*octoflora*
Idaho fescue	Poaceae	*Festuca*	*idahoensis*
Mannagrass	Poaceae	*Glyceria*	sp.
Smooth annual barley	Poaceae	*Hordeum*	*glancum*
Foxtail barley	Poaceae	*Hordeum*	*jubatum*
Giant wildrye	Poaceae	*Leymus*	*condensatus*
Beardless wildrye	Poaceae	*Leymus*	*triticoides*
Indian ricegrass	Poaceae	*Oryzopsis*	*hymenoides*
Fall panicgrass	Poaceae	*Panicum*	*dichotomiflorum*
Western wheatgrass	Poaceae	*Pascopyrum*	*Smithii*
Reed canarygrass	Poaceae	*Phalaris*	*arundinacea*
Common timothy	Poaceae	*Phleum*	*Pretense*
Bulbous bluegrass	Poaceae	*Poa*	*bulbosa*
Nevada bluegrass	Poaceae	*Poa*	*Nevadensis*
Kentucky bluegrass	Poaceae	*Poa*	*Pratensis*
Sandberg's bluegrass	Poaceae	*Poa*	*secunda*
Rabbitfoot grass	Poaceae	*Polypogon*	*monspeliensis*
Weeping alkaligrass	Poaceae	*Puccinellia*	*distans*
Green foxtail	Poaceae	*Setaria*	*glauca*
Alkali cordgrass	Poaceae	*Spartina*	*gracilis*
Sand dropseed	Poaceae	*Sporobolus*	*cryptandrus*
Needle and thread grass	Poaceae	*Stipa*	*comata*
Medusahead	Poaceae	*Taeniatherum*	*caput-medusae*
Prickly-leaved phlox	Polemoniaceae	*Phlox*	*aculeata*
Long-leafed phlox	Polemoniaceae	*Phlox*	*longifolia*
Water smartweed	Polygonaceae	*Polygonum*	*amphibium*
Prostrate knotweed	Polygonaceae	*Polygonum*	*arenasturm*
Spotted ladysthumb	Polygonaceae	*Polygonum*	*persicaria*
Curly dock	Polygonaceae	*Rumex*	*crispis*
Willow leaves dock	Polygonaceae	*Rumex*	*salicifolius*
Common purslane	Portulacaeae	*Portulaca*	*oleracea*
Curly-leaf pondweed	Potamogetonaceae	*Potamogeton*	*crispus*
Cursed buttercup	Ranunculaceae	*Ranunculus*	*scleratus*
Bur buttercup	Ranunculaceae	*Ranunculus*	*testiculatus*
Biennial cinquefoil	Rosaceae	*Potentilla*	*biennis*
Ornamental plum	Rosaceae	*Prunus*	spp.
Bitterbrush	Rosaceae	*Purshia*	*tridentate*
Sweetbriar rose	Rosaceae	*Rosa*	*eglanteria*
Woods' rose	Rosaceae	*Rosa*	*Woodsia*
Catchweed bedstraw	Rubiaceae	*Galium*	*Aparine*
Cottonwood sp.	Salicaceae	*Populus*	sp.

Common Name	Family	Genus	Species
Peachleaf willow	Salicaceae	*Salix*	*amygdaloides*
Coyote willow	Salicaceae	*Salix*	*Exigua*
Pacific willow	Salicaceae	*Salix*	*lucida* spp. *lasiandra*
Willow	Salicaceae	*Salix*	*salix* spp.
Indian paintbrush	Scrophulariaceae	*Castilleja*	*mutis* spp.
Woody mullein	Scrophulariaceae	*Verbascum*	*Blattaria*
Common mullein	Scrophulariaceae	*Verbascum*	*Thapsus*
Water speedwell	Scrophulariaceae	*Veronica*	*anagallis-aquatica*
Virginia groundcherry	Solanaceae	*Physalis*	*virginiana*
Bittersweet nightshade	Solanaceae	*Solanum*	*dulcamara*
Black nightshade	Solanaceae	*Solanum*	*Nigrum*
Simplestem bur-reed	Sparganiaceae	*Sparganium*	*Erectum*
Salt cedar	Tamaricaceae	*Tamarix*	*ramosissima*
Tamarisk	Tamaricaceae	*Tamarix*	*ramosissima*
Common cattail	Typhaceae	*Typha*	*Latifolia*
Chinese elm	Ulmaceae	*Ulmus*	*parvifolia*
Stinging nettle	Urticaceae	*Urtica*	*Dioica*
Prostrate vervain	Verbenaceae	*Verbena*	*bracteata*
Virginia creeper	Vitaceae	*Parthenocissus*	*quinquefolia*
Riverbank grape	Vitaceae	*Vitis*	*riparia*
Puncturevine	Zygophyllaceae	*Tribulus*	*terrestris*

Mammals			
Common Name	**Family**	**Genus**	**Species**
Coyote	Canidae	*Canis*	*latrans*
Red fox	Canidae	*Vulpes*	*vulpes*
North American beaver	Castoridae	*Castor*	*canadensis*
Elk	Cervidae	*Cervus*	*canadensis*
Mule deer	Cervidae	*Odocoileus*	*hemionus*
White-tailed deer	Cervidae	*Odocoileus*	*virginianus*
Mountainvole	Cricetidae	*Microtus*	*montanus*
Deer mouse	Cricetidae	*Peromyscus*	*maniculatus*
Western harvest mouse	Cricetidae	*Reithrodontomys*	*megalotis*
Northern pocket gopher	Geomyidae	*Thomomys*	*talpoides*
Northern pocket gopher	Geomyidae	*Thomomys*	*talpoides*
Black-tailed jackrabbit	Leporidae	*Lepus*	*californicus*
Mountain cottontail	Leporidae	*Sylvilagus*	*nuttalli*
Striped skunk	Mephitidae	*Mephitis*	*mephitis*
House mouse	Muridae	*Mus*	*musculus*
North American river otter	Mustelidae	*Lontra*	*canadensis*
American mink	Mustelidae	*Neovison*	*vison*
Badger	Mustelidae	*Taxidea*	*taxus*
Raccoon	Procyonidae	*Procyon*	*lotor*
Yellow-bellied marmot	Sciuridae	*Marmota*	*flavientris*
Fox squirrel	Sciuridae	*Sciurus*	*niger*

Birds			
Common Name	**Family**	**Genus**	**Species**
Geese, Swans, and Ducks			
Wood duck	Anatidae	*Aix*	*sponsa*
Northern pintail	Anatidae	*Anas*	*acuta*
American wigeon	Anatidae	*Anas*	*americana*

Birds			
Common Name	**Family**	**Genus**	**Species**
Green-winged teal	Anatidae	*Anas*	*carolinensis*
Northern shoveler	Anatidae	*Anas*	*clypeata*
Cinnamon teal	Anatidae	*Anas*	*cyanoptera*
Blue-winged teal	Anatidae	*Anas*	*discors*
Eurasian wigeon	Anatidae	*Anas*	*penelope*
Mallard	Anatidae	*Anas*	*platyrhychos*
Gadwall	Anatidae	*Anas*	*strepera*
Greater white-fronted goose	Anatidae	*Anser*	*albifrons*
Lesser scaup	Anatidae	*Aythya*	*affinis*
Redhead	Anatidae	*Aythya*	*americana*
Ring-necked duck	Anatidae	*Aythya*	*collaris*
Greater scaup	Anatidae	*Aythya*	*marila*
Canvasback	Anatidae	*Aythya*	*valisineria*
Canada goose	Anatidae	*Branta*	*canadensis*
Bufflehead	Anatidae	*Bucephala*	*albeola*
Common goldeneye	Anatidae	*Bucephala*	*clangula*
Barrow's goldeneye	Anatidae	*Bucephala*	*islandica*
Snow goose	Anatidae	*Chen*	*caerulescens*
Ross's goose	Anatidae	*Chen*	*rossii*
Long-tailed duck	Anatidae	*Clangula*	*hyemalis*
Trumpeter swan	Anatidae	*Cygnus*	*buccinator*
Tundra swan	Anatidae	*Cygnus*	*columbianus*
Harlequin duck	Anatidae	*Histrionicus*	*histrionicus*
Hooded merganser	Anatidae	*Lophodytes*	*cucullatus*
White-winged scoter	Anatidae	*Melanitta*	*deglandi*
Common merganser	Anatidae	*Mergus*	*merganser*
Red-breasted merganser	Anatidae	*Mergus*	*serrator*
Ruddy duck	Anatidae	*Oxyura*	*jamaicensis*
Gallinaceous Birds			
California quail	Odontophoridae	*Callipepla*	*californica*
Northern bobwhite	Odontophoridae	*Colinus*	*virginianus*
Chukar	Phasianidae	*Alectoris*	*chukar*
Wild turkey	Phasianidae	*Meleagris*	*gallopavo*
Gray partridge	Phasianidae	*Perdix*	*perdix*
Ring-necked pheasant	Phasianidae	*Phasianus*	*colchicus*
Loons			
Common loon	Gaviidae	*Gavia*	*immer*
Pacific loon	Gaviidae	*Gavia*	*pacifica*
Grebes			
Clark's grebe	Podicipedidae	*Aechmophorus*	*clarkii*
Western grebe	Podicipedidae	*Aechmophorus*	*occidentalis*
Horned grebe	Podicipedidae	*Podiceps*	*auritus*
Eared grebe	Podicipedidae	*Podiceps*	*nigricollis*
Pied-billed grebe	Podicipedidae	*Podilymbus*	*podiceps*
Pelicans and Cormorants			
American white pelican	Pelecanidae	*Pelecanus*	*erythrorhynchos*
Double-crested cormorant	Phalacrocoracidae	*Phalacrocorax*	*auritus*
Bitterns, Herons, and Egrets			
Great egret	Ardeidae	*Ardea*	*alba*
Great blue heron	Ardeidae	*Ardea*	*herodias*
American bittern	Ardeidae	*Botaurus*	*lentiginosus*

Birds			
Common Name	**Family**	**Genus**	**Species**
Cattle egret	Ardeidae	*Bubulcus*	*ibis*
Green heron	Ardeidae	*Butorides*	*virescens*
Snowy egret	Ardeidae	*Egretta*	*thula*
Least bittern	Ardeidae	*Ixobrychus*	*exilis*
Black-crowned night heron	Ardeidae	*Nycticorax*	*nycticorax*
Ibis and Spoonbills			
White-faced ibis	Threskiornithidae	*Plegadis*	*chihi*
New World Vultures			
Turkey vulture	Cathartidae	*Cathartes*	*aura*
Osprey, Kites, Eagles, and Hawks			
Cooper's hawk	Accipitridae	*Accipiter*	*cooperii*
Northern goshawk	Accipitridae	*Accipiter*	*gentilis*
Sharp-shinned hawk	Accipitridae	*Accipiter*	*striatus*
Golden eagle	Accipitridae	*Aquila*	*chrysaetos*
Red-tailed hawk	Accipitridae	*Buteo*	*jamaicensis*
Rough-legged hawk	Accipitridae	*Buteo*	*lagopus*
Ferruginous hawk	Accipitridae	*Buteo*	*regalis*
Swainson's hawk	Accipitridae	*Buteo*	*swainsoni*
Northern harrier	Accipitridae	*Circus*	*cyaneus*
Bald eagle	Accipitridae	*Haleaeetus*	*leucocephalus*
Osprey	Accipitridae	*Pandion*	*haliaetus*
Falcons			
Merlin	Falconidae	*Falco*	*columbarius*
Prairie falcon	Falconidae	*Falco*	*mexicanus*
Peregrine falcon	Falconidae	*Falco*	*peregrinus*
Gyrfalcon	Falconidae	*Falco*	*rusticolus*
American kestrel	Falconidae	*Falco*	*sparverius*
Rails			
American coot	Rallidae	*Fulica*	*americana*
Sora	Rallidae	*Porzana*	*carolina*
Virginia rail	Rallidae	*Rallus*	*limicola*
Cranes			
Sandhill crane	Gruidae	*Grus*	*canadensis*
Plovers			
Snowy plover	Charadriidae	*Charadrius*	*nivosus*
Semi-palmated plover	Charadriidae	*Charadrius*	*semipalmatus*
Killdeer	Charadriidae	*Charadrius*	*vociferus*
American golden plover	Charadriidae	*Pluvialis*	*dominica*
Black-bellied plover	Charadriidae	*Pluvialis*	*squatarola*
Stilts and Avocets			
Black-necked stilt	Recurvirostridae	*Himantopus*	*mexicanus*
American avocet	Recurvirostridae	*Recurvirostra*	*americana*
Sandpipers			
Spotted sandpiper	Scolopacidae	*Actitis*	*macularius*
Sanderling	Scolopacidae	*Calidris*	*alba*
Dunlin	Scolopacidae	*Calidris*	*alpina*
Baird's sandpiper	Scolopacidae	*Calidris*	*bairdii*
Stilt sandpiper	Scolopacidae	*Calidris*	*himantopus*
Western sandpiper	Scolopacidae	*Calidris*	*mauri*
Pectoral sandpiper	Scolopacidae	*Calidris*	*melanotos*
Least sandpiper	Scolopacidae	*Calidris*	*minutilla*

Birds			
Common Name	**Family**	**Genus**	**Species**
Semipalmated sandpiper	Scolopacidae	*Calidris*	*pusilla*
Short-billed dowitcher	Scolopacidae	*Limnodromus*	*griseus*
Long-billed dowitcher	Scolopacidae	*Limnodromus*	*scolopacrus*
Marbled godwit	Scolopacidae	*Limosa*	*fedoa*
Red Knot	Scolopacidae	*Calidris*	*canutus*
Long-billed curlew	Scolopacidae	*Numenius*	*americanus*
Lesser yellowlegs	Scolopacidae	*Tringa*	*flavipes*
Greater yellowlegs	Scolopacidae	*Tringa*	*melanoleuca*
Willet	Scolopacidae	*Tringa*	*semipalmata*
Solitary sandpiper	Scolopacidae	*Tringa*	*solitaria*
Snipe			
Wilson's snipe	Scolopacidae	*Gallinago*	*delicata*
Phalaropes			
Red-necked phalarope	Scolopacidae	*Phalaropus*	*lobatus*
Wilson's phalarope	Scolopacidae	*Phalaropus*	*tricolor*
Gulls and Terns			
California gull	Laridae	*Larus*	*californicus*
Ring-billed gull	Laridae	*Larus*	*delawarensis*
Lesser Black-backed gull	Laridae	*Larus*	*fuscus*
Glaucous-winged gull	Laridae	*Larus*	*glaucescens*
Bonaparte's gull	Laridae	*Larus*	*philadelphia*
Franklin's gull	Laridae	*Larus*	*pipixcan*
Herring gull	Laridae	*Larus*	*smithsonianus*
Thayer's gull	Laridae	*Larus*	*thayeri*
Forster's tern	Laridae	*Sterna*	*forsteri*
Sabine's gull	Laridae	*Xema*	*sabini*
Black tern	Sternidae	*Chlidonias*	*niger*
Caspian tern	Sternidae	*Hydroprogne*	*caspia*
Common tern	Sternidae	*Sterna*	*hirundo*
Doves			
Rock dove	Columbidae	*Columba*	*livia*
Eurasian collared dove	Columbidae	*Streptopelia*	*decaocto*
Mourning dove	Columbidae	*Zenaida*	*macroura*
Cuckoos			
Yellow-billed cuckoo	Cuculidae	*Coccyzus*	*americanus*
Owls			
Northern saw-whet owl	Strigidae	*Aegolius*	*acadicus*
Short-eared owl	Strigidae	*Asio*	*flammeus*
Long-eared owl	Strigidae	*Asio*	*otus*
Burrowing owl	Strigidae	*Athene*	*cunicularia*
Snowy owl	Strigidae	*Bubo*	*scandiacus*
Great horned owl	Strigidae	*Bubo*	*virginianus*
Northern pygmy-owl	Strigidae	*Glaucidium*	*gnoma*
Western screech owl	Strigidae	*Megascops*	*kennicottii*
Flammulated owl	Strigidae	*Otus*	*flammeolus*
Barred owl	Strigidae	*Strix*	*varia*
Barn owl	Tytonidae	*Tyto*	*alba*
Nightjars			
Common nighthawk	Caprimulgidae	*Chordeiles*	*minor*
Common poorwill	Caprimulgidae	*Phalaenoptilus*	*nuttallii*

Birds			
Common Name	**Family**	**Genus**	**Species**
Swifts			
White-throated swift	Apodidae	*Aeronautes*	*saxatalis*
Vaux's swift	Apodidae	*Chaetura*	*vauxi*
Hummingbirds			
Black-chinned hummingbird	Trochilidae	*Archilochus*	*alexandri*
Broad-tailed hummingbird	Trochilidae	*Selasphorus*	*platycercus*
Rufous hummingbird	Trochilidae	*Selasphorus*	*rufus*
Calliope hummingbird	Trochilidae	*Stellula*	*calliope*
Kingfishers			
Belted kingfisher	Cerylidae	*Megaceryle*	*alcyon*
Woodpeckers			
Northern flicker	Picidae	*Colaptes*	*auratus*
Lewis's woodpecker	Picidae	*Melanerpes*	*lewis*
Downy woodpecker	Picidae	*Picoides*	*pubescens*
Hairy woodpecker	Picidae	*Picoides*	*villosus*
Flycatchers			
Olive-sided flycatcher	Tyrannidae	*Cantopus*	*cooperii*
Western wood-pewee	Tyrannidae	*Contopus*	*sordidulus*
Cordilleran	Tyrannidae	*Empidonax*	*occidentalis*
Willow flycatcher	Tyrannidae	*Empidonax*	*trailii*
Gray flycatcher	Tyrannidae	*Empidonax*	*wrightii*
Ash-throated flycatcher	Tyrannidae	*Myiarchus*	*cinerascens*
Say's phoebe	Tyrannidae	*Sayornis*	*saya*
Eastern kingbird	Tyrannidae	*Tyrannus*	*tyrannus*
Western kingbird	Tyrannidae	*Tyrannus*	*verticalis*
Shrikes			
Northern shrike	Laniidae	*Lanius*	*excubitor*
Loggerhead shrike	Laniidae	*Lanius*	*ludovicianus*
Vireos			
Cassin's vireo	Vireonidae	*Vireo*	*cassinii*
Warbling vireo	Vireonidae	*Vireo*	*gilvus*
Red-eyed vireo	Vireonidae	*Vireo*	*olivaceus*
Plumbeous vireo	Vireonidae	*Vireo*	*plumbeus*
Jays, Magpies, and Crows			
American crow	Corvidae	*Corvus*	*brachyrhynchos*
Common raven	Corvidae	*Corvus*	*corax*
Blue jay	Corvidae	*Cyanocitta*	*cristata*
Steller's jay	Corvidae	*Cyanocitta*	*stelleri*
Black-billed magpie	Corvidae	*Pica*	*hudsonia*
Larks			
Horned lark	Alaudidae	*Eremophila*	*alpestris*
Swallows			
Barn swallow	Hirundinidae	*Hirundo*	*rustica*
Cliff swallow	Hirundinidae	*Petrochelidon*	*pyrrhonota*
Bank swallow	Hirundinidae	*Riparia*	*riparia*
Northern rough-winged swallow	Hirundinidae	*Stelgidopteryx*	*serripennis*
Tree swallow	Hirundinidae	*Tachycineta*	*bicolor*
Violet-green swallow	Hirundinidae	*Tachycineta*	*thalassina*
Chickadees			
Black-capped chickadee	Paridae	*Poecile*	*atricapillus*
Mountain chickadee	Paridae	*Poecile*	*gambeli*

Birds			
Common Name	**Family**	**Genus**	**Species**
Bushtits			
Bushtit	Aegithalidae	*Psaltriparus*	*minimus*
Nuthatches			
Red-breasted nuthatch	Sittidae	*Sitta*	*canadensis*
White-breasted nuthatch	Sittidae	*Sitta*	*carolinensis*
Creepers			
Brown creeper	Certhidae	*Certhia*	*americana*
Wrens			
Canyon wren	Troglodytidae	*Catherpes*	*mexicanus*
Marsh wren	Troglodytidae	*Cistothorus*	*palustris*
Rock wren	Troglodytidae	*Salpinctes*	*obsoletus*
House wren	Troglodytidae	*Troglodytes*	*aedon*
Pacific wren	Troglodytidae	*Troglodytes*	*pacificus*
Kinglets, Bluebirds, and Thrushes			
Golden-crowned kinglet	Regulidae	*Regulus*	*satrapa*
Ruby-crowned kinglet	Sylviidae	*Regulus*	*calendula*
Hermit thrush	Turdidae	*Catharus*	*guttatus*
Swainson's thrush	Turdidae	*Catharus*	*ustulatus*
Varied thrush	Turdidae	*Ixoreus*	*naevius*
Townsend's solitaire	Turdidae	*Myadestes*	*townsendi*
Mountain bluebird	Turdidae	*Sialia*	*currucoides*
Western bluebird	Turdidae	*Sialia*	*mexicana*
American robin	Turdidae	*Turdus*	*migratorius*
Mockingbirds and Thrashers			
Gray catbird	Mimidae	*Dumetella*	*carolinensis*
Northern mockingbird	Mimidae	*Mimus*	*polyglottos*
Sage thrasher	Mimidae	*Oeroscoptes*	*montanus*
Starlings			
European starling	Sturnidae	*Sturnus*	*vulgaris*
Pipits			
American pipit	Motacillidae	*Anthus*	*rubescens*
Waxwings			
Cedar waxwing	Bombycillidae	*Bombycilla*	*cedrorum*
Bohemian waxwing	Bombycillidae	*Bombycilla*	*garrulus*
Warblers			
Yellow warbler	Parulidae	*Dendroica*	*petechia*
Townsend's warbler	Parulidae	*Dendroica*	*townsendi*
Common yellowthroat	Parulidae	*Geothlypis*	*trichas*
Yellow-breasted chat	Parulidae	*Icteria*	*virens*
MacGillivray's warbler	Parulidae	*Oporornis*	*tolmiei*
Orange-crowned warbler	Parulidae	*Oreothlypis*	*celata*
Nashville warbler	Parulidae	*Oreothlypis*	*ruficapilla*
Yellow-rumped warbler	Parulidae	*Setophaga*	*coronata*
Wilson's warbler	Parulidae	*Wilsonia*	*pusilla*
Towhees and Sparrows			
Lapland longspur	Calcariidae	*Calcarius*	*lapponicus*
Snow bunting	Calcariidae	*Plectrophenax*	*nivalis*
Grasshopper sparrow	Emberizidae	*Ammodramus*	*savannarum*
Sage sparrow	Emberizidae	*Amphispiza*	*belli*
Black-throated sparrow	Emberizidae	*Amphispiza*	*bilineata*
Lark sparrow	Emberizidae	*Chondestes*	*grammacus*

Birds			
Common Name	**Family**	**Genus**	**Species**
Dark-eyed junco	Emberizidae	*Junco*	*hyemalis*
Lincoln's sparrow	Emberizidae	*Melospiza*	*lincalnii*
Song sparrow	Emberizidae	*Melospiza*	*melodia*
Savannah sparrow	Emberizidae	*Passerculus*	*sandwichensis*
Fox sparrow	Emberizidae	*Passerella*	*iliaca*
Green-tailed towhee	Emberizidae	*Pipilo*	*chlorurus*
Spotted towhee	Emberizidae	*Pipilo*	*maculatus*
Vesper sparrow	Emberizidae	*Pooecetes*	*gramineus*
American tree sparrow	Emberizidae	*Spizella*	*arborea*
Brewer's sparrow	Emberizidae	*Spizella*	*breweri*
Chipping sparrow	Emberizidae	*Spizella*	*passerina*
White-throated sparrow	Emberizidae	*Zonotrichia*	*albicollis*
White-crowned sparrow	Emberizidae	*Zonotrichia*	*leucophrys*
Harris' sparrow	Emberizidae	*Zonotrichia*	*querula*
Grosbeaks and Allies			
Lazuli bunting	Cardinalidae	*Passerina*	*amoena*
Indigo bunting	Cardinalidae	*Passerina*	*cyanea*
Black-headed grosbeak	Cardinalidae	*Pheuctius*	*melanocephalus*
Western tanager	Cardinalidae	*Piranga*	*ludoviciana*
Blackbirds and Orioles			
Red-winged blackbird	Icteridae	*Agelaius*	*phoeniceus*
Brewer's blackbird	Icteridae	*Euphagus*	*cyanocephalus*
Bullock's oriole	Icteridae	*Icterus*	*bullockii*
Brown-headed cowbird	Icteridae	*Molothrus*	*ater*
Great-tailed grackle	Icteridae	*Quiscalus*	*mexicanus*
Common grackle	Icteridae	*Quiscalus*	*quiscula*
Western meadowlark	Icteridae	*Sturnella*	*neglecta*
Yellow-headed blackbird	Icteridae	*Xanthocephalus*	*xanthocephalus*
Finches			
Common redpoll	Fringillidae	*Carduelis*	*flammea*
Pine siskin	Fringillidae	*Carduelis*	*pinus*
American goldfinch	Fringillidae	*Carduelis*	*tristis*
Cassin's finch	Fringillidae	*Carpodacus*	*cassinii*
House finch	Fringillidae	*Carpodacus*	*mexicanus*
Evening grosbeak	Fringillidae	*Coccothraustes*	*vespertinus*
Black rosy-finch	Fringillidae	*Leucosticte*	*atrata*
Gray-crowned rosy-finch	Fringillidae	*Leucosticte*	*tephrocotis*
Weaver Finches			
House sparrow	Passeridae	*Passer*	*domesticus*

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Cockroach	Blattaria (cockroaches)	Blatellidae		
Comb-clawed beetle	Coleoptera (Beetles)	Alleculidae		
	Coleoptera (Beetles)	Anobiidae		
Ant-like flower beetle	Coleoptera (Beetles)	Anthicidae		
Fungus weevils	Coleoptera (Beetles)	Anthribididae		
Seed beetle	Coleoptera (Beetles)	Bruchidae		
Metallic wood-boring beetle	Coleoptera (Beetles)	Buprestidae		
Soldier beetle	Coleoptera (Beetles)	Cantharidae		
Ground beetle	Coleoptera (Beetles)	Carabidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Brown sawyer beetle	Coleoptera (Beetles)	Cerambycidae		
Milkweed long-horned beetle	Coleoptera (Beetles)	Cerambycidae	*Tetraopes*	*tetraophthalmus*
Flea beetle	Coleoptera (Beetles)	Chrysomelidae		
Case-bearing leaf beetle	Coleoptera (Beetles)	Chrysomelidae		
Milkweed leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Chrysochus*	*colbaltinus*
Asparagus leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Crioceris*	*asparagi*
Spotted asparagus beetle	Coleoptera (Beetles)	Chrysomelidae	*Crioceris*	*Duodecim-punctata*
Spotted cucumber leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Diabrotica*	spp.
Elm leaf beetle	Coleoptera (Beetles)	Chrysomelidae	*Galerucella*	*luteola*
Gray tiger beetle	Coleoptera (Beetles)	Cicindelidae		
Ornate checkered beetle	Coleoptera (Beetles)	Cleridae	*Trichodes*	*ornatus*
Ladybird beetle (no spots)	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle (orange; seven spots per elytron	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle (black with cream spots)	Coleoptera (Beetles)	Coccinellidae		
Ladybird beetle	Coleoptera (Beetles)	Coccinellidae	*Hippodamia*	*convergens*
Water boatman	Coleoptera (Beetles)	Corixidae		
Tiny fungus beetle	Coleoptera (Beetles)	Cryptophagidae		
Weevil	Coleoptera (Beetles)	Curculionidae		
Skin beetle	Coleoptera (Beetles)	Dermestidae		
Diving beetle	Coleoptera (Beetles)	Dytiscidae		
Click beetle (dark brown species)	Coleoptera (Beetles)	Elateridae		
Mud-loving beetle	Coleoptera (Beetles)	Heteroceridae		
Water scavenger beetle	Coleoptera (Beetles)	Hydrophillidae		
Minute scavenger beetle	Coleoptera (Beetles)	Latridiidae		
Blister beetle	Coleoptera (Beetles)	Meloidae	*Nemognatha*	spp.
Soft winged flower beetle	Coleoptera (Beetles)	Melyridae		
Tumbling flower beetle	Coleoptera (Beetles)	Mordellidae		
Sap beetle (brown/orange spots on elytra)	Coleoptera (Beetles)	Nitidulidae		
Backswimmer	Coleoptera (Beetles)	Notonectidae		spp.
Scarab beetle (black species)	Coleoptera (Beetles)	Scarabaeidae		
May beetle	Coleoptera (Beetles)	Scarabaeidae	*Phyllophaga*	sp.
False darkling beetle	Coleoptera (Beetles)	Seraptiidae		
Rove beetle	Coleoptera (Beetles)	Staphylinidae		
Darkling beetle	Coleoptera (Beetles)	Tenebrionidae		
European earwig	Dermaptera (Earwigs)	Forficulidae	*Forficula*	*auricularia*
Deer fly	Diptera (Flies)			
Robber fly	Diptera (Flies)	Asilidae		
Small minnow mayfly	Diptera (Flies)	Baetidae		
March flies	Diptera (Flies)	Bibionidae		
Bee fly (two spots on each wing)	Diptera (Flies)	Bombyliidae		
Bee fly (brown coastal edge species)	Diptera (Flies)	Bombyliidae		
Green bottle fly	Diptera (Flies)	Calliforidae		
Bitting midge	Diptera (Flies)	Ceratopogonidae		
Midge (small green species)	Diptera (Flies)	Chironomidae		
Grass flies	Diptera (Flies)	Chloropidae		
Mosquitoes	Diptera (Flies)	Culicidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Long-legged fly (gray species)	Diptera (Flies)	Dolichopodidae		
Dance flies	Diptera (Flies)	Empididae		
	Diptera (Flies)	Muscidae		
House fly	Diptera (Flies)	Muscoididae		
Fungus gnat (brown)	Diptera (Flies)	Mycetophilidae		
Hump-backed flies	Diptera (Flies)	Phoridae		
Moth fly	Diptera (Flies)	Psychodidae		
Dung flies	Diptera (Flies)	Sarcophagidae		
Dark-winged fungus gnat	Diptera (Flies)	Sciaridae		
Soldier fly (metallic green species)	Diptera (Flies)	Stratiomyiidae		
Flower flies	Diptera (Flies)	Syrphidae		
Tachinid fly	Diptera (Flies)	Tachinidae		
Fruit fly (black-wing/red abdomen/green eyes)	Diptera (Flies)	Tephritidae		
Fruit fly (metallic green abdomen/clear wing species)	Diptera (Flies)	Tephritidae		
Stiletto fly	Diptera (Flies)	Therevidae		
Crane fly	Diptera (Flies)	Tipulidae		
Small minnow mayfly	Ephemoroptera	Baetidae		
Minute pirate bug	Hemiptera (True Bugs)	Anthocoridae		
Stilt bugs	Hemiptera (True Bugs)	Berytidae		
Broad-headed bug	Hemiptera (True Bugs)	Coriscidae		
Water boatman	Hemiptera (True Bugs)	Corixidae		
Scentless plant bug	Hemiptera (True Bugs)	Corizidae		
Big-eyed bugs	Hemiptera (True Bugs)	Geocoridae		
Water strider	Hemiptera (True Bugs)	Gerridae		
Seed bug (small gray species)	Hemiptera (True Bugs)	Lygaeidae		
Western big-eyed bug	Hemiptera (True Bugs)	Lygaeidae	*Geocoris*	*pallens*
Small milkweed bug	Hemiptera (True Bugs)	Lygaeidae	*Lygaeus*	*kalmii*
Tarnished plant bug	Hemiptera (True Bugs)	Miridae	*Lygus*	*lineolaris*
Damsel bug	Hemiptera (True Bugs)	Nabidae		
Backswimmer	Hemiptera (True Bugs)	Notonectidae		
Stink bug (green species)	Hemiptera (True Bugs)	Pentatomidae		
Rough plant bug	Hemiptera (True Bugs)	Pentatomidae	*Brochymena*	sp.
Ambush bug	Hemiptera (True Bugs)	Phymatidae	*Phymata*	*americana*
Assassin bug (gray/tan species)	Hemiptera (True Bugs)	Reduviidae		
Shore bug	Hemiptera (True Bugs)	Saldidae		
Aphids	Homoptera (Aphids and Relatives)	Aphididae		
Leafhopper nymphs (gray with white stripe)	Homoptera (Aphids and Relatives)	Cicadellidae		
Delphacid planthopper	Homoptera (Aphids and Relatives)	Delphacidae		
Jumping plantlice (tiny tan/green species)	Homoptera (Aphids and Relatives)	Psyllidae		
	Hymenoptera (Bees, Wasps and Ants)		*Aphaenogaster*	sp.
	Hymenoptera (Bees, Wasps and Ants)		*Forelius*	*pruinosus* (*Royer*)
	Hymenoptera (Bees, Wasps and Ants)	Aphelinidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Honey bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Apis*	*mellifera*
Honey bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Apis*	*mellifera*
Large bumble bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Bombus*	sp.
Longhorn bee	Hymenoptera (Bees, Wasps and Ants)	Apidae	*Melissodes*	sp.
	Hymenoptera (Bees, Wasps and Ants)	Bethylidae		
Braconid wasp	Hymenoptera (Bees, Wasps and Ants)	Braconidae		
	Hymenoptera (Bees, Wasps and Ants)	Chalcidae		
Cuckoo wasp	Hymenoptera (Bees, Wasps and Ants)	Chrysididae		
Gall wasp	Hymenoptera (Bees, Wasps and Ants)	Cynipidae		
	Hymenoptera (Bees, Wasps and Ants)	Diapriidae		
	Hymenoptera (Bees, Wasps and Ants)	Encyrtidae		
	Hymenoptera (Bees, Wasps and Ants)	Eulophidae		
	Hymenoptera (Bees, Wasps and Ants)	Eupelmidae		
	Hymenoptera (Bees, Wasps and Ants)	Figitidae		
Thatch/Wood ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Formica*	*rufa* spp.
Big headed ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Pheidole*	
Owyhee harvester ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Pogonomyrmex*	*salinus*
Odorous house ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Tapinoma*	*sessile*
Pavement ant	Hymenoptera (Bees, Wasps and Ants)	Formicidae	*Tetramorium*	*caespitum*
Flower bee (red-yellow abdomen)	Hymenoptera (Bees, Wasps and Ants)	Halictidae		
Sweat bee (blue-green head)	Hymenoptera (Bees, Wasps and Ants)	Halictidae		
Parasitic ichneumon wasp (orange/black-wing species)	Hymenoptera (Bees, Wasps and Ants)	Ichneumonidae		
Parasitic ichneumon wasp	Hymenoptera (Bees, Wasps and Ants)	Ichneumonidae	*Ophion*	sp.
Leaf-cutting bee	Hymenoptera (Bees, Wasps and Ants)	Megachilidae		
Velvet ant	Hymenoptera (Bees, Wasps and Ants)	Mutillidae		
Fairy flies	Hymenoptera (Bees, Wasps and Ants)	Mymaridae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
	Hymenoptera (Bees, Wasps and Ants)	Perilampidae		
Spider wasp	Hymenoptera (Bees, Wasps and Ants)	Pompillidae		
	Hymenoptera (Bees, Wasps and Ants)	Pteromalidae		
Hunting wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae		
Thread-waisted wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Ammophilia*	spp.
Sand wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Bembix*	*americana*
Caterpillar wasp	Hymenoptera (Bees, Wasps and Ants)	Sphecidae	*Podalonia*	spp.
Tiphiid wasp (brown species)	Hymenoptera (Bees, Wasps and Ants)	Tiphiidae		
Paper wasp	Hymenoptera (Bees, Wasps and Ants)	Vespidae	*Polistes*	*fuscatus*
Western hornet	Hymenoptera (Bees, Wasps and Ants)	Vespidae	*Vespula*	*pennsylvanica*
Termites	Isoptera			
Ochre ringlet	Lepidoptera (Butterflies and Moths)		*Coenonympha*	*tullia*
Northern white skipper	Lepidoptera (Butterflies and Moths)		*Heliopetes*	*ericetorum*
Purplish copper	Lepidoptera (Butterflies and Moths)		*Lycaena*	*helloides*
Tiger moth	Lepidoptera (Butterflies and Moths)	Arctiidae		
Dogbane tiger moth	Lepidoptera (Butterflies and Moths)	Arctiidae	*Cycnia*	*tenera*
Banded woollybear moth	Lepidoptera (Butterflies and Moths)	Arctiidae	*Isia*	*isabella*
Monarch butterfly	Lepidoptera (Butterflies and Moths)	Danaidae	*Danaus*	*plexippus*
Inchworm moth	Lepidoptera (Butterflies and Moths)	Geometridae		
Western pygmy blue butterfly	Lepidoptera (Butterflies and Moths)	Lycaenidae	*Brephidium*	*exile*
Gray hairstreak butterfly	Lepidoptera (Butterflies and Moths)	Lycaenidae	*Strymon*	*melinus*
Euthesanotia-type noctuid	Lepidoptera (Butterflies and Moths)	Noctuidae		
Celery looper moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Anagrapha*	*falcifera*
Looper noctuid moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Dargida*	*procinctus*
Dart noctuid moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Euxoa*	sp.
Clandestine dart moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Spaelotis*	*clandestina*
Beet armyworm moth	Lepidoptera (Butterflies and Moths)	Noctuidae	*Spodoptera*	*exigua*

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Viceroy butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Limenitis*	*archippus*
Field crescent butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Phyciodes*	*campestris*
Painted lady butterfly	Lepidoptera (Butterflies and Moths)	Nymphalidae	*Vanessa*	*cardui*
Western tiger swallowtail butterfly	Lepidoptera (Butterflies and Moths)	Papilionidae	*Papilio*	*rutulus*
Cabbage white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pieris*	*rapae*
Becker's white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*beckerii*
Western white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*occidentalis*
Checkered white butterfly	Lepidoptera (Butterflies and Moths)	Pieridae	*Pontia*	*protodice*
Diamondback moth	Lepidoptera (Butterflies and Moths)	Plutellidae	*Plutella*	*xylostella*
Plume moth	Lepidoptera (Butterflies and Moths)	Pterophoridae		
Corn earworm-like grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Crambus grass moth (gray and silver)	Lepidoptera (Butterflies and Moths)	Pyralidae		
Crambus grass moth (yellow and pearl)	Lepidoptera (Butterflies and Moths)	Pyralidae		
Diorhyctria-type grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Loxostege-like grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Tan grass moth	Lepidoptera (Butterflies and Moths)	Pyralidae		
Grass moth	Lepidoptera (Butterflies and Moths)	Pyrilidae		
Common ringlet butterfly	Lepidoptera (Butterflies and Moths)	Satyridae	*Coenonympha*	*ampelos*
Leaf-roller moth (pale yellow)	Lepidoptera (Butterflies and Moths)	Tortricidae		
Leaf-roller moth (pale yellow with brown markings)	Lepidoptera (Butterflies and Moths)	Tortricidae		
Leaf-roller moth	Lepidoptera (Butterflies and Moths)	Tortricidae	*Choristoneura*	spp.
Green lace-wing	Neuroptera (nervewings)	Chrysopidae		
Ant lion	Neuroptera (nervewings)	Myrmeleontidae		
Snakefly	Neuroptera (nervewings)	Raphidiidae		
Blue-eyed darner	Odonata (Dragonflies and Damselflies)	Aeshnidae	*Aeshna*	*multicolor*
Narrow winged damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Gray damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		
Blue damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae		
Bluet damselfly	Odonata (Dragonflies and Damselflies)	Coenagrionidae	*Enallagma*	sp.
Skimmer dragonfly (red species)	Odonata (Dragonflies and Damselflies)	Libellulidae	*Sympetrum*	spp.
Skimmer dragonfly (tan species)	Odonata (Dragonflies and Damselflies)	Libellulidae	*Sympetrum*	spp.
Saddlebag skimmer dragonfly	Odonata (Dragonflies and Damselflies)	Libellulidae	*Tramea*	spp.
Damselfly	Odonata (Dragonflies and Damselflies)	Zygopidae		
Short-horned grasshopper (gray species)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Short-horned grasshopper (gray with black and yellow hindwings; red-legged)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Short-horned grasshopper (green with white stripes)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Short-horned grasshopper (tan species)	Orthoptera (Grasshoppers and Relatives)	Acrididae		
Tree cricket	Orthoptera (Grasshoppers and Relatives)	Grillidae		
Jeruselem cricket	Orthoptera (Grasshoppers and Relatives)	Gryllacrididae		
Praying mantis	Orthoptera (Grasshoppers and Relatives)	Mantidae		
Ant cricket	Orthoptera (Grasshoppers and Relatives)	Myrmecophilidae	*Myrmecophilus*	
Pygmy grasshopper	Orthoptera (Grasshoppers and Relatives)	Tetrigidae		
Katydids	Orthoptera (Grasshoppers and Relatives)	Tettigoniidae		
Plantlouse (tiny)	Psocoptera (Plantlice and Barklice)			
Thrips	Thysanptera (thripes)			
Caddisfly (black species)	Trichoptera (Caddisflies)			
Caddisfly (small/tan/short antennae)	Trichoptera (Caddisflies)			
Caddisfly (medium-sized/tan/long antennae)	Trichoptera (Caddisflies)			

Insects				
Common Name	**Order**	**Family**	**Genus**	**Species**
Caddisfly (medium-sized/ gray-brown/short antennae)	Trichoptera (Caddisflies)			
Caddisfly (medium-sized/gray/long antennae)	Trichoptera (Caddisflies)			

Fish			
Common	**Family**	**Genus**	**Species**
Largescale sucker	Catostomidae	*Catostomus*	*macrochelius*
Pumpkinseed	Centrarchidae	*Lepomis*	*gibbosus*
Bluegill	Centrarchidae	*Lepomis*	*macrochirus*
Smallmouth bass	Centrarchidae	*Micropterus*	*dolomieu*
Largemouth bass	Centrarchidae	*Micropterus*	*salmoides*
Black crappie	Centrarchidae	*Pomoxis*	*nigromaculatus*
Oriental weatherfish	Cobitidae	*Misgurnus*	*anguillicaudatus*
Common carp	Cyprinidae	*Cyprinus*	*carpio*
Northern pikeminnow	Cyprinidae	*Ptychocheilus*	*oregonensis*
Redside shiner	Cyprinidae	*Richardsonius*	*balteatus*
Brown bullhead	Ictaluridae	*Ameiurus*	*nebulosus*
Channel catfish	Ictaluridae	*Ictalurus*	*punctatus*
Yellow perch	Percidae	*Perca*	*flavescens*
Lahontan cutthroat trout	Salmonidae	*Oncorhynchus*	*larkia henshawi*
Rainbow trout	Salmonidae	*Oncorhynchus*	*mykiss*
Kokanee	Salmonidae	*Oncorhynchus*	*nerka*

Herptiles			
Common Name	**Family**	**Genus**	**Species**
Racer	Colubridae	*Coluber*	*constrictor*
Striped whipsnake	Colubridae	*Masticophis*	*taeniatus*
Gopher snake	Colubridae	*Pituophis*	*catenifer*
Bull snake	Colubridae	*Pituophis*	*melanoleucuc*
Western terrestrial garter snake	Colubridae	*Thamnophis*	*elegans*
Common garter snake	Colubridae	*Thamnophis*	*sirtalis*
Painted turtle	Emydidae	*Chrysemys*	*picta*
Pacific tree frog	Hylidae	*Pseudacris*	*regilla*
Bullfrog	Ranidae	*Rana*	*catesbeiana*
Northern leopard frog	Ranidae	*Rana*	*pipiens*
Great Basin spadefoot toad	Scaphiopodidae	*Spea*	*intermontana*
Western rattlesnake	Viperidae	*Crotalus*	*viridis*

Other			
Common Name	**Family**	**Genus**	**Species**
Water mite		*Acari*	
Free-living aquatic worm		*Nematode*	
Scud	Amphipoda		
Springtail	Collembola		
New Zealand mudsnail	Hydrobiidae	*Potamopyrgus*	*antipodarum*
Aquatic worm	Oligochaeta		
Wind scorpion	Solifudae		
Ink cap fungi	Coprinaceae	*Coprinus*	spp.

Document continues on next page.

Appendix F. Statement of Compliance

STATEMENT OF COMPLIANCE
for Implementation of the
Deer Flat National Wildlife Refuge, Headquartered in Nampa, Canyon County, Idaho
(with Refuge lands in Payette, Owyhee, and Washington Counties in Idaho; and Malheur County in Oregon)
Comprehensive Conservation Plan

The following executive orders and legislative acts have been reviewed as they apply to implementation of the Deer Flat National Wildlife Refuge (Refuge) Comprehensive Conservation Plan (CCP). See 602 FW 3, Exhibit 2 for other potential compliance requirements.

- **National Environmental Policy Act (1969) (42 U.S.C. 4321 et seq.) (NEPA).** The planning process has been conducted in accordance with NEPA Implementing Procedures and Department of the Interior and U.S. Fish and Wildlife Service (Service) procedures, and has been performed in coordination with the affected public.

  The CCP is programmatic in many respects, and specific details of certain projects and actions cannot be determined until a later date depending on funding and implementation schedules. Certain projects or actions may require additional NEPA compliance.

- **National Historic Preservation Act (1966) (16 U.S.C. 470 et seq.).** The implementation of the CCP should not affect cultural resources. The proposed action does not meet the criteria of an effect or adverse effect as an undertaking defined in 36 Code of Federal Regulations 800.9 and Service Manual 614 FW 2. The Service will comply with the National Historic Preservation Act if any management actions have the potential to affect any historic properties that may be present.

- **Executive Order 12372. Intergovernmental Review.** Coordination and consultation with affected Tribal, local, and State governments, other Federal agencies, and landowners has been completed through personal contact and/or in writing by Service planners, Refuge managers, and supervisors.

- **Executive Order 13175. Consultation and Coordination with Indian Tribal Governments.** As required under Secretary of the Interior Order 3206, American Indian Tribal Rights, Federal-Tribal Responsibilities, and the Endangered Species Act, the Project Leader attempted to consult and coordinate with the Nez Perce, Shoshone-Bannock, and Shoshone Paiute Tribes regarding the proposed action. All listed tribes were contacted in writing and by phone to assess their interest in the CCP planning process.

- **Executive Order 12898. Federal Actions to Address Environmental Justice in Minority and Low-Income Populations.** All Federal actions must address and identify, as appropriate, disproportionally high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The CCP was evaluated, and no adverse human health or environmental effects were identified for minority or low-income populations, Indian Tribes, or anyone else.

- **Wilderness Act of 1964.** The Service has evaluated the suitability of the Refuge for wilderness designation and found that no lands within the Refuge meet all necessary criteria for inclusion in the National Wilderness Preservation System.

- **National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-668ee).** Appropriate Use Findings were prepared for boating at no-wake speeds, competitive and group cycling and jogging, individual cycling and jogging, float plan use, geocaching, grazing and farming, high-speed watercraft use, horseback riding, ice skating, remote controlled planes, research, swimming and beach use, and walking with dogs. Walking with dogs, swimming and beach use, individual cycling and jogging, boating at no-wake speeds, horseback riding, and high-speed watercraft use were all found to be appropriate when following stipulations set forth in the compatibility determination for each use. Compatibility determinations were also prepared for fishing, hunting, wildlife observation, photography, interpretation, and environmental education. All wildlife-dependent activities and appropriate nonwildlife-dependent activities were found to be compatible with stipulations.

- **Executive Order 13186. Responsibilities of Federal Agencies to Protect Migratory Birds.** The CCP is consistent with Executive Order 13186 because the CCP and NEPA analyses evaluate the effects of agency actions on migratory birds.

- **Endangered Species Act of 1973 (16 U.S.C. 1531-1544).** CCP implementation is expected to result in findings of no significant action.

- **Executive Order 11990. Protection of Wetlands.** The CCP is consistent with Executive Order 11990 because CCP implementation would protect existing wetlands.

- **Integrated Pest Management, 517 DM 1 and 569 FW 1.** In accordance with 517 DM 1 and 7 RM 14, an integrated pest management (IPM) approach has been adopted to eradicate, control, or contain pest and invasive species on the Refuge. In accordance with 517 DM 1, only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under refuge jurisdiction.

Project Leader, Southeast Idaho
National Wildlife Refuge Complex

4/1/15
Date

Appendix G. Integrated Pest Management (IPM) Program

G.1 Background

IPM is an interdisciplinary approach using methods to prevent, eliminate, contain, and/or control pest species in concert with other management activities on refuge lands and waters to achieve wildlife and habitat management goals and objectives. IPM is also a scientific, adaptive management process where available scientific information and best professional judgment of the refuge staff and other resource experts would be used to identify and implement appropriate management strategies that can be modified and/or changed over time to ensure effective, site-specific management of pest species to achieve desired outcomes. In accordance with 43 Code of Federal Regulations (C.F.R.) 46.145, adaptive management would be particularly relevant where long-term impacts may be uncertain and future monitoring would be needed to make adjustments in subsequent implementation decisions. After a tolerable pest population (threshold) is determined considering achievement of refuge resource objectives and the ecology of pest species, one or more methods, or combinations thereof, would be selected that are feasible, efficacious, and most protective of non-target resources, including native species (fish, wildlife, and plants), and Service personnel, Service authorized agents, volunteers, and the public. Staff time and available funding would be considered when determining feasibility/practicality of various treatments.

IPM techniques to address pests are presented as comprehensive conservation plan (CCP) strategies (see Chapter 2 of this CCP) in an adaptive management context to achieve refuge resource objectives. To satisfy requirements for IPM planning as identified in the Director's Memo (dated September 9, 2004) entitled *Integrated Pest Management Plans and Pesticide Use Proposals: Updates, Guidance, and an Online Database*, the following elements of an IPM program have been incorporated into this CCP:

- Habitat and/or wildlife objectives that identify pest species and appropriate thresholds to indicate the need for and successful implementation of IPM techniques; and
- Monitoring before and/or after treatment to assess progress toward achieving objectives including pest thresholds.

Where pesticides are necessary to address pests, this appendix provides a structured procedure for evaluating potential effects of proposed uses involving ground-based applications to refuge biological resources and environmental quality in accordance with effects analyses presented in Chapter 6 (Environmental Consequences) of the CCP/EIS. Only pesticide uses that would likely cause minor, temporary, or localized effects to refuge biological resources and environmental quality with appropriate best management practices (BMPs), would be allowed for use on the refuge, where necessary.

This appendix does not describe the more detailed process used to evaluate potential effects associated with aerial applications of pesticides. Moreover, it does not address effects of mosquito control with pesticides (larvicides, pupacides, or adulticides) based upon identified human health threats and presence of disease-carrying mosquitoes in sufficient numbers from monitoring conducted on a refuge. However, the basic framework to assess potential effects to refuge biological resources and environmental quality from aerial application of pesticides or use of insecticides for mosquito management would be similar to the process described in this appendix for ground-based treatments of other pesticides.

G.2 Pest Management Laws and Policies

In accordance with Service policy 569 FW 1 (Integrated Pest Management), plant, invertebrate, and vertebrate pests on units of the National Wildlife Refuge System (NWRS) can be controlled to ensure balanced wildlife and fish populations in support of refuge-specific wildlife and habitat management objectives. Pest control on federal (refuge) lands and waters also is authorized under the following legal mandates:

- National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd-668ee);
- Plant Protection Act of 2000 (7 U.S.C. 7701 et seq.);
- Noxious Weed Control and Eradication Act of 2004 (7 U.S.C. 7781-7786, Subtitle E);
- Federal Insecticide, Fungicide, and Rodenticide Act of 1996 (7 U.S.C. 136-136y);
- National Invasive Species Act of 1996 (16 U.S.C. 4701);
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (16 U.S.C. 4701);
- Food Quality Protection Act of 1996 (7 U.S.C. 136);
- Executive Order 13148, Section 601(a);
- Executive Order 13112; and
- Animal Damage Control Act of 1931 (7 U.S.C. 426-426c, 46 Stat. 1468).

Pests are defined as "…living organisms that may interfere with the site-specific purposes, operations, or management objectives or that jeopardize human health or safety" according to Department policy 517 DM 1 (Integrated Pest Management Policy). Similarly, 569 FW 1 defines pests as "…invasive plants and introduced or native organisms that may interfere with achieving our management goals and objectives on or off our lands, or that jeopardize human health or safety." 517 DM 1 also defines an invasive species as "a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health." Throughout the remainder of this CCP, the terms "pest" and "invasive species" are used interchangeably because both can prevent/impede achievement of refuge wildlife and habitat objectives and/or degrade environmental quality.

In general, control of pests (vertebrate or invertebrate) on refuges would conserve and protect the nation's fish, wildlife, and plant resources as well as maintain environmental quality. From 569 FW 1, animal or plant species that are considered pests may be managed if the following criteria are met:

- Threat to human health and wellbeing or private property; the acceptable level of damage by the pest has been exceeded; or State or local government has designated the pest as noxious;
- Detrimental to resource objectives as specified in a refuge resource management plan (e.g., CCP, habitat management plan [HMP]), if available; and
- Control would not conflict with attainment of resource objectives or the purposes for which the refuge was established.

The specific justifications for pest management activities on refuges follow.

- Protect human health and wellbeing;
- Prevent substantial damage to important refuge resources;
- Protect newly introduced species or re-establish native species;

- Control nonnative (exotic) species in order to support existence for populations of native species;
- Prevent damage to private property; and
- Provide the public with quality, compatible wildlife-dependent recreational opportunities.

In accordance with Service policy 620 FW 1 (Habitat Management Plans), there are additional management directives regarding invasive species found on the refuge:

- "We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."
- "Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and prevent new and expanded infestations of invasive species. Conduct refuge habitat management activities to prevent, control, or eradicate invasive species…"

Animal species damaging/destroying federal property and/or detrimental to the management program of a refuge may be controlled as described in 50 C.F.R. 31.14 (Official Animal Control Operations). For example, the incidental removal of beavers damaging refuge infrastructure (e.g., clogging with subsequent damaging of water control structures) and/or negatively affecting habitats (e.g., removing woody species from existing or restored riparian areas) managed on refuge lands may be conducted without a pest control proposal. We recognize beavers are native species and most of their activities on refuge lands represent a natural process beneficial for maintaining wetland habitats.

Trespass and feral animals also may be controlled on refuge lands. Based upon 50 C.F.R. 28.43 (Destruction of Dogs and Cats), dogs and cats running at large on a national wildlife refuge and observed in the act of killing, injuring, harassing, or molesting humans or wildlife may be disposed of in the interest of public safety and protection of the wildlife. Feral animals should be disposed of by the most humane method(s) available and in accordance with relevant Service directives (including Executive Order 11643).

Disposed wildlife specimens may be donated or loaned to public institutions. Donation or loans of resident wildlife species would only be made after securing state approval (50 C.F.R. 30.11 [Donation and Loan of Wildlife Specimens]). Surplus wildlife specimens may be sold alive or butchered, dressed and processed subject to Federal and state laws and regulations (50 C.F.R. 30.12 [Sale of Wildlife Specimens]).

G.3 Strategies

To fully embrace IPM as identified in 569 FW 1, the following strategies, where applicable, will be carefully considered on the refuge for each pest species:

Prevention. This would be the most effective and least expensive long-term management option for pests. It encompasses methods to prevent new introductions or the spread of established pests to un-infested areas. It requires identifying potential routes of invasion to reduce the likelihood of infestation. Hazard Analysis and Critical Control Points (HACCP) planning can be used to determine if current management activities on a refuge may introduce and/or spread invasive species in order to

identify appropriate BMPs for prevention. See http://www.haccp-nrm.org/ for more information about HACCP planning.

Prevention may include source reduction, using pathogen-free or weed-free seeds or fill; exclusion methods (e.g., barriers) and/or sanitation methods (e.g., wash stations) to prevent re-introductions by various mechanisms including vehicles, personnel, livestock, and horses. Because invasive species are frequently the first to establish in newly disturbed sites, prevention would require a reporting mechanism for early detection of new pest occurrences with quick response to eliminate any new satellite pest populations. Prevention would require consideration of the scale and scope of land management activities that may promote pest establishment within un-infested areas or promote reproduction and spread of existing populations. Along with preventing initial introduction, prevention would involve halting the spread of existing infestations to new sites (Mullin et al. 2000). The primary reason for prevention would be to keep pest-free lands or waters from becoming infested. Executive Order 11312 emphasizes the priority of prevention with respect to managing pests. Methods to prevent the introduction and/or spread of pests on refuge lands follow:

- Before beginning ground-disturbing activities (e.g., disking, scraping), inventory and prioritize pest infestations in project operating areas and along access routes. Refuge staff will identify pest species on-site or within reasonably expected potential invasion vicinity. Where possible, the refuge staff will begin project activities in un-infested areas before working in pest-infested areas.
- The refuge staff will locate and use pest-free project staging areas. They will avoid or minimize travel through pest-infested areas, or restrict use to those periods when spread of seed or propagules of invasive plants will be least likely.
- The refuge staff will determine the need for and, when appropriate, identify sanitation sites where equipment can be cleaned of pests. Where possible, the refuge staff will clean equipment before entering lands at on-refuge approved cleaning site(s). This practice does not pertain to vehicles traveling frequently in and out of the project area that remain on roadways. Seeds and plant parts of pest plants will need to be collected, where practical. The refuge staff will remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- The refuge staff will clean all equipment before leaving the project site, if operating in areas infested with pests. The refuge staff will determine the need for and, when appropriate, identify sanitation sites where equipment can be cleaned.
- Refuge staff, their authorized agents, and refuge volunteers will, where possible, inspect, remove, and properly dispose of seed and parts of invasive plants found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and then properly discarding them (e.g., incinerating).
- The refuge staff will evaluate options, including closure, to restrict traffic at sites with ongoing restoration of desired vegetation. They will revegatate disturbed soil (except travel ways on surfaced projects) to optimize plant establishment for each specific site. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. The refuge staff will use native material, where appropriate and feasible. They will use certified weed-free or weed-seed-free hay or straw where certified materials are reasonably available.
- The refuge staff will provide information, training, and appropriate pest identification materials to permit holders and recreational visitors. The refuge staff will educate them about pest identification, biology, impacts, and effective prevention measures.

- The refuge staff will require grazing permittees to use preventative measures for their livestock while on refuge lands.
- The refuge staff would inspect borrow material for invasive plants prior to use and transport onto and/or within refuge lands.
- The refuge staff will consider invasive plants in planning for road maintenance activities.
- The refuge staff will restrict off-road travel to designated routes.

The following are methods to prevent the introduction and/or spread of pests into refuge waters:

- The refuge staff will inspect boats (including air boats), trailers, and other boating equipment. Where possible, they will remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Where possible, the refuge staff will drain water from motor, live well, bilge, and transom wells while on land before leaving the site. If possible, the refuge staff will wash and dry boats, downriggers, anchors, nets, floors of boats, propellers, axles, trailers, and other boating equipment to kill pests not visible at the boat launch.
- Where feasible, the refuge staff will maintain a 100-foot buffer of aquatic pest-free clearance around boat launches and docks or quarantine areas when cleaning around culverts, canals, or irrigation sites. Where possible, the refuge staff will inspect and clean equipment before moving to new sites or one project area to another.

These prevention methods to minimize/eliminate the introduction and/or spread of pests were taken verbatim or slightly modified from the *Pacific Northwest Region Invasive Plant Program: Preventing and Managing Invasive Plants, Final Environmental Impact Statement* (U.S. Forest Service [USFS] 2005: Appendix E).

Mechanical/Physical Methods. These methods would remove and destroy, disrupt the growth of, or interfere with the reproduction of pest species. For plants, these treatments can be accomplished by hand, hand tool (manual), or power tools (mechanical) and include pulling, grubbing, digging, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, and mulching of the pest plants.

For animal species, Service employees or their authorized agents could use mechanical/physical methods (including trapping) to control pests as a refuge management activity. Based upon 50 C.F.R. 31.2, trapping can be used on a refuge to reduce surplus wildlife populations for a "balanced conservation program" in accordance with Federal or state laws and regulations. In some cases, non-lethally trapped animals will be relocated to off-refuge sites with prior approval from the state.

Each of these tools will be efficacious to some degree and applicable to specific situations. In general, mechanical controls can effectively control annual and biennial pest plants. However, to control perennial plants, the root system has to be destroyed or it will resprout and continue to grow and develop. Mechanical controls are typically not capable of destroying a perennial plant's root system. Although some mechanical tools (e.g., disking, plowing) may damage root systems, they may stimulate regrowth, producing a denser plant population that may aid in the spread depending upon the target species (e.g., Canada thistle). In addition, steep terrain and soil conditions will be major factors that can limit the use of many mechanical control methods.

Some mechanical control methods (e.g., mowing), which will be used in combination with herbicides, can be very effective techniques to control perennial species. For example, mowing perennial plants followed sequentially by treating the plant regrowth with a systemic herbicide often will improve the efficacy of the herbicide compared to herbicide treatment only.

Cultural Methods. These methods will involve manipulating habitat to increase pest mortality by reducing its suitability to the pest. Cultural methods include water-level manipulation, mulching, planting winter cover crops, changing planting dates to minimize pest impact, using prescribed burning (facilitate revegetation, increase herbicide efficacy, and remove litter to assist in emergence of desirable species), flaming with propane torches, using trap crops, having crop rotations that include non-susceptible crops, moisture management, addition of beneficial insect habitat, reducing clutter, proper trash disposal, planting or seeding desirable species to shade or outcompete invasive plants, applying fertilizer to enhance desirable vegetation, prescriptive grazing, and other habitat alterations.

Biological Control Agents. Classical biological control will involve the deliberate introduction and management of natural enemies (parasites, predators, or pathogens) to reduce pest populations. Many of the most ecologically or economically damaging pest species in the United States originated in foreign countries. These newly introduced pests, which are free from natural enemies found in their country or region of origin, may have a competitive advantage over cultivated and native species. This competitive advantage often allows introduced species to flourish, and they may cause widespread economic damage to crops or out compete and displace native vegetation. Once the introduced pest species population reaches a certain level, traditional methods of pest management may be cost-prohibitive or impractical. Biological controls typically are used when these pest populations have become so widespread that eradication or effective control will be difficult or no longer practical.

Biological control has advantages as well as disadvantages. Benefits include reducing pesticide use, host specificity for target pests, long-term self-perpetuating control, low cost per acre, capacity for searching and locating hosts, synchronizing biological control agents to hosts' life cycles, and the low likelihood that hosts will develop resistance to agents. Disadvantages include the following: limited availability of agents from their native lands, the dependence of control on target species density, slow rate at which control occurs, biotype matching, the difficulty and expense of conflicts over control of the target pest, and host specificity when host populations are low.

A reduction in target species populations from biological controls is typically a slow process, and efficacy can be highly variable. It may not work well in a particular area while working well in other areas. Biological control agents require specific environmental conditions to survive over time. Some of these conditions are understood, whereas others are only partially understood or not at all.

Biological control agents will not eradicate a target pest. When using biological control agents, residual levels of the target pest typically are expected; the agent population level or survival will be dependent upon the density of its host. After the pest population decreases, the population of the biological control agent will decrease correspondingly. This is a natural cycle. Some pest populations (e.g., invasive plants) tend to persist for several years after a biological control agent becomes established due to seed reserves in the soil, inefficiencies in the agents' search behavior, and the natural lag in population buildup of the agent.

The full range of pest groups potentially found on refuge lands and waters would include disease causing organisms, invertebrates (insects, mollusks), vertebrates, and invasive plants (the most common group). Often it is assumed that biological control will address many if not most of these pest problems. There are several well-documented success stories of biological control of invasive weed species in the Pacific Northwest, including Mediterranean sage, St. Johnswort (Klamath weed), and tansy ragwort. Emerging success stories include Dalmatian toadflax, diffuse knapweed, leafy spurge, purple loosestrife, and yellow star-thistle. However, historically, each new introduction of a biological control agent in the United States has only about a 30% success rate (Coombs et al. 2004). Refer to Coombs et al. (2004) for the status of biological control agents for invasive plants in the Pacific Northwest.

Introduced species without desirable close relatives in the United States would generally be selected as biological controls. Natural enemies that are restricted to one or a few closely related plants in their country of origin are targeted as biological controls (Center et al. 1997; Hasan and Ayres 1990).

The refuge staff will ensure introduced agents are approved by the applicable authorities. Except for a small number of formulated biological control products registered by the U.S. Environmental Protection Agency (USEPA) under Federal Insecticide, Fungicide and Rodenticide Act of 1972 (FIFRA), most biological control agents are regulated by the U.S. Department of Agriculture's (USDA's) Animal Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ). State departments of agriculture and, in some cases, county agricultural commissioners or weed districts, have additional approval authority.

Federal permits (USDA-APHIS-PPQ Form 526) are required to import biocontrol agents from another state. Form 526 may be obtained at www.aphis.usda.gov/permits/ppq_epermits.shtml, or by writing to:

USDA-APHIS-PPQ
Biological Assessment and Taxonomic Support
4700 River Road, Unit 113
Riverdale, MD 20737

The Service strongly supports the development, and legal and responsible use of appropriate, safe, and effective biological control agents for nuisance and non-indigenous or pest species.

State and county agriculture departments may also be sources for biological control agents or they may have information about where biological control agents may be obtained. Commercial sources should have the Application and Permit to Move Live Plant Pests and Noxious Weeds (USDA-PPQ Form 226 USDA-APHIS-PPQ, Biological Assessment and Taxonomic Support, 4700 River Road, Unit 113, Riverdale, MD 20737) to release specific biological control agents in a state and/or county. Furthermore, certification regarding the biological control agent's identity (genus, specific epithet, subspecies, and variety) and purity (e.g., parasite free, pathogen free, and biotic and abiotic contaminants) should be specified in purchase orders.

Biological control agents are subject to 7 RM 8 (Exotic Species Introduction and Management). In addition, the refuge staff would follow the International Code of Best Practice for Classical Biological Control of Weeds (http://sric.ucdavis.edu/exotic/exotic.htm) as ratified by delegates to the X International Symposium on Biological Control of Weeds, Bozeman, Montana, on July 9, 1999. This code identifies the following:

- Release only approved biological control agents,
- Use the most effective agents,
- Document releases, and
- Monitor for impact to the target pest, non-target species, and the environment.

Biological control agents formulated as pesticide products and registered by the USEPA (e.g., *Bti*) are also subject to pesticide use proposals (PUP) review and approval (see below).

A record of all releases would be maintained with date(s), location(s), and environmental conditions of the release site(s); the identity, quantity, and condition of the biological control agents released; and other relevant data and comments such as weather conditions. Systematic monitoring to determine the establishment and effectiveness of the release is also recommended.

National Environmental Policy Act (NEPA) documents regarding biological and other environmental effects of biological control agents prepared by another Federal agency, where the scope is relevant to evaluation of releases on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the Bureau of Land Management (BLM), the USFS, the National Park Service, USDA Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s) from the review. Incorporating by reference (43 C.F.R. 46.135) is a technique used to avoid redundancies in analysis. It also can reduce the bulk of a Service NEPA document, which must only identify the documents that are incorporated by reference. In addition, relevant portions must be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of the relevance of the referenced material to the current analysis.

Pesticides. The selective use of pesticides would be based upon pest ecology (including mode of reproduction), the size and distribution of pest populations, site-specific conditions (e.g., soils, topography), known efficacy under similar site conditions, and the capability to use BMPs to reduce/eliminate potential effects to non-target species and sensitive habitats, and the potential to contaminate surface and groundwater. All pesticide use (pesticide, target species, application rate, and method of application) would comply with the applicable Federal (FIFRA) and state regulations pertaining to pesticide use, safety, storage, disposal, and reporting. Before pesticides can be used to eradicate, control, or contain pests on refuge lands and waters, PUPs would be prepared and approved in accordance with 569 FW 1. PUP records would provide a detailed, time-, site-, and target-specific description of the proposed use of pesticides on the refuge. All PUPs would be created, approved, or disapproved, and stored in the Pesticide Use Proposal System (PUPS), which is a centralized database only accessible on the Service's intranet (https://systems.fws.gov/pups). Only Service employees would be authorized to access PUP records for a refuge in this database.

Application equipment would be selected to provide site-specific delivery to target pests while minimizing/eliminating direct or indirect (e.g., drift) exposure to non-target areas and degradation of surface and groundwater quality. Where possible, target-specific equipment (e.g., backpack sprayer, wiper) would be used to treat target pests. Other target-specific equipment to apply pesticides would include soaked wicks or paint brushes for wiping vegetation and lances, hatchets, or syringes for direct injection into stems. Granular pesticides may be applied using seeders or other specialized dispensers. In contrast, aerial spraying (e.g., fixed wing or helicopter) would only be used where access is difficult (remoteness) and/or the size/distribution of infestations precludes practical use of ground-based methods.

Because repeated use of one pesticide may allow resistant organisms to survive and reproduce, multiple pesticides with variable modes of action would be considered for treatments on refuge lands and waters. This is especially important if multiple applications within years and/or over a growing season likely would be necessary for habitat maintenance and restoration activities to achieve resource objectives. Integrated chemical and non-chemical controls also are highly effective, where practical, because pesticide-resistant organisms can be removed from the site.

Cost may not be the primary factor in selecting a pesticide for use on a refuge. If the least expensive pesticide would potentially harm natural resources or people, then a different product would be selected, if available. The most efficacious pesticide available with the least potential to degrade environmental quality (soils, surface water, and groundwater) and the least potential effect on native species and communities of fish, wildlife, plants, and their habitats would be acceptable for use on refuge lands in the context of an IPM approach.

Habitat restoration/maintenance. Restoration and/or proper maintenance of refuge habitats associated with achieving wildlife and habitat objectives would be essential for long-term prevention, eradication, or control (at or below threshold levels) of pests. Promoting desirable plant communities through the manipulation of species composition, plant density, and growth rate is an essential component of invasive plant management (Brooks et al. 2004; Masters and Shelly 2001; Masters et al. 1996). The following three components of succession could be manipulated through habitat maintenance and restoration: site availability, species availability, and species performance (Cox and Anderson 2004). Although a single method (e.g., herbicide treatment) may eliminate or suppress pest species in the short term, the resulting gaps and bare soil create niches that are conducive to further invasion by the species and/or other invasive plants. On degraded sites where desirable species are absent or in low abundance, revegetation with native/desirable grasses, forbs, and legumes may be necessary to direct and accelerate plant community recovery and achieve site-specific objectives in a reasonable timeframe. The selection of appropriate species for revegetation would be dependent on a number of factors including resource objectives and site-specific, abiotic factors (e.g., soil texture, precipitation/temperature regimes, and shade conditions). Seed availability and cost, ease of establishment, seed production, and competitive ability also would be important considerations.

G.4 Priorities for Treatments

For many refuges, the magnitude (number, distribution, and sizes of infestations) of pest problems is too extensive and beyond the available capital resources to effectively address during any single field season. To manage pests in such a refuge, it would be essential to prioritize treatment of infestations. Highest priority treatments would be focused on early detection and rapid response to eliminate infestations of new pests, if possible. This would be especially important for aggressive pests potentially impacting species, species groups, communities, and/or habitats associated refuge purpose(s), NWRS resources of concern (federally listed species, migratory birds, selected marine mammals, and interjurisdictional fish), and native species for maintaining/restoring biological integrity, diversity, and environmental health.

The next priority would be treating established pests that appear in one or more previously un-infested areas. Moody and Mack (1988) demonstrated through modeling that small, new outbreaks of invasive plants eventually would infest an area larger than the established, source population. They also found that control efforts focusing on the large, main infestation rather than the new, small satellites reduced the chances of overall success. The lowest priority would be treating large

infestations (sometimes monotypic stands) of well-established pests. In this case, initial efforts would focus upon containment of the perimeter followed by work to control/eradicate the established infested area. If containment and/or control of a large infestation are not effective, then efforts would focus upon halting pest reproduction or managing source populations. Maxwell et al. (2009) found treating fewer populations that are sources represents an effective long-term strategy to reduce the total number of invasive populations and decrease meta-population growth rates.

Although state-listed noxious weeds would always be of high priority for management, other pest species known to cause substantial ecological impact would also be considered. For example, cheatgrass may not be listed by a state as noxious, but it can greatly alter fire regimes in shrub-steppe habitats, resulting in large monotypic stands that displace native bunch grasses, forbs, and shrubs. Pest control would likely require a multi-year commitment from refuge staff. Essential to the long-term success of pest management would be pre- and post-treatment monitoring, assessment of the successes and failures of treatments and development of new approaches when proposed methods do not achieve desired outcomes.

G.5 Best Management Practices

BMPs can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats as well as degradation of water quality from drift, surface runoff, or leaching. Based upon the Department of Interior Pesticide Use policy (517 DM 1) and the Service Integrated Pest Management policy (569 FW 1), the use of applicable BMPs (where feasible) also would likely ensure that pesticide uses may not adversely affect federally listed species and/or their critical habitats through determinations made using the process described in 50 C.F.R. 402.

The following are BMPs pertaining to mixing/handling and applying pesticides for all ground-based treatments of pesticides, which would be considered and used, where feasible, based upon target- and site-specific factors and time-specific environmental conditions. Although not listed below, the most important BMP to eliminate/reduce potential impacts to non-target resources would be an IPM approach to preventing, controlling, eradicating, and containing pests.

G.5.1 Pesticide Handling and Mixing

- As a precaution against spilling, spray tanks would not be left unattended during filling.
- All pesticide containers would be triple rinsed, and the rinsate would be used as water in the sprayer tank and applied to treatment areas.
- All pesticide spray equipment would be properly cleaned. Where possible, rinsate would be used as part of the make-up water in the sprayer tank and applied to treatment areas.
- The refuge staff would triple rinse and recycle (where feasible) pesticide containers.
- All unused pesticides would be properly discarded at a local “safe send” collection.
- Pesticides and pesticide containers would be lawfully stored, handled, and disposed of in accordance with the label and in a manner safeguarding human health, fish, and wildlife, and preventing soil and water contamination.
  The refuge staff would consider the water quality parameters (e.g., pH, hardness) that are important to ensure greatest efficacy where specified on the pesticide label.
- All pesticide spills would be addressed immediately using procedures identified in the refuge spill response plan.

G.5.2 Applying Pesticides

- Pesticide treatments would only be conducted by or under the supervision of Service personnel and non-Service applicators with the appropriate state or BLM certification to safely and effectively conduct these activities on refuge lands and waters.
- The refuge staff would comply with all applicable Federal, state, and local pesticide use laws and regulations as well as Departmental, Service, and NWRS pesticide-related policies. For example, the refuge staff would use application equipment and apply rates for the specific pest(s) identified on the pesticide label as required under FIFRA.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators would review the labels, material safety data sheets (MSDSs), and PUPs for each pesticide, determining the target pest, appropriate mix rate(s), personal protective equipment (PPE), and other requirements listed on the pesticide label.
- A 1-foot no-spray buffer from the water's edge would be used, where applicable and where it does not detrimentally influence effective control of pest species.
- Low-impact herbicide application techniques (e.g., spot treatment, cut stump, oil basal, Thinvert system applications) would be used rather than broadcast foliar applications (e.g., boom sprayer, other larger tank wand applications), where practical.
- Low-volume rather than high-volume foliar applications would be used where low-impact methods mentioned above are not feasible or practical to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators would use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.
- Applicators would use the largest droplet size that results in uniform coverage.
- Applicators would use drift-reduction technologies such as low-drift nozzles, where possible.
- Where possible, spraying would occur during low (average <7 miles per hour [mph] and preferably 3 to 5 mph) and consistent direction wind conditions with moderate temperatures (typically <85°F).
- Where possible, applicators would avoid spraying during inversion conditions (often associated with calm and very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment would be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications would be made at the lowest height for uniform coverage of target pests to minimize/eliminate potential drift.
- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) would typically be conducted during early morning hours.
- Spray applications would not be conducted on days with >30% forecast for rain within 6 hours, except for pesticides that are rapidly rain-fast (e.g., glyphosate in 1 hour) to minimize/eliminate potential runoff.
- Where possible, applicators would use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Where possible, applicators would use a non-toxic dye to aid in identifying target area treated as well as potential overspray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, the application would be stopped until repairs can be made to the sprayer.

- For pesticide uses associated with cropland and facilities management, buffers, as appropriate, would be used to protect sensitive habitats, especially wetlands and other aquatic habitats.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications. The refuge staff would only apply adjacent to sensitive areas when the wind is blowing in the opposite direction.
- Applicators would use scouting for early detection of pests to eliminate unnecessary pesticide applications.
- The refuge staff would consider timing of applications so native plants are protected (e.g., senescence), while effectively treating invasive plants.
- Rinsate from cleaning spray equipment after application would be recaptured and reused or applied to an appropriate pest plant infestation.
- Application equipment (e.g., sprayer, all-terrain vehicle [ATV], tractor) would be thoroughly cleaned and PPE would be removed or disposed of on-site by applicators after treatments to eliminate the potential spread of pests to un-infested areas.

G.6 Safety

G.6.1 Personal Protective Equipment

All applicators would wear the specific PPE identified on the pesticide label. The appropriate PPE should be worn at all times during handling, mixing, and applying. PPE can include the following: disposable (e.g., Tyvek) or laundered coveralls; gloves (latex, rubber, or nitrile); rubber boots; and/or a National Institute for Occupational Safety and Health (NIOSH)–approved respirator. Because exposure to concentrated product is usually greatest during mixing, extra care should be taken while preparing pesticide solutions. Persons mixing these solutions can be best protected if they wear long gloves, an apron, footwear, and a face shield.

Coveralls and other protective clothing used during an application would be laundered separately from other laundry items. Transporting, storing, handling, mixing, and disposing of pesticide containers would be consistent with label requirements, USEPA and Occupational Safety and Health Administration (OSHA) requirements, and Service policy.

If a respirator is necessary for a pesticide use, then the following requirements would be met in accordance with Service safety policy: a written Respirator Program, fit testing, physical examination (including pulmonary function and blood work for contaminants), and proper storage of the respirator.

G.6.2 Notification

The restricted entry interval (REI) is the time period after the application after which someone may safely enter a treated area without PPE. Refuge staff, authorized management agents of the Service, volunteers, and members of the public who could be in or near a pesticide-treated area within the stated re-entry time period on the label would be notified about treatment areas. Posting would occur at any site where individuals might inadvertently become exposed to a pesticide during other activities on the refuge. Where required by the label and/or state-specific regulations, sites would

also have information posted on its perimeter and at other likely locations of entry. The refuge staff would also notify appropriate private property owners of an intended application, including any private individuals who have requested notification. Special efforts would be made to contact nearby individuals who are beekeepers or who have expressed chemical sensitivities.

G.6.3 Medical Surveillance

Medical surveillance may be required for Service personnel and approved volunteers who mix, apply, and/or monitor use of pesticides (see 242 FW 7 [Pesticide Users] and 242 FW 4 [Medical Surveillance]). In accordance with 242 FW 7.12A, Service personnel would be medically monitored if one or more of the following criteria are met: personnel are exposed or may have been exposed to concentrations at or above the published permissible exposure limits or threshold limit values (see 242 FW 4); the personnel use pesticides in a manner considered "frequent pesticide use"; or the personnel use pesticides in a manner that requires a respirator (see 242 FW 14 for respirator use requirements). In 242 FW7.7A, "Frequent Pesticide Use means when a person applying pesticide handles, mixes, or applies pesticides, with a Health Hazard rating of 3 or higher, for 8 or more hours in any week or 16 or more hours in any 30-day period." Under some circumstances, individuals who use pesticides infrequently, experience an acute exposure (sudden, short term), or use pesticides with a health hazard ranking of 1 or 2 may be medically monitored. This decision would consider the individual's health and fitness level, the pesticide's specific health risks, and the potential risks from other pesticide-related activities. Refuge cooperators (e.g., cooperative farmers) and other authorized agents (e.g., state and county employees) would be responsible for their own medical monitoring needs and costs.

Standard examinations (at refuge expense) of appropriate refuge staff would be provided by the nearest certified occupational health and safety physician as determined by Federal Occupational Health.

G.6.4 Certification and Supervision of Pesticide Applicators

Appropriate Refuge staff or approved volunteers handling, mixing, and/or applying, or directly supervising others engaged in pesticide use activities would be trained and state or federally (BLM) licensed to apply pesticides to refuge lands or waters. In accordance with 242 FW7.18A and 569 FW 1.10B, certification is required to apply restricted use pesticides based upon USEPA regulations. For safety reasons, all individuals participating in pest management activities with general use pesticides are also encouraged to attend appropriate training or acquire pesticide applicator certification. The certification requirement would be for a commercial or private applicator depending upon the state. New staff unfamiliar with proper procedures for storing, mixing, handling, applying, and disposing of herbicides and containers would receive orientation and training before handling or using any products. Documentation of training would be kept in the files at the refuge office.

G.6.5 Record Keeping

G.6.5.1 Labels and material safety data sheets

Pesticide labels and MSDSs would be maintained at the refuge shop and laminated copies kept in the mixing area. These documents would also be carried by field applicators, where possible. A written reference (e.g., note pad, chalk board, dry erase board) for each tank to be mixed would be kept in

the mixing area for quick reference while mixing is in progress. In addition, approved PUPs stored in the PUPS database typically contain website links (URLs) to pesticide labels and MSDSs.

G.6.5.2 Pesticide use proposals

A PUP would be prepared for each proposed pesticide use associated with annual pest management on refuge lands and waters. A PUP would include specific information about the proposed pesticide use including the common and chemical names of the pesticide(s), target pest species, size and location of treatment site(s), application rate(s) and method(s), and federally listed species determinations, where applicable.

In accordance with Service guidelines (Director's memo [December 12, 2007]), a refuge staff may receive up to five-year approvals for Washington Office and field-reviewed proposed pesticide uses based upon meeting identified criteria including an approved IPM plan, where necessary (see http://www.fws.gov/contaminants/Issues/IPM.cfm). For a refuge, an IPM plan (requirements described herein) can be completed independently or in association with a CCP or HMP if IPM strategies and potential environmental effects are adequately addressed within appropriate NEPA documentation.

PUPs would be created, approved, or disapproved, and stored as records in the PUPS, which is a centralized database on the Service's intranet (https://systems.fws.gov/pups). Only Service employees can access PUP records in this database.

G.6.5.3 Pesticide usage

In accordance with 569 FW 1, the refuge Project Leader would be required to maintain records of all pesticides annually applied on lands or waters under refuge jurisdiction. This would encompass pesticides applied by other federal agencies, state and county governments, non-government applicators including cooperators and their pest management service providers with Service permission. For clarification, pesticide means all insecticides, insect and plant growth regulators, dessicants, herbicides, fungicides, rodenticides, acaricides, nematicides, fumigants, avicides, and piscicides.

The following usage information can be reported for approved PUPs in the PUPS database:

- Pesticide trade name(s)
- Active ingredient(s)
- Total acres treated
- Total amount of pesticides used (lbs or gallons)
- Total amount of active ingredient(s) used (lbs)
- Target pest(s)
- Efficacy (% control)

To determine whether treatments are efficacious (eradicating, controlling, or containing the target pest) and achieving resource objectives, habitat and/or wildlife response would be monitored both pre- and post-treatment, where possible. Considering available annual funding and staffing, appropriate monitoring data regarding characteristics (attributes) of pest infestations (e.g., area, perimeter, degree of infestation density, percent cover, density) as well as habitat and/or wildlife response to treatments may be collected and stored in a relational database (e.g., Refuge Habitat Management Database), preferably a geo-referenced data management system

(e.g., Refuge Lands Geographic Information System [RLGIS]) to facilitate data analyses and subsequent reporting. In accordance with adaptive management, data analysis and interpretation would allow treatments to be modified or changed over time, as necessary, to achieve resource objectives considering site-specific conditions in conjunction with habitat and/or wildlife responses. Monitoring could also identify short- and long-term impacts to natural resources and environmental quality associated with IPM treatments in accordance with adaptive management principles identified in 43 C.F.R. 46.145.

G.7 Evaluating Pesticide Use Proposals

Pesticides would only be used on refuge lands for habitat management and croplands/facilities maintenance after approval of a PUP. In general, proposed pesticide uses on refuge lands would only be approved where there would likely be minor, temporary, or localized effects to fish and wildlife species and minimal potential to degrade environmental quality. Potential effects to listed and non-listed species would be evaluated with quantitative ecological risk assessments and other screening measures. Potential effects to environmental quality would be based upon pesticide characteristics of environmental fate (water solubility, soil mobility, soil persistence, and volatilization) and other quantitative screening tools. Ecological risk assessments, characteristics of environmental fate, and potential to degrade environmental quality for pesticides would be documented in Chemical Profiles (see Section G.7.6). These profiles would include threshold values for quantitative measures of ecological risk assessments and screening tools for environmental fate that represent minimal potential effects to species and environmental quality. In general, only pesticide uses with appropriate BMPs (see Section G.5) for habitat management and cropland/facilities maintenance on refuge lands that would potentially have minor, temporary, or localized effects on refuge biological and environmental quality (threshold values not exceeded) would be approved.

G.7.1 Overview of Ecological Risk Assessment

An ecological risk assessment process would be used to evaluate potential adverse effects to biological resources as a result of a pesticide(s) proposed for use on refuge lands. It is an established quantitative and qualitative methodology for comparing and prioritizing risks of pesticides and conveying an estimate of the potential risk for an adverse effect. This quantitative methodology provides an efficient mechanism to integrate best available scientific information regarding hazard, patterns of use (exposure), and dose-response relationships in a manner that is useful for ecological risk decision-making. It would provide an effective way to evaluate potential effects where there is missing or unavailable scientific information (data gaps) to address reasonable, foreseeable adverse effects in the field as required under 40 C.F.R. 1502.22. Protocols for ecological risk assessment of pesticide uses on the refuge were developed through research and established by the USEPA (2004). Assumptions for these risk assessments are presented in Section G.7.2.3.

The toxicological data used in ecological risk assessments are typically results of standardized laboratory studies provided by pesticide registrants to the USEPA to meet regulatory requirements under FIFRA. These studies assess the acute (lethality) and chronic (reproductive) effects associated with short- and long-term exposure to pesticides on representative species of birds, mammals, freshwater fish, aquatic invertebrates, and terrestrial and aquatic plants. Other effects data publicly available would also be used for risk assessment protocols described herein. Toxicity endpoint and environmental fate data are available from a variety of resources. Some of the more useful resources can be found in Section G.7.6.

Table G-1. Ecotoxicity Tests Used to Evaluate Potential Effects to Birds, Fish, and Mammals to Establish Toxicity Endpoints for Risk Quotient Calculations

Species Group	Exposure	Measurement endpoint
Bird	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[a]
Fish	Acute	Median Lethal Concentration (LC_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[b]
Mammal	Acute	Oral Lethal Dose (LD_{50})
	Chronic	No Observed Effect Concentration (NOEC) or No Observed Adverse Effect Concentration (NOAEC)[c]

[a] Measurement endpoints typically include a variety of reproductive parameters (e.g., number of eggs, number of offspring, eggshell thickness, and number of cracked eggs).
[b] Measurement endpoints for early life stage/life cycle typically include embryo hatch rates, time to hatch, growth, and time to swim-up.
[c] Measurement endpoints include maternal toxicity, teratogenic effects or developmental anomalies, evidence of mutagenicity or genotoxicity, and interference with cellular mechanisms such as DNA synthesis and DNA repair.

G.7.2 Determining Ecological Risk to Fish and Wildlife

The potential for pesticides used on the refuge to cause direct adverse effects to fish and wildlife would be evaluated using USEPA's Ecological Risk Assessment Process (USEPA 2004). This deterministic approach, which is based upon a two-phase process involving estimation of environmental concentrations and then characterization of risk, would be used for ecological risk assessments. This method integrates exposure estimates (estimated environmental concentration [EEC] and toxicological endpoints [e.g., LC_{50} and oral LD_{50}]) to evaluate the potential for adverse effects to species groups (birds, mammals, and fish) representative of legal mandates for managing units of the NWRS. This integration is achieved through risk quotients (RQs) calculated by dividing the EEC by acute and chronic toxicity values selected from standardized toxicological endpoints or published effect (Table G-1).

$$RQ = EEC/Toxicological\ Endpoint$$

The level of risk associated with direct effects of pesticide use would be characterized by comparing calculated RQs to the appropriate Level of Concern (LOC) established by the USEPA (1998 [Table 2]). The LOC represents a quantitative threshold value for screening potential adverse effects to fish and wildlife resources associated with pesticide use. The following are four exposure-species group scenarios that would be used to characterize ecological risk to fish and wildlife on the refuge: acute-listed species, acute-nonlisted species, chronic-listed species, and chronic-nonlisted species.

Acute risk would indicate the potential for mortality associated with short-term dietary exposure to pesticides immediately after an application. For characterization of acute risks, median values from LC_{50} and LD_{50} tests would be used as toxicological endpoints for RQ calculations. In contrast, chronic risks would indicate the potential for adverse effects associated with long-term dietary exposure to pesticides from a single application or multiple applications over time (within a season and over years). For characterization of chronic risks, the no observed adverse effect concentration (NOAEC) or no observed effect concentration (NOEC) for reproduction would be used as toxicological endpoints for RQ calculations. Where available, the NOAEC would be preferred over a NOEC value.

Listed species are those federally designated as threatened, endangered, or proposed in accordance with the Endangered Species Act of 1973 (16 U.S. Code [U.S.C.] 1531-1544, 87 Stat. 884, as amended, Public Law 93-205). For listed species, potential adverse effects would be assessed at the individual level because loss of individuals from a population could detrimentally impact a species. In contrast, risks to non-listed species would consider effects at the population level. An RQ<LOC would indicate the proposed pesticide use "may affect, not likely to adversely affect" individuals (listed species), and it would not pose an unacceptable risk for adverse effects to populations (non-listed species) for each taxonomic group (Table G-2). In contrast, an RQ>LOC would indicate a "may affect, likely to adversely affect" for listed species, and it would also pose unacceptable ecological risk for adverse effects to non-listed species.

Table G-2. Presumption of Unacceptable Risk for Birds, Fish, and Mammals

Risk Presumption		Level of Concern	
		Listed Species	Nonlisted Species
Acute	Birds	0.1	0.5
	Fish	0.05	0.5
	Mammals	0.1	0.5
Chronic	Birds	1.0	1.0
	Fish	1.0	1.0
	Mammals	1.0	1.0

Source: EPA (1998).

G.7.2.1 Environmental exposure

Following release into the environment through application, pesticides would experience several different routes of environmental fate. Pesticides that would be sprayed can move through the air (e.g., particle or vapor drift) and may eventually end up in other parts of the environment such as non-target vegetation, soil, or water. Pesticides may be bound to soil particles or organic matter and may be transformed by soil micro-organisms or chemical processes. Pesticides applied directly to the soil may be washed off the soil into nearby bodies of surface water (e.g., surface runoff) or may percolate through the soil to lower soil layers and groundwater (e.g., leaching) (Baker and Miller 1999; Butler et al. 1998; Extension Toxicology Network [EXTOXNET] 1993; Pope et al. 1999; Ramsay et al. 1995). Pesticides that would be injected into the soil may also be subject to the latter two fates.

The aforementioned possibilities are by no means complete, but they do indicate that movement of pesticides in the environment is very complex, with transfers occurring continually among different environmental compartments. In some cases, these exchanges occur not only between areas that are close together, but may also involve transportation of pesticides over long distances (Barry 2004; Woods 2004).

G.7.2.1.1 Terrestrial exposure

The EEC for exposure to terrestrial wildlife would be quantified using an USEPA screening-level approach (USEPA 2004). This screening-level approach is not affected by product formulation because it evaluates pesticide active ingredient(s). This approach would vary depending upon the proposed pesticide application method: spray or granular.

G.7.2.1.1.1 Terrestrial—spray application

For spray applications, exposure would be determined using the Kanaga nomogram method (Pfleeger et al. 1996; USEPA 2004, 2005a) through the USEPA's Terrestrial Residue Exposure model (T-REX) version 1.2.3 (USEPA 2005b). To estimate the maximum (initial) pesticide residue on short grass (<20 cm tall) as a general food item category for terrestrial vertebrate species, T-REX input variables would include the following from the pesticide label: maximum pesticide application rate (pounds active ingredient [a.i.] [acid equivalent]/acre) and pesticide half-life (days) in soil. Although there are other food item categories (tall grasses; broadleaf plants and small insects; and fruits, pods, seeds and large insects), short grass was selected because it would yield maximum EECs (240 parts per million [ppm] per lb a.i./acre) for worst-case risk assessments. Short grass is not representative of forage for carnivorous species (e.g., raptors), but it would characterize the maximum potential exposure through the diet of avian and mammalian prey items. Consequently, this approach would provide a conservative screening tool for pesticides that do not biomagnify.

For RQ calculations in T-REX, the model would require the weight of surrogate species and Mineau scaling factors (Mineau et al. 1996). Body weights of bobwhite quail and mallard are included in T-REX by default, but body weights of other organisms (Table G-3) would be entered manually. The Mineau scaling factor accounts for small-bodied bird species that may be more sensitive to pesticide exposure than would be predicted only by body weight. Mineau scaling factors would be entered manually with values ranging from 1 to 1.55 that are unique to a particular pesticide or group of pesticides. If specific information to select a scaling factor is not available, then a value of 1.15 would be used as a default. Alternatively, zero would be entered if it is known that body weight does not influence toxicity of pesticide(s) being assessed. The upper bound estimate output from the T-REX Kanaga nomogram would be used as an EEC for calculation of RQs. This approach would yield a conservative estimate of ecological risk.

Table G-3. Average Body Weight of Selected Terrestrial Wildlife Species Frequently Used in Research to Establish Toxicological Endpoints

Species	Body Weight (kg)
Mammal (15 g)	0.015
House sparrow	0.0277
Mammal (35 g)	0.035
Starling	0.0823
Red-winged blackbird	0.0526
Common grackle	0.114
Japanese quail	0.178
Bobwhite quail	0.178
Rat	0.200
Rock dove (aka pigeon)	0.542
Mammal (1,000 g)	1.000
Mallard	1.082
Ring-necked pheasant	1.135

Source: Dunning (1984).

G.7.2.1.1.2 Terrestrial—granular application

Granular pesticide formulations and pesticide-treated seed pose a unique route of exposure for avian and mammalian species. The pesticide is applied in discrete units that birds or mammals might ingest accidentally with food items, or intentionally as in the case of some bird species actively seeking and picking up gravel or grit to aid digestion or seed as a food source. Granules may also be consumed by wildlife foraging on earthworms, slugs, or other soft-bodied soil organisms to which the granules may adhere.

Terrestrial wildlife RQs for granular formulations or seed treatments would be calculated by dividing the maximum milligrams of a.i. exposed (e.g., EEC) on the surface of an area equal to 1 square foot by the appropriate LD_{50} value multiplied by the surrogate's body weight (Table G-3). An adjustment to surface area calculations would be made for broadcast, banded, and in-furrow applications. An adjustment also would be made for applications with and without incorporation of the granules. Without incorporation, it would be assumed that 100% of the granules remain on the soil surface, available to foraging birds and mammals. Press wheels push granules flat with the soil surface, but they are not incorporated into the soil. If granules are incorporated in the soil during band or T-band applications or after broadcast applications, it would be assumed only 15% of the applied granules remain available to wildlife. It would be assumed that only 1% of the granules are available on the soil surface following in-furrow applications.

EECs for pesticides applied in granular form and as seed treatments would be determined considering potential ingestion rates of avian or mammalian species (e.g., 10%-30% body weight/day). This would provide an estimate of maximum exposure that may occur as a result of granule or seed treatment spills such as those that commonly occur at end rows during application and planting. The availability of granules and seed treatments to terrestrial vertebrates would also be considered by calculating the loading per unit area (LD_{50}/foot^2) for comparison to USEPA LOCs (USEPA 1998). The T-REX version 1.2.3 (USEPA 2005b) contains a submodel that automates Kanaga exposure calculations for granular pesticides and treated seed.

The following formulas would be used to calculate EECs depending upon the type of granular pesticide application:

- In-furrow applications assume a typical value of 1% granules, bait, or seed remain unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}580\ mg/lbs)(1\%\ exposed))] / \{[(43{,}560\ ft.^2/acre)/(row\ spacing\ (ft.))] / (row\ spacing\ (ft.)\}$$

or

$$mg\ a.i./ft^2 = [(lbs\ product/1{,}000\ ft.\ row)(\%\ a.i.)(1{,}000\ ft.\ row)(453{,}580\ mg/lb.)(1\%\ exposed)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Incorporated banded treatments assume that 15% of granules, bait, seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/1{,}000\ row\ ft.)(\%\ a.i.)(453{,}580\ mg/lb.)(1\text{-}\%\ incorporated)] / (1{,}000\ ft.)(band\ width\ (ft.))$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

- Broadcast treatment without incorporation assumes 100% of granules, bait, seeds are unincorporated.

$$mg\ a.i./ft.^2 = [(lbs.\ product/acre)(\%\ a.i.)(453{,}590\ mg/lb.)] / (43{,}560\ ft.^2/acre)$$

$$EEC = [(mg\ a.i./ft.^2)(\%\ of\ pesticide\ biologically\ available)]$$

Where:

  - % of pesticide biologically available = 100% without species -specific ingestion rates
  - Conversion for calculating mg a.i./ft.^{2} using ounces: 453,580 mg/lb. /16 = 28,349 mg/oz.

The following equation would be used to calculate an RQ based on the EEC calculated by one of the above equations. The EEC would be divided by the surrogate LD_{50} toxicological endpoint multiplied by the body weight (Table G-3) of the surrogate.

$$RQ = EEC / [LD_{50}\ (mg/kg) * body\ weight\ (kg)]$$

As with other risk assessments, an RQ>LOC would be a presumption of unacceptable ecological risk. An RQ<LOC would be a presumption of acceptable risk with only minor, temporary, or localized effects to species.

G.7.2.1.2 Aquatic exposure

Exposures to aquatic habitats (e.g., wetlands, meadows, ephemeral pools, water delivery ditches) would be evaluated separately for ground-based pesticide treatments of habitats managed for fish and wildlife compared with cropland/facilities maintenance. The primary exposure pathway for aquatic organisms from any ground-based treatments likely would be particle drift during the pesticide application. However, different exposure scenarios would be necessary as a result of contrasting application equipment and techniques as well as pesticides used to control pests on agricultural lands (especially those cultivated by cooperative farmers for economic return from crop yields) and facilities maintenance (e.g., roadsides, parking lots, trails) compared with other managed habitats on the refuge. In addition, pesticide applications may be done <25 feet of the high-water mark of aquatic habitats for habitat management treatments, whereas no-spray buffers (≥25 feet) would be used for croplands/facilities maintenance treatments.

G.7.2.1.2.1 Habitat treatments

For the worst-case exposure scenario to non-target aquatic habitats, EECs (Table G-4) would be derived from Urban and Cook (1986). The EECs assume an intentional overspray to an entire, non-target water body (1-foot depth) from a treatment <25 feet from the high-water mark using the maximum application rate (acid basis [see above]). However, use of BMPs for applying pesticides (see Section G.5.2) would likely minimize/eliminate potential drift to non-target aquatic habitats during actual treatments. If there would be unacceptable (acute or chronic) risk to fish and wildlife with the simulated 100% overspray (RQ>LOC), then the proposed pesticide use may be disapproved or the PUP would be approved at a lower application rate to minimize/eliminate unacceptable risk to aquatic organisms (RQ = LOC).

Table G-4. EECs (ppb) of Pesticides in Aquatic Habitats (1-foot depth) Immediately after Direct Application

Lbs/acre	EEC (parts per billion [ppb])
0.10	36.7
0.20	73.5
0.25	91.9
0.30	110.2
0.40	147.0
0.50	183.7
0.75	275.6
1.00	367.5
1.25	459.7
1.50	551.6
1.75	643.5
2.00	735.7
2.25	827.6
2.50	919.4
3.00	1,103.5
4.00	1,471.4
5.00	1,839
6.00	2,207
7.00	2,575
8.00	2,943
9.00	3,311
10.00	3,678

Source: Urban and Cook (1986).

G.7.2.1.2.2 Cropland/facilities maintenance treatments

Field drift studies conducted by the Spray Drift Task Force, which is a joint project of several agricultural chemical businesses, were used to develop a generic spray drift database. From this database, the AgDRIFT computer model was created to satisfy USEPA pesticide registration spray drift data requirements and as a scientific basis to evaluate off-target movement of pesticides from particle drift and assess potential effects of exposure to wildlife. Several versions of the computer model have been developed (i.e., v2.01 through v2.10). The Spray Drift Task Force AgDRIFT model version 2.01 (AgDRIFT 2001; Spray Drift Task Force 2003) would be used to derive EECs resulting from drift of pesticides to refuge aquatic resources from ground-based pesticide applications >25 feet from the high-water mark. The Spray Drift Task Force AgDRIFT model is publicly available at http://www.agdrift.com. At this website, click "AgDRIFT 2.0," then click "Download Now," and follow the instructions to obtain the computer model.

The AgDRIFT model is composed of submodels called tiers. Tier I Ground submodel would be used to assess ground-based applications of pesticides. Tier outputs (EECs) would be calculated with AgDRIFT using the following input variables: maximum application rate (acid basis [see above]), low boom (20 inches), fine to medium droplet size, USEPA-defined wetland, and a ≥25-foot distance (buffer) from treated area to water.

G.7.2.2 Use of information on effects of biological control agents, pesticides, degradates, and adjuvants

NEPA documents regarding biological and other environmental effects of biological control agents, pesticides, degradates, and adjuvants prepared by another Federal agency, where the scope would be relevant to evaluation of effects from pesticide uses on refuge lands, would be reviewed. Possible source agencies for such NEPA documents include the BLM, USFS, the National Park Service, USDA Animal and Plant Health Inspection Service, and the military services. It might be appropriate to incorporate by reference parts or all of existing document(s). Incorporating by reference (40 C.F.R. 1502.21) is a technique used to avoid redundancies in analysis. It also would reduce the bulk of a Service NEPA document, which would only identify the documents that are incorporated by reference. In addition, relevant portions would be summarized in the Service NEPA document to the extent necessary to provide the decision maker and public with an understanding of relevance of the referenced material to the current analysis.

In accordance with the requirements set forth in 43 C.F.R. 46.135, the Service would specifically incorporate through reference ecological risk assessments prepared by the USFS (http://www.fs.fed.us/r6/invasiveplant-eis/Risk-Assessments/Herbicides-Analyzed-InvPlant-EIS.htm) and BLM (http://www.blm.gov/wo/st/en/prog/more/veg_eis.html). These risk assessments and associated documentation are also available in total with the administrative record for the Final EIS titled *Pacific Northwest Region Invasive Plant Program: Preventing and Managing Invasive Plants* (USFS 2005) and *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic EIS (PEIS)* (BLM 2007). In accordance with 43 C.F.R. 46.120(d), use of existing NEPA documents by supplementing, tiering to, incorporating by reference, or adopting previous NEPA environmental analyses would avoid redundancy and unnecessary paperwork.

As a basis for completing “Chemical Profiles” for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide and adjuvant uses prepared by the USFS would be incorporated by reference:

- 2,4-D
- Chlorsulfuron
- Clopyralid
- Dicamba
- Glyphosate
- Imazapic
- Imazapyr
- Metsulfuron methyl
- Picloram
- Sethoxydim
- Sulfometuron methyl
- Triclopyr
- Nonylphenol polyethoxylate (NPE)–based surfactants

As a basis for completing “Chemical Profiles” for approving or disapproving refuge PUPs, ecological risk assessments for the following herbicide uses as well as evaluation of risks associated with pesticide degradates and adjuvants prepared by the BLM would be incorporated by reference:

- Bromacil
- Chlorsulfuron
- Diflufenzopyr
- Diquat
- Diuron
- Fluridone
- Imazapic
- Overdrive (diflufenzopyr and dicamba)
- Sulfometuron methyl
- Tebuthiuron
- Pesticide degradates and adjuvants (*Appendix D – Evaluation of risks from degradates, polyoxyethylene-amine (POEA) and R-11, and endocrine disrupting chemicals*)

G.7.2.3 Assumptions for ecological risk assessments

There are a number of assumptions involved with the ecological risk assessment process for terrestrial and aquatic organisms associated with using the USEPA's process. These assumptions may be risk neutral or may lead to an over- or under-estimation of risk from pesticide exposure depending upon site-specific conditions. These assumptions, their application to the conditions typically encountered, and whether they may lead to recommendations that are risk neutral, underestimate, or overestimate ecological risk from potential pesticide exposure are discussed below.

- Indirect effects would not be evaluated by ecological risk assessments. These effects include the mechanisms of indirect exposure to pesticides: consuming prey items (fish, birds, or small mammals), reductions in the availability of prey items, and disturbance associated with pesticide application activities.
- Exposure to a pesticide product can be assessed based upon the active ingredient. However, exposure to a chemical mixture (pesticide formulation) may result in effects that are similar or substantially different compared to only the active ingredient. Non-target organisms may be exposed directly to the pesticide formulation or only various constituents of the formulation as they dissipate and partition in the environment. If toxicological information for both the active ingredient and formulated product are available, then data representing the greatest potential toxicity would be selected for use in the risk assessment process (USEPA 2004). As a result, this conservative approach may lead to an overestimation of risk characterization from pesticide exposure.
- Because toxicity tests with listed or candidate species or closely related species are not available, data for surrogate species would be most often used for risk assessments. Specifically, bobwhite quail and mallard duck are the most frequently used surrogates for evaluating potential toxicity to federally listed avian species. Bluegill sunfish, rainbow trout, and fathead minnow are the most common surrogates for evaluating toxicity for freshwater fishes. Sheepshead minnow can be an appropriate surrogate marine species for coastal environments. Rats and mice are the most common surrogates for evaluating toxicity for mammals. Interspecies sensitivity is a major source of uncertainty in pesticide assessments. As a result of this uncertainty, data are selected for the most sensitive species tested within a taxonomic group (birds, fish, and mammals), given the quality of the data is acceptable. If additional toxicity data for more species of organisms in a particular group are available, the selected data would not be limited to the species previously listed as common surrogates.

- The Kanaga nomogram outputs maximum EEC values that may be used to calculate an average daily concentration over a specified interval of time, which is referred to as a time-weighted-average (TWA). The maximum EEC would be selected as the exposure input for both acute and chronic risk assessments in the screening-level evaluations. The initial or maximum EEC derived from the Kanaga nomogram represents the maximum expected instantaneous or acute exposure to a pesticide. Acute toxicity endpoints are determined using a single exposure to a known pesticide concentration typically for 48 to 96 hours. This value is assumed to represent ecological risk from acute exposure to a pesticide. On the other hand, chronic risk to pesticide exposure is a function of pesticide concentration and duration of exposure to the pesticide. An organism's response to chronic pesticide exposure may result from either the concentration of the pesticide, length of exposure, or some combination of both factors. Standardized tests for chronic toxicity typically involve exposing an organism to several different pesticide concentrations for a specified length of time (days, weeks, months, years, or generations). For example, avian reproduction tests include a 10-week exposure phase. Because a single length of time is used in the test, time response data are usually not available for inclusion into risk assessments. Without time response data, it is difficult to determine the concentration that elicits a toxicological response.
- Using maximum EECs for chronic risk estimates may result in an overestimation of risk, particularly for compounds that dissipate rapidly. Conversely, using TWAs for chronic risk estimates may underestimate risk if it is the concentration rather than the duration of exposure that is primarily responsible for the observed adverse effect. The maximum EEC would be used for chronic risk assessments although it may result in an overestimation of risk. TWAs may be used for chronic risk assessments, but they would be applied judiciously considering the potential for an underestimation or overestimation of risk. For example, the number of days exposure exceeds an LOC may influence the suitability of a pesticide use. The greater the number of days the EEC exceeds the LOC, the greater the ecological risk. This is a qualitative assessment, and is subject to the reviewer's expertise in ecological risk assessment and tolerance for risk.
- The length of time used to calculate the TWA can have a substantial effect on the exposure estimates, and there is no standard method for determining the appropriate duration for this estimate. The T-REX model assumes a 21-week exposure period, which is equivalent to avian reproductive studies designed to establish a steady-state concentration for bioaccumulative compounds. However, this does not necessarily define the true exposure duration needed to elicit a toxicological response. Pesticides that do not bioaccumulate may achieve a steady-state concentration earlier than 21 weeks. The duration of time used for calculating TWAs would require justification and would not exceed the duration of exposure in the chronic toxicity test (approximately 70 days for the standard avian reproduction study). An alternative to using the duration of the chronic toxicity study is to base the TWA on the application interval. In this case, increasing the application interval would suppress both the estimated peak pesticide concentration and the TWA. Another alternative to using TWAs would be to consider the number of days that a chemical is predicted to exceed the LOC.
- Pesticide dissipation is assumed to be first-order in the absence of data suggesting alternative dissipation patterns such as biphasic. Field dissipation data would generally be the most pertinent for assessing exposure in terrestrial species that forage on vegetation. However, these data are often not available and can be misleading, particularly if the compound is prone to "wash-off." Soil half-life is the most common degradation data available. Dissipation or degradation data that would reflect the environmental conditions typical of refuge lands would be used, if available.

- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column.
- Actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species exclusively and permanently occupy the treated area, or adjacent areas receiving pesticide at rates commensurate with the treatment rate. This assumption would produce a maximum estimate of exposure for risk characterization. This assumption would likely lead to an overestimation of exposure for species that do not permanently and exclusively occupy the treated area (USEPA 2004).
- Exposure through incidental ingestion of pesticide-contaminated soil is not considered in the USEPA risk assessment protocols. Research suggests <15% of the diet can consist of incidentally ingested soil depending upon species and feeding strategy (Beyer et al. 1994). An assessment of pesticide concentrations in soil compared to food item categories in the Kanaga nomogram indicates incidental soil ingestion would not likely increase dietary exposure to pesticides. Inclusion of soil into the diet would effectively reduce the overall dietary concentration compared to the present assumption that the entire diet consists of a contaminated food source (Fletcher et al. 1994). An exception to this may be soil-applied pesticides in which exposure from incidental ingestion of soil may increase. Potential for pesticide exposure under this assumption may be underestimated for soil-applied pesticides and overestimated for foliar-applied pesticides. The concentration of a pesticide in soil would likely be less than predicted in food items.
- Exposure through inhalation of pesticides is not considered in the USEPA risk assessment protocols. Such exposure may occur through three potential sources: spray material in droplet form at time of application, vapor phase with the pesticide volatilizing from treated surfaces, and airborne particulates (soil, vegetative matter, and pesticide dusts). The USEPA (1990) reported that exposure from inhaling spray droplets at the time of application is not an appreciable route of exposure for birds. According to research on mallards and bobwhite quail, respirable particle size (particles reaching the lung) in birds is limited to a maximum diameter of 2 to 5 microns. The spray droplet spectra covering the majority of pesticide application scenarios indicate that less than 1% of the applied material is within the respirable particle size. This route of exposure is further limited because the permissible spray drop size distribution for ground pesticide applications is restricted to American Society of Agricultural Engineers (ASAE) medium or coarser drop size distribution.
- Inhalation of a pesticide in the vapor phase may be another source of exposure for some pesticides under certain conditions. This mechanism of exposure to pesticides occurs post-application and pertains to those pesticides that have a high vapor pressure. The USEPA is currently evaluating protocols for modeling inhalation exposure from pesticides including near-field and near-ground air concentrations based upon equilibrium and kinetics-based models. Risk characterization for exposure with this mechanism is unavailable.
- The effect from exposure to dusts contaminated with the pesticide cannot be assessed generically as partitioning issues related to application site soils and chemical properties of the applied pesticides render the exposure potential from this route highly situation-specific.
- Dermal exposure may occur through three potential sources: direct application of spray to terrestrial wildlife in the treated area or within the drift footprint, incidental contact with contaminated vegetation, or contact with contaminated water or soil. Interception of spray and incidental contact with treated substrates may pose a risk to avian wildlife (Driver et al. 1991). However, available research related to wildlife dermal contact with pesticides is extremely limited, with the exception of dermal toxicity values, which are common for some

mammals used as human surrogates (rats and mice). The USEPA is currently evaluating protocols for modeling dermal exposure. Risk characterization may be underestimated for this route of exposure, particularly with high-risk pesticides such as some organophosphates or carbamate insecticides. If protocols are established by the USEPA for assessing dermal exposure to pesticides, they would be considered for incorporation into pesticide assessment protocols.

- Exposure to a pesticide may occur from consuming surface water, dew, or other water on treated surfaces. Water-soluble pesticides have the potential to dissolve in surface runoff, and puddles in a treated area may contain pesticide residues. Similarly, pesticides with lower organic carbon partitioning characteristics and higher solubility in water have a greater potential to dissolve in dew and other water associated with plant surfaces. Estimating the extent to which such pesticide loadings to drinking water occur is complex and would depend upon the partitioning characteristics of the active ingredient, soil types in the treatment area, and the meteorology of the treatment area. In addition, the use of various water sources by wildlife is highly species-specific. Currently, risk characterization for this exposure mechanism is not available. The USEPA is actively developing protocols to quantify drinking water exposures from puddles and dew. If and when protocols are formally established by the USEPA for assessing exposure to pesticides through drinking water, these protocols would be incorporated into pesticide risk assessment protocols.
- Risk assessments are based upon the assumption that the entire treatment area would be subject to pesticide application at the rates specified on the label. In most cases, there is potential for uneven application of pesticides due to incidents such as changes in calibration of application equipment, spillage, and localized releases at specific areas in or near the treated field that are associated with mixing, handling, and application equipment, as well as applicator skill. Inappropriate use of pesticides and the occurrence of spills represent a potential underestimation of risk. However, they are likely not important factors for risk characterization. All pesticide applicators are required to be certified by the state in which they apply pesticides. Certification training includes the safe storage, transport, handling, and mixing of pesticides, equipment calibration, and proper application with annual continuing education.
- The USEPA relies on Fletcher (1994) for setting the assumed pesticide residues in wildlife dietary items. The USEPA (2004) "believes that these residue assumptions reflect a realistic upper-bound residue estimate, although the degree to which this assumption reflects a specific percentile estimate is difficult to quantify." Fletcher et al.'s (1994) research suggests that the pesticide active ingredient residue assumptions used by the USEPA represent a 95th percentile estimate. However, research conducted by Pfleeger et al. (1996) indicates that USEPA residue assumptions for short grass were not exceeded. Baehr and Habig (2000) compared USEPA residue assumptions with distributions of measured pesticide residues for the USEPA's UTAB (Uptake, Translocation, Accumulation, and Biotransformation) database. Overall residue selection level tends to overestimate risk characterization. This is particularly evident when wildlife individuals are likely to have selected a variety of food items acquired from multiple locations. Some food items may be contaminated with pesticide residues whereas others are not contaminated. However, it is important to recognize differences in species' feeding behavior. Some species may consume whole aboveground plant material, but others preferentially select different plant structures. Also, species may preferentially select a food item although multiple food items may be present. Without species-specific knowledge regarding foraging behavior, characterizing ecological risk other than in general terms is not possible.

- Acute and chronic risk assessments rely on comparisons of wildlife dietary residues with LC_{50} or NOEC values expressed as concentrations of pesticides in laboratory feed. These comparisons assume that ingestion of food items in the field occurs at rates commensurate with those in the laboratory. Although the screening assessment process adjusts dry-weight estimates of food intake to reflect the increased mass in fresh-weight wildlife food intake estimates, it does not allow for gross energy and assimilative efficiency differences between wildlife food items and laboratory feed. Differences in assimilative efficiency between laboratory and wild diets suggest that current screening assessment methods are not accounting for a potentially important aspect of food requirements.
- There are several other assumptions that can affect non-target species not considered in the risk assessment process. These include possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic and biotic factors), and behavioral changes induced by exposure to a pesticide. These factors may exist at some level contributing to adverse effects to non-target species, but they are usually characterized in the published literature in only a general manner, limiting their value in the risk assessment process.
- It is assumed that aquatic species exclusively and permanently occupy the water body being assessed. Actual habitat requirements of aquatic species are not considered. With the possible exception of scenarios where pesticides are directly applied to water, it is assumed that no habitat use considerations specific for any species would place the organisms in closer proximity to pesticide use sites. This assumption produces a maximum estimate of exposure or risk characterization. It would likely be realistic for many aquatic species that may be found in aquatic habitats within or in close proximity to treated terrestrial habitats. However, the spatial distribution of wildlife is usually not random because wildlife distributions are often related to habitat requirements of species. Clumped distributions of wildlife may result in an underestimation or overestimation of risk depending upon where the initial pesticide concentration occurs relative to the species or species habitat.
- For species found in the water column, it would be assumed that the greatest bioavailable fraction of the pesticide active ingredient in surface waters is freely dissolved in the water column. Additional chemical exposure from materials associated with suspended solids or food items is not considered because partitioning onto sediments likely is minimal. Adsorption and bioconcentration occur at lower levels for many newer pesticides compared with older, more persistent bioaccumulative compounds. The potential for additional exposure from pesticides with RQs close to the listed species LOC, may be a limitation of risk assessments, where potential pesticide exposure or risk may be underestimated.
- Mass transport losses of pesticide from a water body (except for losses by volatilization, degradation, and sediment partitioning) would not be considered for ecological risk assessment. The water body would be assumed to capture all pesticide active ingredients entering as runoff, drift, and by being adsorbed to eroded soil particles. It would also be assumed that pesticide active ingredient is not lost from the water body by overtopping or flow-through, nor is concentration reduced by dilution. In total, these assumptions would lead to a near maximum possible water-borne concentration. However, this assumption would not account for the potential to concentrate pesticide through evaporative loss. This limitation may have the greatest impact on water bodies with high surface-to-volume ratios such as ephemeral wetlands, where evaporative losses are accentuated and applied pesticides have low rates of degradation and volatilization.

- For acute risk assessments, there would be no averaging time for exposure. An instantaneous peak concentration would be assumed, where instantaneous exposure is sufficient in duration to elicit acute effects comparable to those observed over more protracted exposure periods (typically 48 to 96 hours) tested in the laboratory. In the absence of data regarding time-to-toxic event, analyses, and latent responses to instantaneous exposure, risk would likely be overestimated.
- For chronic exposure risk assessments, the averaging times considered for exposure are commensurate with the duration of invertebrate life-cycle or fish early-life-stage tests (e.g., 21-28 days and 56-60 days, respectively). Response profiles (time to effect and latency of effect) to pesticides likely vary widely with mode of action and species, and should be evaluated on a case-by-case basis as available data allow. Nevertheless, because the USEPA relies on chronic exposure toxicity endpoints based on a finding of no observed effect, the potential for any latent toxicity effects or averaging time assumptions to alter the results of an acceptable chronic risk assessment prediction is limited. The extent to which duration of exposure from water-borne concentrations overestimate or underestimate actual exposure depends on several factors. These include the following: localized meteorological conditions, runoff characteristics of the watershed (e.g., soils, topography), the hydrological characteristics of receiving waters, environmental fate of the pesticide active ingredient, and the method of pesticide application. It should also be understood that chronic effects studies are performed using a method that holds water concentration in a steady state. This method is not likely to reflect conditions associated with pesticide runoff. Pesticide concentrations in the field increase and decrease in surface water on a cycle influenced by rainfall, pesticide use patterns, and degradation rates. As a result of the dependency of this assumption on several undefined variables, risk associated with chronic exposure may underestimate risk in some situations and overestimate risk in others.
- There are several other factors that can affect non-target species not considered in the risk assessment process. These include the following: possible additive or synergistic effects from applying two or more pesticides or additives in a single application, co-location of pesticides in the environment, cumulative effects from pesticides with the same mode of action, effects of multiple stressors (e.g., combination of pesticide exposure, adverse abiotic [not pesticides] and biotic factors), and sublethal effects such as behavioral changes induced by exposure to a pesticide. These factors may exist at some level, contributing to adverse effects to non-target species, but they are not routinely assessed by regulatory agencies. Therefore, information on these factors is not extensive, limiting their value for the risk assessment process. As this type of information becomes available, it would be included, either quantitatively or qualitatively, in this risk assessment process.
- USEPA is required by the Food Quality Protection Act to assess the cumulative risks of pesticides that share common mechanisms of toxicity, or act the same within an organism. Currently, USEPA has identified four groups of pesticides that have a common mechanism of toxicity requiring cumulative risk assessments. These four groups are: the organophosphate insecticides, N-methyl carbamate insecticides, triazine herbicides, and chloroacetanilide herbicides.

G.7.3 Pesticide Mixtures and Degradates

Pesticide products are usually a formulation of several components generally categorized as active ingredients and inert or other ingredients. The term “active ingredient” is defined by FIFRA as preventing, destroying, repelling, or mitigating the effects of a pest, or a plant regulator, defoliant,

desiccant, or nitrogen stabilizer. In accordance with FIFRA, the active ingredient(s) must be identified by name(s) on the pesticide label along with its relative composition expressed in percentage(s) by weight. In contrast, inert ingredient(s) are not intended to affect a target pest. Their role in the pesticide formulation is to act as a solvent (keep the active ingredient in a liquid phase), an emulsifying or suspending agent (keep the active ingredient from separating out of solution), or a carrier (such as clay in which the active ingredient is impregnated on the clay particle in dry formulations). For example, if isopropyl alcohol is used as a solvent in a pesticide formulation, then it would be considered an inert ingredient. FIFRA only requires that inert ingredients identified as hazardous and their associated percent composition be declared on a product label, along with the total percentage of all inert ingredients. Inert ingredients that are not classified as hazardous are not required to be identified.

The USEPA (September 1997) issued Pesticide Regulation Notice 97-6, which encouraged manufacturers, formulators, producers, and registrants of pesticide products to voluntarily substitute the term "other ingredients" for "inert ingredients" in the ingredient statement. This change recognized that all components in a pesticide formulation could potentially elicit or contribute to an adverse effect on non-target organisms and, therefore, are not necessarily inert. Whether referred to as "inerts" or "other ingredients," these constituents within a pesticide product have the potential to affect species or environmental quality. The USEPA categorizes regulated inert ingredients into the following four lists (http://www.epa.gov/opprd001/inerts/index.html):

- List 1 – Inert Ingredients of Toxicological Concern
- List 2 – Potentially Toxic Inert Ingredients
- List 3 – Inerts of Unknown Toxicity
- List 4 – Inerts of Minimal Toxicity

Several of the List 4 compounds are naturally occurring earthen materials (e.g., clay materials, simple salts) that would not elicit toxicological response at applied concentrations. However, some of the inerts (particularly the List 3 compounds and unlisted compounds) may have moderate to high potential toxicity to aquatic species based on MSDSs or published data.

Comprehensively assessing potential effects to non-target fish, wildlife, plants, and/or their habitats from pesticide use is a complex task. It would be preferable to assess the cumulative effects from exposure to the active ingredient, and its degradates and inert ingredients, as well as other active ingredients in the spray mixture. However, it would only be feasible to conduct deterministic risk assessments for each component in the spray mixture singly. Limited scientific information is available regarding ecological effects (additive or synergistic) from chemical mixtures that typically rely upon broadly encompassing assumptions. For example, the USFS (2005) found that mixtures of pesticides used in land (forest) management likely would not cause additive or synergistic effects to non-target species based upon a review of scientific literature regarding toxicological effects and interactions of agricultural chemicals (Agency for Toxic Substances and Disease Registry [ATSDR] 2004). Moreover, information on inert ingredients, adjuvants, and degradates is often limited by the availability of and access to reliable toxicological data for these constituents.

Toxicological information regarding "other ingredients" may be available from sources such as the following:

- Toxicology, Occupational Medicine, and Environmental Series (TOMES) (a proprietary toxicological database including USEPA's Integrated Risk Information System (IRIS), the

Hazardous Substance Data Bank, and the Registry of Toxic Effects of Chemical Substances [RTECS]).
- USEPA's ECOTOX database, which includes AQUIRE (a database containing scientific papers published on the toxic effects of chemicals to aquatic organisms).
- TOXLINE (a literature searching tool).
- MSDSs from pesticide suppliers.
- Other sources such as the *Farm Chemicals Handbook*.

Because there is a lack of specific inert toxicological data, inert(s) in a pesticide may cause adverse ecological effects. However, inert ingredients typically represent only a small percentage of the pesticide spray mixture, and it would be assumed that negligible effects would be expected to result from inert ingredient(s).

Although the potential effects of degradates should be considered when selecting a pesticide, it is beyond the scope of this assessment process to consider all possible breakdown chemicals of the various product formulations containing an active ingredient. Degradates may be more or less mobile and more or less hazardous in the environment than their parent pesticides (Battaglin et al. 2003). Differences in environmental behavior (e.g., mobility) and toxicity between parent pesticides and degradates would make assessing potential degradate effects extremely difficult. For example, a less toxic and more mobile, bioaccumulative, or persistent degradate may have potentially greater effects on species and/or degrade environmental quality. The lack of data on the toxicity of degradates for many pesticides would represent a source of uncertainty for assessing risk.

A USEPA-approved label specifies whether a product can be mixed with one or more pesticides. Without product-specific toxicological data, it would not possible to quantify the potential effects of these mixtures. In addition, a quantitative analysis could only be conducted if reliable scientific information allowed a determination of whether the joint action of a mixture would be additive, synergistic, or antagonistic. Such information would not likely exist unless the mode of action would be common among the chemicals and receptors. Moreover, the composition of and exposure to mixtures would be highly site- and/or time-specific and, therefore, it would be nearly impossible to assess potential effects to species and environmental quality.

To minimize or eliminate potential negative effects associated with applying two or more pesticides as a mixture, the use would be conducted in accordance with the labeling requirements. Labels for two or more pesticides applied as a mixture should be completely reviewed, where products with the least potential for negative effects would be selected for use on the refuge. This is especially relevant when a mixture would be applied in a manner that may already have the potential for an effect(s) associated with an individual pesticide (e.g., runoff to ponds in sandy watersheds). Use of a tank mix under these conditions would increase the level of uncertainty in terms of risk to species or potential to degrade environmental quality.

Adjuvants generally function to enhance or prolong the activity of pesticide. For terrestrial herbicides, adjuvants aid in the absorption into plant tissue. "Adjuvant" is a broad term that generally applies to surfactants, selected oils, anti-foaming agents, buffering compounds, drift control agents, compatibility agents, stickers, and spreaders. Adjuvants are not under the same registration requirements as pesticides, and the USEPA does not register or approve the labeling of spray adjuvants. Individual pesticide labels identify types of adjuvants approved for use with the pesticide. In general, adjuvants compose a relatively small portion of the volume of pesticides applied.

Selection of adjuvants with limited toxicity and low volumes would be recommended to reduce the potential for the adjuvant to influence the toxicity of the pesticide.

G.7.4 Determining Effects to Soil and Water Quality

The approval process for pesticide uses would consider potential to degrade water quality on and off refuge lands. A pesticide can only affect water quality through movement away from the treatment site. After application, pesticide mobilization can be characterized by one or more of the following (Kerle et al. 1996):

- Attach (sorb) to soil, vegetation, or other surfaces and remain at or near the treated area;
- Attach to soil and move off-site through erosion from runoff or wind;
- Dissolve in water that can be subjected to runoff or leaching.

As an initial screening tool, selected chemical characteristics and rating criteria for a pesticide can be evaluated to assess potential to enter ground and/or surface waters. These would include the following: persistence, sorption coefficient (K_{oc}), groundwater ubiquity score (GUS), and solubility.

Persistence, which is expressed as half-life ($t_{½}$), represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially). Persistence in the soil can be categorized as the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996). Half-life data is usually available for aquatic and terrestrial environments.

Another measure of pesticide persistence is dissipation time (DT_{50}). It represents the time required for 50% of the deposited pesticide to degrade and move from a treated site, whereas half-life describes the rate for degradation only. As for half-life, units of dissipation time are usually expressed in days. Field or foliar dissipation times are the preferred data for use to estimate pesticide concentrations in the environment. However, soil half-life is the most common persistence data cited in published literature. If field or foliar dissipation data are not available, soil half-life data may be used. The average or representative half-life value of most important degradation mechanisms will be selected for quantitative analysis for both terrestrial and aquatic environments.

Mobility of a pesticide is a function of how strongly it is adsorbed to soil particles and organic matter, its solubility in water, and its persistence in the environment. Pesticides strongly adsorbed to soil particles, relatively insoluble in water, and not environmentally persistent would be less likely to move across the soil surface into surface waters or to leach through the soil profile and contaminate groundwater. Conversely, pesticides that are not strongly adsorbed to soil particles, are highly water soluble, and are persistent in the environment would have greater potential to move from the application site (off-site movement).

The degree of pesticide adsorption to soil particles and organic matter (Kerle et al. 1996) is expressed as the soil adsorption coefficient (K_{oc}). The soil adsorption coefficient is measured as micrograms of pesticide per gram of soil (µg/g) and can range from near zero to the thousands. Pesticides with higher K_{oc} values are strongly sorbed to soil and, therefore, would be less subject to movement.

Water solubility describes the amount of pesticide that will dissolve in a known quantity of water. The water solubility of a pesticide is expressed as milligrams of pesticide dissolved in a liter of water (mg/L or ppm). Pesticides with solubility <0.1 ppm are virtually insoluble in water; those with solubility 100 to 1,000 ppm are moderately soluble, and those with solubility >10,000 ppm are highly

soluble (U.S. Geological Survey [USGS] 2000). As pesticide solubility increases, there would be greater potential for off-site movement.

The GUS is a quantitative screening tool to estimate a pesticide's potential to move in the environment. It uses soil persistence and adsorption coefficients in the following formula.

$$GUS = \log_{10}(t_{½}) \times [4 - \log_{10}(K_{oc})]$$

The potential pesticide movement rating would be based upon its GUS value. Pesticides with a GUS <0.1 would considered to have an extremely low potential to move toward groundwater. Values of 1.0 to 2.0 would be low, 2.0 to 3.0 would be moderate, 3.0 to 4.0 would be high, and >4.0 would have a very high potential to move toward groundwater.

Water solubility describes the amount of pesticide dissolving in a specific quantity of water, where it is usually measured as mg/L or ppm. Solubility is useful as a comparative measure because pesticides with higher values are more likely to move by runoff or leaching. GUS, water solubility, $t_{½}$, and K_{oc} values are available for selected pesticides from the Oregon State University (OSU) Extension Pesticide Properties Database at http://npic.orst.edu/ppdmove.htm. Many of the values in this database were derived from the Soil Conservation Service (SCS)/Agricultural Research Service (ARS)/Cooperative Extension service (CES) Pesticide Properties Database for Environmental Decision Making (Wauchope et al. 1992).

Soil properties influence the fate of pesticides in the environment. The following six properties are mostly likely to affect pesticide degradation and the potential for pesticides to move off-site by leaching (vertical movement through the soil) or runoff (lateral movement across the soil surface).

- Permeability is the rate of water movement vertically through the soil. It is affected by soil texture and structure. Coarse-textured soils (e.g., high sand content) have a larger pore size and are generally more permeable than fine-textured soils (i.e., high clay content). The more permeable soils would have a greater potential for pesticides to move vertically down through the soil profile. Soil permeability rates (inches/hour) are usually available in county soil survey reports.
- Soil texture describes the relative percentage of sand, silt, and clay. In general, greater clay content with smaller pore size would lower the likelihood and rate that water would move through the soil profile. Clay also serves to adsorb (bind) pesticides to soil particles. Soils with high clay content would adsorb more pesticide than soils with relatively low clay content. In contrast, sandy soils with coarser texture and lower water-holding capacity would have a greater potential for water to leach through them.
- Soil structure describes soil aggregation. Soils with a well-developed soil structure have a looser, more aggregated structure that would be less likely to be compacted. Both characteristics allow for less restricted flow of water through the soil profile, resulting in greater infiltration.
- Organic matter would be the single most important factor affecting pesticide adsorption in soils. Many pesticides are adsorbed to organic matter, which would reduce their rate of downward movement through the soil profile. Also, soils high in organic matter would tend to hold more water, which may make less water available for leaching.
- Soil moisture affects how fast water would move through the soil. If soils are already wet or saturated before rainfall or irrigation, excess moisture would runoff rather than infiltrate into the soil profile. Soil moisture also would influence microbial and chemical activity in soil, which affects pesticide degradation.

- Soil pH would influence chemical reactions that occur in the soil, which in turn determines whether a pesticide will degrade, the rate of degradation, and, in some instances, which degradation products are produced.

Based upon the aforementioned properties, soils most vulnerable to groundwater contamination would be sandy soils with low organic matter. In contrast, the least vulnerable soils would be well-drained clayey soils with high organic matter. Consequently, pesticides with the lowest potential for movement in conjunction with appropriate BMPs (see below) would be used in an IPM framework to treat pests while minimizing effects to non-target biota and protecting environmental quality.

Along with soil properties, the potential for a pesticide to affect water quality through runoff and leaching would consider site-specific environmental and abiotic conditions including rainfall, water table conditions, and topography (Huddleston 1996).

- Water is necessary to separate pesticides from soil. This can occur in two basic ways. Pesticides that are soluble move easily with runoff water. Pesticide-laden soil particles can be dislodged and transported from the application site in runoff. The concentration of pesticides in the surface runoff would be greatest for the first runoff event following treatment. The rainfall intensity and route of water infiltration into soil, to a large extent, determine pesticide concentrations and losses in surface runoff. The timing of the rainfall after application also would have an effect. Rainfall interacts with pesticides at a shallow soil depth (¼ to ½ inch), which is called the mixing zone (Baker and Miller 1999). The pesticide/water mixture in the mixing zone would tend to leach down into the soil or runoff depending upon how quickly the soil surface becomes saturated and how rapidly water can infiltrate into the soil. Leaching would decrease the amount of pesticide available near the soil surface (mixing zone) to runoff during the initial rainfall event following application and subsequent rainfall events.
- Terrain slope would affect the potential for surface runoff and the intensity of runoff. Steeper slopes would have greater potential for runoff following a rainfall event. In contrast, soils that are relatively flat would have little potential for runoff, except during intense rainfall events. In addition, soils in lower areas would be more susceptible to leaching as a result of receiving excessive water from surrounding higher elevations.
- Depth to groundwater would be an important factor affecting the potential for pesticides to leach into groundwater. If the distance from the soil surface to the top of the water table is shallow, pesticides would have less distance to travel to reach groundwater. Shallower water tables that persist for longer periods would be more likely to experience groundwater contamination. Soil survey reports are available for individual counties. These reports provide data in tabular format regarding the water table depths and the months during which it persists. In some situations, a hard pan exists above the water table that would prevent pesticide contamination from leaching.

G.7.5 Determining Effects to Air Quality

Pesticides may volatilize from soil and plant surfaces and move from the treated area into the atmosphere. The potential for a pesticide to volatilize is determined by the pesticide's vapor pressure, which would be affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these numbers easier to compare, vapor pressure may be expressed in exponent form ($I \times 10^{-7}$), where "I" represents a vapor pressure index. In general, pesticides with $I<10$ would have a low potential to volatilize, whereas pesticides with

I>1,000 would have a high potential to volatilize (OSU 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA ARS pesticide database.

G.7.6 Preparing a Chemical Profile

The following instructions would be used by Service personnel to complete Chemical Profiles for pesticides. Specifically, profiles would be prepared for pesticide active ingredients (e.g., glyphosate, imazapic) that would be contained in one or more trade name products that are registered and labeled with USEPA. All information fields under each category (e.g., Toxicological Endpoints, Environmental Fate) would be completed for a Chemical Profile. If no information is available for a specific field, then "No data is available in references" would be recorded in the profile. Available scientific information would be used to complete Chemical Profiles. Each entry of scientific information would be shown with applicable references.

Completed Chemical Profiles would provide a structured decision-making process using quantitative assessment/screening tools with threshold values (where appropriate) that would be used to evaluate potential biological and other environmental effects to refuge resources. For ecological risk assessments presented in these profiles, the "worst-case scenario" would be evaluated to determine whether a pesticide could be approved for use considering the maximum single application rate specified on pesticide labels for habitat management and croplands/facilities maintenance treatments pertaining to refuges. Where the "worst-case scenario" likely would only result in minor, temporary, and localized effects to listed and nonlisted species with appropriate BMPs (see Section G.5), the proposed pesticide's use in a PUP would have a scientific basis for approval under any application rate specified on the label that is at or below rates evaluated in a Chemical Profile. In some cases, the Chemical Profile would include a lower application rate than the maximum labeled rate in order to protect refuge resources. As necessary, Chemical Profiles would be periodically updated with new scientific information or as pesticides with the same active ingredient are proposed for use on the refuge in PUPs.

Throughout this section, threshold values (to prevent or minimize potential biological and environmental effects) would be clearly identified for specific information presented in a completed Chemical Profile. Comparison with these threshold values provides an explicit scientific basis to approve or disapprove PUPs for habitat management and cropland/facilities maintenance on refuge lands. In general, PUPs would be approved for pesticides with Chemical Profiles where there would be no exceedances of threshold values. However, BMPs are identified for some screening tools that would minimize/eliminate potential effects (exceedance of the threshold value) as a basis for approving PUPs.

Date: Service personnel would record the date when the Chemical Profile is completed or updated. Chemical Profiles (e.g., currently approved pesticide use patterns) would be periodically reviewed and updated, as necessary. The most recent review date would be recorded on a profile to document when it was last updated.

Trade Name(s): Service personnel would accurately and completely record the trade name(s) from the pesticide label, which includes a suffix that describes the formulation (e.g., WP, DG, EC, L, SP, I, II, or 64). The suffix often distinguishes a specific product among several pesticides with the same active ingredient. Service personnel would record a trade name for each pesticide product with the same active ingredient.

Common Chemical Name(s): Service personnel would record the common name(s) listed on the pesticide label or MSDS for an active ingredient. The common name of a pesticide is listed as the active ingredient on the title page of the product label immediately following the trade name, and the MSDS, Section 2: Composition/Information on Ingredients. A Chemical Profile is completed for each active ingredient.

Pesticide Type: Service personnel would record the type of pesticide for an active ingredient as one of the following: herbicide, dessicant, fungicide, fumigant, growth regulator, insecticide, pisicide, or rodenticide.

EPA Registration Number(s): This number (EPA Reg. No.) appears on the title page of the label and MSDS, Section 1: Chemical Product and Company Description. It is not the EPA Establishment Number, which is usually located near it. Service personnel would record the EPA Reg. No. for each trade name product with an active ingredient based upon PUPs.

Pesticide Class: Service personnel would list the general chemical class for the pesticide (active ingredient). For example, Malathion is an organophosphate and carbaryl is a carbamate.

CAS (Chemical Abstract Service) Number: This number is often located in the second section (Composition/Information on Ingredients) of the MSDS. The MSDS table listing components usually contains this number immediately prior to or following the percent composition.

Other Ingredients: From the most recent MSDS for the proposed pesticide product(s), Service personnel would include any chemicals in the pesticide formulation not listed as the active ingredient and described as toxic or hazardous, or regulated under the Superfund Amendments and Reauthorization Act (SARA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), State Right-to-Know, or other listed authorities. These are usually found in MSDS sections titled "Hazardous Identifications," "Exposure Control/Personal Protection," and "Regulatory Information." If concentrations of other ingredients are available for any compounds identified as toxic or hazardous, then Service personnel would record this information in the Chemical Profile by trade name. MSDS(s) may be obtained from the manufacturer, manufacturer's website, or from an online database maintained by Crop Data Management Systems, Inc. (see list below).

G.7.6.1 Toxicological Endpoints

Toxicological endpoint data would be collected for acute and chronic tests with mammals, birds, and fish. Data would be recorded for species available in the scientific literature. If no data are found for a particular taxonomic group, then "No data available in references" would be recorded as the data entry. Throughout the Chemical Profile, references (including toxicological endpoint data) would be cited using parentheses (#) following the recorded data.

Mammalian LD_{50}: For test species in the scientific literature, Service personnel would record available data for oral lethal dose (LD_{50}) in mg/kg-bw (body weight) or ppm-bw. The most common test species in scientific literature are rat and mouse. The lowest LD_{50} value found for a rat would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk to mammals (see Table G-1 in Section G.7.1).

Mammalian LC_{50}: For test species in the scientific literature, Service personnel would record available data for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species in scientific literature are rat and mouse. The lowest LC_{50} value found for a rat would be used as a toxicological endpoint for diet-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Mammalian Reproduction: For test species listed in the scientific literature, Service personnel would record the test results (e.g., Lowest Observed Effect Concentration [LOEC], Lowest Observed Effect Level [LOEL], No Observed Adverse Effect Level [NOAEL], NOAEC) in mg/kg-bw or mg/kg-diet for reproductive test procedure(s) (e.g., generational studies [preferred], fertility, newborn weight). The most common test species available in scientific literature are rats and mice. The lowest NOEC, NOAEC, No Observed Effect Level [NOEL], or NOAEL test results found for a rat would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Avian LD_{50}: For test species available in the scientific literature, Service personnel would record values for oral lethal dose (LD_{50}) in mg/kg-bw or ppm-bw. The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LD_{50} value found for an avian species would be used as a toxicological endpoint for dose-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian LC_{50}: For test species available in the scientific literature, Service personnel would record values for dietary lethal concentration (LC_{50}) as reported (e.g., mg/kg-diet or ppm-diet). The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest LC_{50} value found for an avian species would be used as a toxicological endpoint for dietary-based RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Avian Reproduction: For test species available in the scientific literature, Service personnel would record test results (e.g., LOEC, LOEL, NOAEC, NOAEL) in mg/kg-bw or mg/kg-diet consumed for reproductive test procedure(s) (e.g., early life cycle, reproductive). The most common test species available in scientific literature are the bobwhite quail and mallard. The lowest NOEC, NOAEC, NOEL, or NOAEL test results found for an avian species would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Fish LC_{50}: For test freshwater or marine species listed in the scientific literature, Service personnel would record an LC_{50} in ppm or mg/L. The most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow (marine). Test results for many game species may also be available. The lowest LC_{50} value found for a freshwater fish species would be used as a toxicological endpoint for RQ calculations to assess acute risk (see Table G-1 in Section G.7.1).

Fish Early Life Stage (ELS)/Life Cycle: For test freshwater or marine species available in the scientific literature, Service personnel would record test results (e.g., LOEC, NOAEL, NOAEC, Lowest Observable Adverse Effect Concentration [LOAEC] in ppm for test procedure(s) (e.g., early life cycle, life cycle). The most common test species available in the scientific literature are bluegill, rainbow trout, and fathead minnow. Test results for other game species may also be available. The lowest test value found for a fish species (preferably freshwater) would be used as a toxicological endpoint for RQ calculations to assess chronic risk (see Table G-1 in Section G.7.1).

Other: For test invertebrate as well as non-vascular and vascular plant species available in the scientific literature, Service personnel would record LC_{50}, LD_{50}, LOEC, LOEL, NOAEC, NOAEL, or EC_{50} (environmental concentration) values in ppm or mg/L. The most common test invertebrate species available in scientific literature are the honey bee and the water flea (*Daphnia magna*). Green algae (*Selenastrum capricornutum*) and pondweed (*Lemna minor*) are frequently available test species for aquatic non-vascular and vascular plants, respectively.

Ecological Incident Reports: After a site has been treated with pesticide(s), wildlife may be exposed to these chemical(s). When exposure is high relative to the toxicity of the pesticides, wildlife may be killed or visibly harmed (incapacitated). Such events are called ecological incidents. The USEPA maintains a database (Ecological Incident Information System) of ecological incidents. This database stores information extracted from incident reports submitted by various Federal and state agencies and non-government organizations. Information included in an incident report is date and location of the incident, type and magnitude of effects observed in various species, use(s) of pesticides known or suspected of contributing to the incident, and results of any chemical residue and cholinesterase activity analyses conducted during the investigation.

Incident reports can play an important role in evaluating the effects of pesticides by supplementing quantitative risk assessments. All incident reports for pesticide(s) with the active ingredient and associated information would be recorded.

G.7.6.2 Environmental Fate

Water Solubility: Service personnel would record values for water solubility (S_w), which describes the amount of pesticide that dissolves in a known quantity of water. S_w is expressed as mg/L (ppm). Pesticide S_w values would be categorized as one of the following: insoluble <0.1 ppm, moderately soluble = 100 to 1,000 ppm, highly soluble >10,000 ppm (USGS 2000). As pesticide S_w increases, there would be greater potential to degrade water quality through runoff and leaching.

S_w would be used to evaluate the potential for bioaccumulation in aquatic species (see Octanol-Water Partition Coefficient [K_{ow}] below).

Soil Mobility: Service personnel would record available values for soil adsorption coefficient (K_{oc} [µg/g]). It provides a measure of a chemical's mobility and leaching potential in soil. K_{oc} values are directly proportional to organic content, clay content, and surface area of the soil. K_{oc} data for a pesticide may be available for a variety of soil types (e.g., clay, loam, sand).

K_{oc} values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

Soil Persistence: Service personnel would record values for soil half-life, which represents the length of time (days) required for 50% of the deposited pesticide to degrade (completely or partially) in the soil. Based upon the $t_{½}$ value, soil persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

- If soil $t_{½}$ ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.
- If soil $t_{½}$ >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with K_{oc}, soil $t_{½}$ values would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below).

Soil Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade and move from a treated site, whereas soil $t_{½}$ describes the rate of degradation only. As for $t_{½}$, units of dissipation time are usually expressed in days. Field dissipation time would be the preferred data for use to estimate pesticide concentrations in the environment because it is based upon field studies compared to soil $t_{½}$, which is derived in a laboratory. However, soil $t_{½}$ is the most common persistence data available in the published literature. If field dissipation data are not available, soil half-life data would be used in a Chemical Profile. The average or representative half-life value of most important degradation mechanism would be selected for quantitative analysis for both terrestrial and aquatic environments.

Based upon the DT_{50} value, environmental persistence in the soil would also be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

- If soil DT_{50} ≤100 days, then a PUP would be approved without additional BMPs to protect water quality.
- If soil DT_{50} >100 days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Along with K_{oc}, soil DT_{50} values (preferred over soil $t_{½}$) would be used in evaluating the potential to degrade groundwater by leaching (see Potential to Move to Groundwater below), if available.

Aquatic Persistence: Service personnel would record values for aquatic $t_{½}$, which represents the length of time required for 50% of the deposited pesticide to degrade (completely or partially) in water. Based upon the $t_{½}$ value, aquatic persistence would be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days (Kerle et al. 1996).

Threshold for Approving PUPs:

- If aquatic $t_{½} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If aquatic $t_{½} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Aquatic Dissipation: Dissipation time (DT_{50}) represents the time required for 50% of the deposited pesticide to degrade or move (dissipate), whereas aquatic $t_{½}$ describes the rate of degradation only. As for $t_{½}$, units of dissipation time are usually expressed in days. Based upon the DT_{50} value, environmental persistence in aquatic habitats would also be categorized as one of the following: non-persistent <30 days, moderately persistent = 30 to 100 days, and persistent >100 days.

Threshold for Approving PUPs:

- If aquatic $DT_{50} \leq 100$ days, then a PUP would be approved without additional BMPs to protect water quality.
- If aquatic $DT_{50} > 100$ days, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Potential to Move to Groundwater: $GUS = \log_{10}(\text{soil } t_{½}) \times [4 - \log_{10}(K_{oc})]$. If a DT_{50} value is available, it would be used rather than a $t_{½}$ value to calculate a GUS score. Based upon the GUS value, the potential to move toward groundwater would be recorded as one of the following categories: extremely low potential<1.0, low - 1.0 to 2.0, moderate - 2.0 to 3.0, high - 3.0 to 4.0, or very high>4.0.

Threshold for Approving PUPs:

- If GUS ≤4.0, then a PUP would be approved without additional BMPs to protect water quality.
- If GUS >4.0, then a PUP would only be approved with additional BMPs specifically to protect water quality. One or more BMPs such as the following would be included in the Specific BMPs section to minimize potential surface runoff and leaching that can degrade water quality:
    - Do not exceed one application per site per year.
    - Do not use on coarse-textured soils where the ground water table is <10 feet and average annual precipitation >12 inches.
    - Do not use on steep slopes if substantial rainfall is expected within 24 hours or ground is saturated.

Volatilization: Pesticides may volatilize (evaporate) from soil and plant surfaces and move off-target into the atmosphere. The potential for a pesticide to volatilize is a function of its vapor pressure, which is affected by temperature, sorption, soil moisture, and the pesticide's water solubility. Vapor pressure is often expressed in mm Hg. To make these values easier to compare, vapor pressure would be recorded by Service personnel in exponential form ($I \times 10^{-7}$), where "I" represents a vapor pressure index. In general, pesticides with I<10 would have low potential to volatilize, whereas pesticides with I >1,000 would have a high potential to volatilize (OSU 1996). Vapor pressure values for pesticides are usually available in the pesticide product MSDS or the USDA ARS pesticide database (see References).

Threshold for Approving PUPs:

- If I ≤1,000, then a PUP would be approved without additional BMPs to minimize drift and protect air quality.
- If I >1,000, then a PUP would only be approved with additional BMPs specifically to minimize drift and protect air quality. One or more BMPs such as the following would be included in the Specific BMPs section to reduce volatilization and potential to drift and degrade air quality:
    - Do not treat when wind velocities are <2 or >10 mph with existing or potential inversion conditions.
    - Apply large-diameter droplets possible for spray treatments.
    - Avoid spraying when air temperatures >85°F.
    - Use the lowest spray height possible above target canopy.
    - Where identified on the pesticide label, soil-incorporate pesticide as soon as possible during or after application.

Octanol-Water Partition Coefficient (K_{ow}): The octanol-water partition coefficient (K_{ow}) is the concentration of a pesticide in octanol and water at equilibrium at a specific temperature. Because octanol is an organic solvent, it is considered a surrogate for natural organic matter. Therefore, K_{ow} would be used to assess potential for a pesticide to bioaccumulate in tissues of aquatic species (e.g., fish). If K_{ow} >1,000 or S_w<1 mg/L *and* soil $t_{½}$>30 days, then there would be high potential for a pesticide to bioaccumulate in aquatic species such as fish (USGS 2000).

Threshold for Approving PUPs:

- If the potential for a pesticide to bioaccumulate in aquatic species is not high, then the PUP would be approved.
- If there is a high potential to bioaccumulate in aquatic species (K_{ow}>1,000 or S_w<1 mg/L *and* soil $t_{½}$>30 days), then the PUP would not be approved, except under unusual circumstances where approval would only be granted by the Washington Office.

Bioaccumulation/Bioconcentration: This is the physiological process where pesticide concentrations in tissue increase in biota because they are taken and stored at a faster rate than they are metabolized or excreted. The potential for bioaccumulation would be evaluated through bioaccumulation factors (BAFs) or bioconcentration factors (BCFs). Based upon BAF or BCF values, the potential to bioaccumulate would be recorded as one of the following: low = 0 to 300; moderate = 300 to 1,000; or high >1,000 (Calabrese and Baldwin 1993).

Threshold for Approving PUPs:

- If BAF or BCF≤1,000, then a PUP would be approved without additional BMPs.
- If BAF or BCF>1,000, then a PUP would not approved, except under unusual circumstances where approval would only be granted by the Washington Office.

G.7.6.3 Worst-Case Ecological Risk Assessment

Max Application Rates (acid equivalent [ae]): Service personnel would record the highest application rate of an active ingredient (ae basis) for habitat management and cropland/facilities maintenance treatments in this data field of a Chemical Profile. These rates can be found in Table CP.1 under the column heading "Max Product Rate – Single Application (lbs/acre – AI on acid equiv basis)." This table would be prepared for a Chemical Profile from information specified in labels for trade name products identified in PUPs. If these data are not available in pesticide labels, "NS" should be written, for "not specified on label" in this table.

EECs: An ECC represents potential exposure to fish and wildlife (birds and mammals) from using a pesticide. EECs would be derived by Service personnel using an USEPA screening-level approach (USEPA 2004). For each max application rate (see description under Max Application Rates [acid equivalent]), Service personnel would record two EEC values in a Chemical Profile; these would represent the worst-case terrestrial and aquatic exposures for habitat management and croplands/facilities maintenance treatments. For terrestrial and aquatic EEC calculations, see description for data entry under Presumption of Unacceptable Risk/Risk Quotients, which is the next field for a Chemical Profile.

Presumption of Unacceptable Risk/Risk Quotients: Service personnel would calculate and record acute and chronic RQs for birds, mammals, and fish using the provided tabular formats for habitat management and/or cropland/facilities maintenance treatments. RQs recorded in a Chemical Profile would represent the worst-case assessment for ecological risk. See Section G.7.2 for discussion regarding the calculations of RQs.

For aquatic assessments associated with habitat management treatments, RQ calculations would be based upon selected acute and chronic toxicological endpoints for fish, and the EEC would be

derived from Urban and Cook (1986) assuming 100% overspray to an entire 1-foot-deep water body using the max application rate (ae basis [see above]).

For aquatic assessments associated with cropland/facilities maintenance treatments, RQ calculations would be done by Service personnel based upon selected acute and chronic toxicological endpoints for fish, and an EEC would be derived from the aquatic assessment in AgDRIFT model version 2.01 under Tier I ground-based application with the following input variables: max application rate (ae basis [see above]), low boom (20 inches), fine to medium/coarse droplet size, 20 swaths, USEPA-defined wetland, and 25-foot distance (buffer) from treated area to water.

See Section G.7.2.1.2 for more details regarding the calculation of EECs for aquatic habitats for habitat management and cropland/facilities maintenance treatments.

For terrestrial avian and mammalian assessments, RQ calculations would be done by Service personnel based upon dietary exposure, where the "short grass" food item category would represent the worst-case scenario. For terrestrial spray applications associated with habitat management and cropland/facilities maintenance treatments, exposure (EECs and RQs) would be determined using the Kanaga nomogram method through the USEPA's T-REX version 1.2.3. T-REX input variables would include the following: max application rate (acid basis [see above]) and pesticide half-life (days) in soil to estimate the initial, maximum pesticide residue concentration on general food items for terrestrial vertebrate species in short (<20 cm tall) grass.

For granular pesticide formulations and pesticide-treated seed with a unique route of exposure for terrestrial avian and mammalian wildlife, see Section G.7.2.1.1.2 for the procedure that would be used to calculate RQs.

All calculated RQs in both tables would be compared with Levels of Concern (LOCs) established by USEPA (see Table G-2 in Section G.7.2). If a calculated RQ exceeds an established LOC value (in brackets inside the table), then there would be a potential for an acute or chronic effect (unacceptable risk) to federally listed (T&E) species and nonlisted species. See Section G.7.2 for detailed descriptions of acute and chronic RQ calculations and comparison to LOCs to assess risk.

Threshold for approving PUPs:

- If RQs≤LOCs, then a PUP would be approved without additional BMPs.
- If RQs>LOCs, then a PUP would only be approved with additional BMPs specifically to minimize exposure (ecological risk) to bird, mammal, and/or fish species. One or more BMPs such as the following would be included in the Specific BMPs section to reduce potential risk to nonlisted or listed species:
    - Lower application rate and/or fewer number of applications so RQs≤LOCs.
    - For aquatic assessments (fish) associated with cropland/facilities maintenance, increase the buffer distance beyond 25 feet so RQs≤LOCs.

Justification for Use: Service personnel would describe the reason for using the pesticide-based control of specific pests or groups of pests. In most cases, the pesticide label would provide the appropriate information regarding control of pests to describe in the section.

Specific BMPs: Service personnel would record specific BMPs necessary to minimize or eliminate potential effects to non-target species and/or degradation of environmental quality from drift, surface

runoff, or leaching. These BMPs would be based upon scientific information documented in previous data fields of a Chemical Profile. Where necessary and feasible, these specific practices would be included in PUPs as a basis for approval.

If there are no specific BMPs that are appropriate, then Service personnel would describe why the potential effects to refuge resources and/or degradation of environmental quality are outweighed by the overall resource benefit(s) from the proposed pesticide use in the BMPs section of the PUP. See Section G.5 of this document for a complete list of BMPs associated with mixing and applying pesticides appropriate for all PUPs with ground-based treatments that would be additive to any necessary, chemical-specific BMPs.

References: Service personnel would record scientific resources used to provide data/information for a Chemical Profile. They would use the number sequence to uniquely reference data in a Chemical Profile. The following online data resources are readily available for toxicological endpoint and environmental fate data for pesticides:

1. California Product/Label Database. Department of Pesticide Regulation, California Environmental Protection Agency. (http://www.cdpr.ca.gov/docs/label/labelque.htm#regprods)

2. ECOTOX database. Office of Pesticide Programs, USEPA, Washington, D.C. (http://cfpub.epa.gov/ecotox/)

3. Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University, and University of Idaho through Oregon State University, Corvallis, Oregon. (http://extoxnet.orst.edu/pips/ghindex.html)

4. Food and Agriculture Organization (FAO) specifications and evaluations for plant protection products. Pesticide Management Unit, Plant Protection Services, Food and Agriculture Organization, United Nations. (http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/)

5. Human health and ecological risk assessments. Pesticide Management and Coordination, Forest Health Protection, USDA, USFS. (http://www.fs.fed.us/foresthealth/pesticide/risk.htm)

6. Pesticide Chemical Fact Sheets. Clemson University Pesticide Information Center. (http://entweb.clemson.edu/pesticid/Document/Labels/factshee.htm)

7. Pesticide Fact Sheets. Published by Information Ventures, Inc. for BLM, Department of Interior; Bonneville Power Administration, U.S. Department of Energy; and USFS. (http://infoventures.com/e-hlth/pesticide/pest-fac.html)

8. Pesticide Fact Sheets. National Pesticide Information Center. (http://npic.orst.edu/npicfact.htm)

9. Pesticide Fate Database. USEPA, Washington, D.C. (http://cfpub.epa.gov/pfate/home.cfm).

10. Pesticide product labels and material safety data sheets. Crop Data Management Systems, Inc. (CDMS) (http://www.cdms.net/pfa/LUpdateMsg.asp) or multiple websites maintained by agrichemical companies.

11. Registered Pesticide Products (Oregon database). Oregon Department of Agriculture. (http://www.oda.state.or.us/dbs/pest_products/search.lasso)

12. Regulatory notes. Pest Management Regulatory Agency, Health Canada, Ontario, Canada. (http://www.hc-sc.gc.ca/pmra-arla/)

13. Reptile and Amphibian Toxicology Literature. Canadian Wildlife Service, Environment Canada, Ontario, Canada. (http://www.cws-scf.ec.gc.ca/nwrc-cnrf/ratl/index_e.cfm)

14. Specific Chemical Fact Sheet – New Active Ingredients, Biopesticide Fact Sheet and Registration Fact Sheet. USEPA, Washington, D.C. (http://www.epa.gov/pestidides/factsheets/chemical_fs.htm)

15. U.S. EPA. 1997. Pesticide Regulation (PR) Notice 97-6. Washington, DC: U.S. Environmental Protection Agency. Available: http://www.epa.gov/PR_Notices/pr97-6.html.

16. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Invasive Species Initiative. The Nature Conservancy. (http://tnsweeds.ucdavis.edu/handbook.html)

17. Wildlife Contaminants Online. USGS, Department of Interior, Washington, D.C. (http://www.pwrc.usgs.gov/contaminants-online/)

18. One-liner database. 2000. USEPA, Office of Pesticide Programs, Washington, D.C.

Chemical Profile

Date:			
Trade Name(s):		**Common Chemical Name(s):**	
Pesticide Type:		**EPA Registration Number:**	
Pesticide Class:		**CAS Number:**	
Other Ingredients:			

Toxicological Endpoints

Mammalian LD_{50}:	
Mammalian LC_{50}:	
Mammalian Reproduction:	
Avian LD_{50}:	
Avian LC_{50}:	
Avian Reproduction:	
Fish LC_{50}:	
Fish ELS/Life Cycle:	
Other:	

Ecological Incident Reports

Environmental Fate

Water solubility (S_w):	
Soil Mobility (K_{oc}):	
Soil Persistence ($t_{½}$):	
Soil Dissipation (DT_{50}):	
Aquatic Persistence ($t_{½}$):	
Aquatic Dissipation (DT_{50}):	

Potential to Move to Groundwater (GUS score):	
Volatilization (mm Hg):	
Octanol-Water Partition Coefficient (K_{ow}):	
Bioaccumulation/Biocentration:	**BAF:`** **BCF:**

Worst Case Ecological Risk Assessment

Max Application Rate (ai lbs/acre – ae basis)	**Habitat Management:** **Croplands/Facilities Maintenance:**
EECs	**Terrestrial (Habitat Management):** **Terrestrial (Croplands/Facilities Maintenance):** **Aquatic (Habitat Management):** **Aquatic (Croplands/Facilities Maintenance):**

Habitat Management Treatments:

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Cropland/Facilities Maintenance Treatments:

Presumption of Unacceptable Risk		**Risk Quotient (RQ)**	
		Listed (T&E) Species	**Nonlisted Species**
Acute	Birds	[0.1]	[0.5]
	Mammals	[0.1]	[0.5]
	Fish	[0.05]	[0.5]
Chronic	Birds	[1]	[1]
	Mammals	[1]	[1]
	Fish	[1]	[1]

Justification for Use:	
Specific Best Management Practices (BMPs):	
References:	

Table CP.1 Pesticide Name

Trade Name	**Treatment Type[b]**	**Max Product Rate – Single Application (lbs/acre or gal/acre)**	**Max Product Rate -Single Application (lbs/acre - AI on acid equiv basis)**	**Max Number of Applications Per Season**	**Max Product Rate Per Season (lbs/acre/season or gal/acre/season)**	**Minimum Time Between Applications (Days)**

[a] From each label for a pesticide identified in pesticide use proposals (PUPs), Service personnel would record application information associated with possible/known uses on Service lands.
[b] Treatment type: H – habitat management or CF – cropland/facilities maintenance. If a pesticide is labeled for both types of treatments (uses), then record separate data for H and CF applications.

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Appendix H. Public Involvement

H.1 Public Involvement Efforts

Public involvement was sought in the early stages of development of the comprehensive conservation plan and environmental impact statement (CCP/EIS). Prior to beginning public scoping, the Refuge created a Stakeholder Scoping Team to help identify people and organizations that would be interested in the CCP process. The team met in June 2010 and brainstormed organizations and individuals that could help us provide information to the public about the CCP process, maximize public involvement, and identify outreach tools that could be used. Invitees to this team included representatives of the business, agricultural, hunting, recreation, conservation, and Hispanic communities.

Public involvement strategies included face-to-face meetings with community organizations, local, State, and Federal agencies, elected officials (or their aides), and Refuge users. To inform the broader public and invite discussion and feedback, the planning team held public open houses, provided a call-in line two times a month, and conducted weekly on-site field outreach. Field outreach included distributing pamphlets to visitors and engaging them in conversation regarding the CCP. The Refuge also maintained a CCP website where the public could print out comment forms or submit emails during the scoping phase.

During public scoping, three issues were of most interest to Refuge stakeholders: surface water recreation, upland recreation, and hunting. We held work sessions for commenters and partners with differing viewpoints to identify solutions for difficult issues. The Refuge invited approximately 130 people to attend the work sessions held from September 23 to September 25, 2010, 47 attended at least some part of the work sessions. Six members of the public also viewed the work sessions at some point during the three days. To view a summary of the work sessions, please visit the Deer Flat NWR Planning website at www.fws.gov/deerflat/refugeplanning.html.

A brief summary of our public involvement events, meetings, and outreach tools follows.

H.1.1. Invitation to the Tribes

- May 27, 2010. Letters were mailed to Robert Bear, Tribal Chairman of Shoshone-Paiute Tribes; Alonzo Coby, Fort Hall Business Council (FHBC) Chairman of Shoshone-Bannock Tribes; and Samuel Penney, Chairman of the Nez Perce Tribe.
- May 12, 2011. Emails were sent to Robert Bear, Tribal Chairman of the Shoshone-Paiute Tribes, Brooklyn Baptiste, Chairman of the Nez Perce Tribe, and Nathan Small, FHBC Chairman of the Shoshone-Bannock Tribes to invite them to send a representative to the Extended Team Meetings.
- May 18, 2011. Received word from Brian Kelly and Meggan Laxalt-Mackay of the Service's Ecological Services office that the Shoshone-Paiute prefer to be consulted through the Wings and Roots program. Brian Kelly has taken the lead on reinstating a consultation process with the Tribe. When the consultation process resumes, the Refuge will be a participant.
- May 25, 2011. Called and left messages for the chairmen of the Shoshone-Paiute, Shoshone-Bannock, and Nez Perce Tribes asking how they would like to be involved in the CCP process.
- September 20, 2011. Called and left messages for Nathan Small, FHBC Chairman of Shoshone-Bannock Tribes, and Brooklyn Baptiste, Chairman of the Nez Perce Tribe, asking

them how they would like to be involved and letting them know that if there was no response by October 30, we would assume that they were not interested in participating in the process.

- August 29, 2011. Brian Kelly attempted to set up a consultation meeting with the Shoshone-Paiute for September 8, 2011. The meeting did not occur.
- October 27, 2011. Attempted to contact the Natural Resources departments of the Nez Perce and Shoshone-Bannock Tribes. Left messages for Keith Lawrence and Yvette Tuell.
- November 1, 2011. Keith Lawrence of the Nez Perce Tribe's Natural Resources department contacted us to let us know that they were not interested in being involved in the CCP, and to contact their Cultural Resources department.
- November 3, 2011. Contacted Pat Baird, archaeologist for the Nez Perce Tribe, who said that they wanted to be notified of undertakings and to provide them copies of the Draft and Final CCPs. These contacts were added to the mailing list.

H.1.2 Meetings and Communication with Federal, State, or Local Elected Officials and Federal, State, or Local Agencies

H.1.2.1 Interagency Coordination Team

- May 27, 2010 Letters.

  Letters requesting involvement on the CCP Interagency Coordinating Team (ICT) were sent to U.S. senators and representatives, State of Idaho senators and representatives within the Lake Lowell districts, the Governor of Idaho, Canyon County commissioners, the mayors of Caldwell and Nampa, Bureau of Reclamation, Idaho Department of Fish and Game (IDFG), Idaho Department of Environmental Quality (IDEQ), Canyon County Parks Recreation and Waterways (CCPRW), and the Boise Project Board of Control.
- ICT Meetings

  July 1, 2010. Attendees included representatives of IDEQ, Bureau of Reclamation, CCPRW, Canyon County Commissioners, Senator Crapo's office, Canyon County District 13, and the City of Caldwell.

  November 30, 2010. Attendees included representatives of the City of Nampa, State Representative Christy Perry's office, Canyon County Commissioners, CCPRW, Bureau of Reclamation, and the City of Caldwell.

  May 27, 2011. Attendees included representatives of the City of Caldwell, IDEQ, Canyon County Commissioners, CCPRW, the offices of Senators Crapo and Risch, the office of Congressman Labrador, Canyon County Sheriff's office, Idaho Department of Parks and Recreation, IDFG, and the City of Greenleaf.

  March 14, 2013. Attendees included representatives of the offices of Senators Crapo and Risch, the office of Congressman Labrador, the Cities of Nampa, Caldwell, and Greenleaf; Canyon County Commissioners, CCPRW, Canyon County Sheriff's Office, Boise Project Board of Control, IDFG, and Idaho Department of Parks and Recreation.
- ICT Updates

  Updates were sent to the coordination team monthly. ICT updates were sent on August 2, 2010; September 9, 2010; October 8, 2010; November 10, 2010; January 12, 2011; February 22, 2011; March 21, 2011; May 4, 2011; June 9, 2011; July 27, 2011; August 30, 2011; September 29, 2011; October 25, 2011; November 30, 2011; December 22, 2011; February 6, 2012; February 23, 2012; April 2, 2012; April 27, 2012; May 31,

2012; July 2, 2012; August 2, 2012; September 5, 2012; October 4, 2012; November 1, 2012; November 29, 2012; January 3, 2013; March 18, 2013; April 25, 2013; June 6, 2013. No ICT update was sent in December 2010, because of the meeting held at the end of November. No ICT update was sent in April 2011. An update was sent in early May. January 2012 update was sent the first week of February.

- Current Representatives on the ICT

  Kathy Alder – Canyon County Commissioner
  Tom Bicak – Director, CCPRW
  Tom Dale – Mayor, City of Nampa
  Joe Decker – Canyon County Public Information Officer
  Paul Deveau – Project Manager, Boise Project Board of Control
  Steve Dunn – Natural Resource Specialist, Bureau of Reclamation
  Phil Hardy – Regional Director for Congressman Raul Labrador
  Darrin Johnson – Director, Nampa Parks and Recreation
  Dean Johnson – Lands Resource Supervisor, Idaho Department of Lands
  Dustin Miller – Environmental Liaison for Governor Otter
  Susan Miller – Executive Assistant to the Mayor of Caldwell
  Lauri Monnot – Watershed Coordinator, IDEQ
  Christy Perry – Representative for Canyon County District 13
  Scott Reinecker – Regional Director, IDFG
  John Revier – Deputy Chief of Staff for Congressman Simpson
  Bryan Ricker – Regional Director for Senator Crapo
  Mike Roach – Natural Resource Director for Senator Risch

H.1.2.2 Congressional Meetings/Tours (in addition to ICT involvement)

- May 27, 2010. Letters requesting involvement on the CCP ICT were sent to U.S. senators and representatives, State of Idaho senators and representatives within the Lake Lowell districts, the Governor of Idaho, Canyon County commissioners, the mayors of Caldwell and Nampa, Bureau of Reclamation, IDFG, Idaho DEQ, CCPRW, and the Boise Project Board of Control.
- May 26, 2011. Refuge Manager Jennifer Brown-Scott and Deputy Regional Chief of NWRS Ben Harrison, met with Senators Crapo and Risch, Congressman Simpson, and Congressman Labrador's staff in Washington D.C. to brief them on the preliminary draft alternatives.
- August 18, 2011. Refuge Manager Jennifer Brown-Scott, Regional Chief of NWRS Robin West, Deputy Regional Director Richard Hannan, and Regional Director Robyn Thorson met with representatives from the offices of Senators Crapo and Risch, and Congressmen Labrador and Simpson, to discuss public comment and future changes to the preliminary draft alternatives.
- March 20, 2013. Refuge Manager Jennifer Brown-Scott provided informational CCP presentation to an aide of Congressman Labrador.

H.1.2.3 Presentations for Federal, State and County Agencies (in addition to ICT involvement)

- June 2010. Sent invitations to a presentation on August 3, 2010. No County employees responded.
- August 4, 2010. Held presentation for Idaho's state agencies. Kurt Stieglitz, IDFG; Thomas Woolf, Idaho Department of Agriculture; Jim Vannoy, Idaho Department of Health and Welfare; and David Dahms, Idaho Department of Parks and Recreation attended.

- August 11, 2010. Met with Idaho Department of Lands to discuss management authority.
- October 11, 2011. Met with IDFG and discussed public comments and potential changes to the preliminary draft alternatives.
- March 14, 2013. Interagency coordinating team meeting.
- April 4, 2013. Ecological Services meeting.

H.1.3 Communication with the Public, Local Businesses, and Community Organizations

H.1.3.1 Presentations with Community/Business Organizations

- During scoping in summer 2010, we contacted over 40 nongovernmental organizations and State and county agencies to offer CCP question-and-answer sessions. We met with 23 groups, including the following:
  - June 10, 2010. Informational CCP presentation to Caldwell Kiwanis.
  - June 10, 2010. Informational CCP presentation to Southwest Idaho Birders Association.
  - June 16, 2010. Informational CCP presentation to Idaho Bass Federation Nation.
  - July 10, 2010. Brief speech at the Premier Bass Tournament weigh-in.
  - July 12, 2010. Informational CCP presentation to the board of Golden Eagle Audubon Society.
  - July 13, 2010. Informational CCP presentation to Southern Idaho Sailing Association.
  - July 14, 2010. Informational CCP presentation to the Idaho-Oregon Snake River Water Trail Coalition.
  - July 20, 2010. Informational CCP presentation to the Southwest Irrigation District (SWID) Resource Conservation and Development.
  - July 21, 2010. Informational CCP presentation to the Friends of Deer Flat Refuge.
  - July 26, 2010. Informational CCP presentation to the Intermountain Jet Boat Association.
  - July 27, 2010. Informational CCP presentation to the Kiwanis Club.
  - August 4, 2010. Informational CCP presentation at the Boise Watershed Teacher Workshop.
  - August 9, 2010. Informational CCP presentation to the Western White Water Association.
  - August 10, 2010. Informational CCP presentation to the Idaho Waterfowl Association.
  - August 10, 2010. Brief presentation at the Caldwell Chamber of Commerce luncheon.
  - August 13, 2010. Speech to a floatplane club.
  - August 18, 2010. Informational CCP presentation to the Caldwell Rotary Club.
  - August 23, 2010. Informational CCP presentation to the Snake River Canyon Scenic Byway.
  - August 26, 2010. Informational CCP presentation to the Nampa Association of Realtors.
  - August 31, 2010. Informational CCP presentation to the Caldwell Optimist Club.
- Two requests for CCP presentations were received in the winter of 2011. Presentations were provided to the following organizations.
  - February 14, 2011. Informational CCP presentation to the Woman's Century Club.
  - March 13, 2011. Informational CCP presentation to the Nampa Exchange Club.
- During the preliminary draft alternatives public comment period in summer 2011, we contacted 70 nongovernmental organizations to offer CCP question-and-answer sessions. We met with 28 groups, including the following.

June 6, 2011. Informational CCP presentation to Idaho Power.
June 6, 2011. Informational CCP presentation to Snake River Bassmasters.
June 8, 2011. Informational CCP presentation to the Nampa Exchange Club.
June 9, 2011. Informational CCP presentation to the Caldwell Kiwanis Club.
June 9, 2011. Informational CCP presentation to the Lower Boise Watershed Council.
June 14, 2011. Informational CCP presentation to the Nampa Lions Club.
June 17, 2011. Informational CCP presentation to a local floatplane club.
June 21, 2011. Informational CCP presentation to the Ada County Association of Realtors.
June 21, 2011. Informational CCP presentation to the Caldwell Exchange Club.
June 21, 2011. Informational CCP presentation to Southwest Idaho Resource Conservation and Development.
June 22, 2011. Informational CCP presentation to the Caldwell Optimist Club.
June 22, 2011. Informational CCP presentation to the Caldwell Rotary Club.
June 28, 2011. Informational CCP presentation to the Treasure Valley Kiwanis Club.
June 28, 2011. Informational CCP presentation to the Nampa Rotary Club.
June 28, 2011. Informational CCP presentation to Lakeside Bassmasters.
June 29, 2011. Informational CCP presentation to the Sunrise Rotary.
June 30, 2011. Informational CCP presentation to Idaho Water Sports.
July 6, 2011. Informational CCP presentation to Idaho Waterfowl Association.
July 7, 2011. Informational CCP presentation to Bass Federation Nation.
July 11, 2011. Informational CCP presentation to Western Whitewater Association.
July 12, 2011. Informational CCP presentation to Golden Eagle Audubon Society.
July 13, 2011. Informational CCP presentation to the Caldwell Chamber of Commerce.
July 15, 2011. Informational CCP presentation to the Boise Sailors Association.
July 21, 2011. Informational CCP presentation to the Nampa Kiwanis Club.
July 21, 2011. Informational CCP presentation to Idaho Bass Federation.
July 23, 2011. Informational CCP presentation to the Idaho Recreation Council.
July 25, 2011. Informational CCP presentation to the Snake River Canyon Scenic Byway.
January 1, 2012. Informational CCP presentation to the Parma Lion's club.
October 1, 2012. Informational CCP presentation to the Idaho RC&D.

- During the Draft CCP/EIS comment period in spring 2013, we contacted 76 agencies and nongovernmental organizations to offer CCP question-and-answer sessions. We met with 26 groups, including the following.

  March 14, 2013. Informational CCP presentation to the Southern Idaho Birding Association.
  March 16, 2013. Informational CCP presentation to the Friends of Deer Flat.
  March 19, 2013. Informational CCP presentation to the Parma Lion's Club.
  March 19, 2013. Informational CCP presentation to the Idaho Gem Fly.
  March 19, 2013, Informational CCP presentation to Southwest Idaho Resource Conservation
  March 20, 2013. Informational CCP presentation to the Caldwell Optimists.
  March 20, 2013. Informational CCP presentation to the Caldwell Rotary Club.
  March 20, 2013. Informational CCP presentation to the Nampa/Caldwell Association of Realtors.
  March 20, 2013. Informational CCP presentation to Save Lake Lowell.

March 21, 2013. Informational CCP presentation to the Fly Fishers of Idaho.
March 25, 2013. Informational CCP presentation to the Intermountain Jet Boat Association.
March 26, 2013. Informational CCP presentation to the Golden Eagle Audubon Society.
April 2, 2013. Informational CCP presentation to the Lakeside Bassmasters.
April 4, 2013. Informational CCP presentation to the Idaho BASS Nation.
April 4, 2013. Informational CCP presentation to the BASS Federation.
April 8, 2013. Informational CCP presentation to Western Whitewater.
April 9, 2013. Informational CCP presentation to the Caldwell Chamber of Commerce.
April 9, 2013. Informational CCP presentation to the Nampa Rotary Club.
April 10, 2013. Informational CCP presentation to the Snake River Water Trail.
April 10, 2013. Informational CCP presentation to the Nampa Exchange Club.
April 20, 2013. Informational CCP presentation to the Boise Sailors Association.
April 25, 2013. Informational CCP presentation to the Sunrise Club.
April 29, 2013. Informational CCP presentation to the Canyon County Alliance for Responsible Growth.
April 30, 2013. Informational CCP presentation to the Caldwell Exchange club.
May 1, 2013. Informational CCP presentation to the Caldwell Lion's Club.
May 2, 2013. Informational CCP presentation to Caldwell Kiwanis.

H.1.3.2 Public Open Houses/Scoping Sessions

- July 28, 2010. Open House from 12:00 PM to 3:00 PM at the Refuge Visitor Center.
- August 20, 2010. Open House from 10:00 AM to 6:00 PM at the Refuge Visitor Center.
- August 21, 2010. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- September 23-24, 2010. Work Session 1. Participation was by invitation. The work sessions were open to public viewing.
- September 24-25, 2010. Work Session 2. Participation was by invitation. The work sessions were open to public viewing.
- June 3, 2011. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- June 4, 2011. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- July 8, 2011. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- July 9, 2011. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- March 29, 2013. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- March 30, 2013. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.
- April 26, 2013. Open House from 12:00 PM to 3:00 PM and 6:00 PM to 9:00 PM at the Refuge Visitor Center.
- April 27, 2013. Open House from 10:00 AM to 3:00 PM at the Refuge Visitor Center.

H.1.3.3 Field Outreach

- June 26, 2010. Staff outreach at Upper Dam East.
- July 1, 2010. Staff outreach at Gotts Point and Lower Dam Recreation Area.

- July 10, 2010. Staff outreach at Gotts Point, the Lower Dam Recreation Area, and the Lavender Festival.
- July 11, 2010. Staff outreach at the Lavender Festival.
- July 22, 2010. Staff outreach at the Lower Dam Recreation Area.
- July 30, 2010. Staff outreach at the Lower Dam Recreation Area, the Upper Dam, and Gotts Point.
- August 8, 2010. Staff outreach at Access #7, Lower Dam Recreation Area, Upper Dam East, and Upper Dam West.
- August 14, 2010. Staff outreach at the Lower Dam Recreation Area.
- August 27, 2010. Staff outreach at the Upper Dam West, Upper Dam East, Lower Dam Recreation Area, and Gotts Point.
- June 25-26, 2011. Staff outreach at the Boise Recreation Festival.
- July 8-9, 2011. Staff outreach at the Lavender Festival.

H.1.3.4 CCP Hotline

- June 23, 2010. Available 5:00 PM to 7:00 PM
- July 14, 2010. Available 5:00 PM to 7:00 PM
- July 28, 2010. Available 5:00 PM to 7:00 PM
- August 11, 2010. Available 5:00 PM to 7:00 PM
- August 25, 2010. Available 5:00 PM to 7:00 PM
- September 8, 2010. Available 5:00 PM to 7:00 PM

H.1.3.5 News Releases

The following CCP-related news releases were issued to over 100 statewide television, radio, and print media contacts.

- June 21, 2010. Announcement of start of CCP process and opportunities for comment.
- July 19, 2010. Announcement of upcoming open house about management plan.
- September 16, 2010. Announcement of CCP Work Sessions.
- December 28, 2010. Update on status of CCP planning and announcement of release of Planning Update #2.
- May 27, 2011. Announcement of comment period for preliminary draft alternatives.
- October 25, 2011. Update on status of CCP planning and announcement of release of Planning Update #4.
- March 15, 2013. Announcement of comment period for Draft CCP/EIS and release of Planning Update #5.

H.1.3.6 Press Coverage

- 2010. Idaho Bass Federation Nation, “Lake Lowell.” idahobassfederationnation.com/yahoo_site_admin/assets/docs/1_IBFN_Header_2nd_Qtr_2010-Completed.17062425.pdf

- April 14, 2010. Idaho Press-Tribune, "Deer Flat Prepares to Update Conservation Guidelines." www.idahopress.com/news/deer-flat-prepares-to-update-conservation-guidelines/article_502215ae-4783-11df-9634-001cc4c002e0.html
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- May 02, 2010. KTVB, "Some residents want vehicle ban lifted on Lake Lowell recreation spot." www.ktvb.com/home/Some-SW-Idaho-residents-want-vehicle-ban-lifted-92636164.html
- May 02, 2010. NWCN, "Some Residents Want Vehicle Ban Lifted on Lake Lowell Recreation Spot." www.nwcn.com/news/idaho/Some-residents-want-vehicle-ban-lifted-on-Lake-Lowell-recreation-spot-92680184.html
- May 05, 2010. Idaho Press-Tribune, "Public Can Give Views on Lake Lowell Water." www.idahopress.com/news/public-can-give-views-on-lake-lowell-water/article_e36e2b28-580d-11df-acbc-001cc4c03286.html
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- June 16, 2010. Idaho Press-Tribune, "Lake Lowell Flush with Water." www.idahopress.com/news/lake-lowell-flush-with-water/article_d8417eec-7907-11df-af0a-001cc4c002e0.html
- June 21, 2010. Press release was sent to local press outlets informing the public of the start of public scoping and promoting the CCP hotline.
- June 21, 2010. Idaho Statesman, "Deer Flat National Wildlife Refuge Kicks Off Comprehensive Planning Process, Wants Public Comment."
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- August 24, 2010. KTRV-TV "Canyon County Commissioners Call on Citizens."
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H.1.3.7 Planning Updates

- July 15, 2010. Planning Update 1 was mailed to individuals on our mailing list and adjacent landowners. Copies of the update were available at the Visitor Center and at outreach events. Adjacent landowners in Malheur County were accidentally left off of the initial mailing. They received Planning Update 1 and Planning Update 2 in December. This planning update let the public know of the Refuge's intent to begin a planning process, provided an overview of the CCP process, and requested public comment.
- November 29, 2010. Planning Update 2 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of comments received during the summer scoping period.
- May 27, 2011. Planning Update 3 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of preliminary draft alternatives and requested public comment.
- October 25, 2011. Planning Update 4 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update provided an overview of comments received after the release of the preliminary draft alternatives and explained some of the changes that would be made based on those comments.

- March 15, 2013. Planning Update 5 was mailed to individuals on the CCP mailing list. Adjacent landowners not on the mailing list received postcards informing them of the availability of the planning update on the Refuge's website. Copies of the planning update were also available at the Visitor Center and outreach events. This planning update presented a summary of the alternatives proposed in the Draft CCP/EIS and requested public comment.

H.1.3.8 Other Tools

- The Refuge website featured CCP information, Refuge fact sheets, frequently asked questions, and comment forms.
- CCP information flyers and outreach "business cards" were placed in over 40 local businesses.
- CCP informational "half sheets" and/or outreach "business cards" were handed out at every presentation and outreach event and were passed out during field outreach.
- Refuge and CCP fact sheets were created and made available at presentations and outreach events, and in the Visitor Center.
- The Refuge created CCP messages that played on the Headquarters/Visitor Center phone lines if someone was put on hold or called after business hours.
- Participated in Senator Crapo's press conference at the Lower Dam Recreation Area on August 14, 2010.
- Article in the Southwest Idaho Birders Association July newsletter
- Article in the Idaho Bass Federation Nation spring newsletter
- Article in the Deer Flat NWR Volunteer newsletter
- Draft CCP video PowerPoint posted on Refuge website
- Spanish language translation of Planning Updates #3 (preliminary alternatives) and #5 (Draft CCP/EIS) posted on Refuge website

H.1.3.9 Federal Register Notices

- July 15, 2010. Federal Register published notice of intent to prepare a CCP/EIS and a request for comments.
- March 15, 2013. Federal Register published notice of action to release Draft CCP/EIS and make it available for public comment.

H.1.3.10 Field Reviews

- June 16-19, 2008. Wildlife and Habitat Management Field Review on Refuge. Approximately 30 participants.
- September 9-11, 2008. Public Uses Field Review on Refuge. Approximately 25 participants.

H.2 Response to Comments

This appendix contains a summary of all the comments we received on the Draft CCP/EIS, during the official public comment period, held from March 15 to May 15, 2013. During the 60-day comment period, we received comments from 170 entities or individuals as well as one petition signed by 426 people. All written comments were reviewed and organized so that an objective analysis, summary, and presentation of the comments could be made.

Each original piece of correspondence was assigned an identification number and identified with the last name and first initial of the commenter. Note that for simplicity's sake, the word "letter" is generally used throughout this appendix to refer to any comment or reference document we received by letter, fax, email, or other forms.

Some individual commenters mailed a number of letters and/or reference materials. Multiple correspondences from a commenter are counted as one comment letter. Telephone calls from the public were also received. All callers were encouraged to place their comments in writing so they could be included in the public record.

A database was created to log correspondence from each of the commenters. To help analyze the nature and extent of comments received, a number of themes and subthemes were identified within the letters. Comments were coded manually and electronically within the identified themes.

Comments were grouped into 21 categories based upon management actions considered in the Draft CCP/EIS' alternatives or based on topics of particular interest as indicated by comments themselves. The categories are: CCP/EIS process, the purpose of Lake Lowell, water rights, wildlife and habitat management, trapping, water quality, public use management (general), facilities, refuge access, hunting, fishing, wildlife observation and photography, environmental education and interpretation, partnerships, nonwildlife-dependent recreation, boating (general), boating (closures), boating (no-wake zones), economic effects, hydropower facility, and editorial comments.

Due to the volume and similarity of written comments received, most comments have been paraphrased from the originals, and in some cases consolidated with others where the Service's response is the same. In some cases we have included specific language from a letter that best summarized similarly written comments.

We received comments both in opposition to and in support of each alternative. Where the comment provided some level of detail or was based on a real or perceived fact, we provided a response. Where the comment expressed solely an opinion and was not supported by any assertion, the Service considered the comment in selection of our Preferred Alternative, but did not respond to the comment in this appendix, other than to thank the writers for expressing their opinions and thoughts.

H.2.1 Changes Made to the Final CCP

Table H-1 shows the major changes between the Draft and Final CCP. For additional information, see Chapter 2 and Maps 4–9 in the CCP/EIS.

Table H-1. Summary of Changes to Alternative 2 between the Draft and Final CCP/EIS.

Theme	Alternative 2 Draft CCP/EIS	Alternative 2 Final CCP/EIS
Public Use		
Youth Waterfowl Hunt	Open only southeast of Parking Lot 1.	Open in all designated waterfowl hunt zones, not in area southeast of Parking Lot 1.
Ice fishing	Not allowed.	Allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by the Bureau of Reclamation (see Map 3).
Walking with on-leash dogs	Allowed on designated trails.	Allowed on designated trails and at Lower Dam Recreation Area (LDRA).
Jogging, bicycling, and	Groups of more than 4 people would need to	Groups with 10 or fewer people would not require an SUP. Groups of more than 10 people would require an SUP.

Theme	Alternative 2 Draft CCP/EIS	Alternative 2 Final CCP/EIS
horseback riding	obtain a special use permit (SUP). Groups of more than 10 people would be prohibited.	
Trapping	Not included in Draft CCP/EIS	Trapping would not be allowed on the Lake Lowell Unit. Trappers would be allowed to use the Snake River Islands to access trapping sites below high water that are under the State's jurisdiction. The use of licensed trappers for predator management under the provisions of 50 CFR 31.16, would be considered if it is identified as a management need.
Sailing regattas	Not allowed at Lake Lowell Unit.	Allow at Lake Lowell Unit every other week in April and May, with other stipulations to ensure that each regatta does not restrict the ability of other users to enjoy the Refuge.
Swimming	Allowed only in two designated areas.	Encouraged in two designated areas, but allowed elsewhere, with the exception of around fishing or other wildlife-dependent facilities (e.g., docks), or immediately adjacent to boat launch areas.
Nonwildlife-dependent organized group activities	Allowed at LDRA only, and by SUP.	Allowed only at LDRA. Stipulations laid out in the Swimming, Beach Use, and Picnicking Compatibility Determination (see Appendix B). If staffing and funding levels allow at a later time, events may be required to obtain an SUP, and a fee may be assessed for the SUP.
Clarifying edits	Throughout the document.	Edits were incorporated to improve the clarity and accuracy of the document.

H.2.2 Summary of Comments Received

This section provides a summary of the individual comments received on the Draft CCP/EIS followed by the Service's responses to those comments. The comments are organized into 21 categories based on management actions considered in the Draft CCP/EIS alternatives or based on topics of particular interest as indicated by comments themselves.

H.2.2.1 CCP/EIS Process

1. **Comment summary:** Comments supported or opposed each of the alternatives we identified in the Draft CCP/EIS. Some favored Alternative 1 since it meant no changes would occur in the current management. Others agreed with our preferred alternative (Alternative 2), believing it will provide a balanced approach to recreation and wildlife management. Others favored Alternatives 3 or 4 because they provide better protections for wildlife and habitat as well as wildlife-dependent recreationists.

   Response: The Service acknowledges and appreciates these comments.

2. **Comment summary:** Management actions are required only if there is proof that a problem exists, there are no studies, data, or evidence that wildlife are being negatively impacted by recreational activities on Lake Lowell. Wildlife have been coexisting with multiple uses and there is no reason to change current management.

   Response: As discussed in Section 1.4, the Service undertook a comprehensive conservation planning process for the Refuge because the National Wildlife Refuge System

Administration Act of 1966 (16 U.S.C. 668dd-668ee, et seq.), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), requires CCPs to set forth management guidance for a refuge for a period of 15 years.

In developing a CCP, National Wildlife Refuge System policy requires that best available science be used. Studies need not have been conducted on the particular Refuge. Many studies have shown that human-caused disturbance can be detrimental to wildlife, as cited throughout the document especially in Chapter 2 and Appendix B. The most relevant studies were used to assess the effects of recreational activities on wildlife before proposing management strategies. Rationales for these strategies are in Section 2.4.

Deer Flat Refuge was established primarily for the protection of migratory birds and other wildlife (see Section 1.7.2). As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first." The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System—hunting, fishing, wildlife observation and photography, and environmental education and interpretation—that the Service should make extra efforts to facilitate on refuges, where compatible with the wildlife and wildlife habitat mission.

Other activities can be allowed if deemed appropriate (see Appendix A) and if they can be implemented without impairing existing or future wildlife-dependent uses. Therefore, where conflicts arise between protections for wildlife and habitat and recreational activities, priority must be given to wildlife and habitat.

H.2.2.2 Purpose of Lake Lowell

3. **Comment summary:** The infrastructure and water in Lake Lowell were built and owned through tax dollars for local use. Concerns of ownership of the water and the management of the established reservoir and the regulations imposed by executive order are in need of justification.

   Response: We recognize that the Refuge is an overlay refuge on Reclamation's Lake Lowell reservoir, and Reclamation has primary jurisdiction over the manipulation of Lake Lowell's water levels. The Board of Control has the day-to-day responsibility of controlling Lake Lowell's water levels. The executive order that established Deer Flat NWR states that the Refuge does not have the legal authority to manipulate water levels. The Service also recognizes that Refuge operations are secondary to operations and maintenance of the irrigation project.

   Under the Refuge Administration Act, each refuge must be managed to fulfill the Refuge System mission as well as the specific purposes for which it was established. The Refuge was established to provide refuge and breeding grounds for migratory birds and other wildlife, subject to use by the Department of the Interior for Reclamation work originally identified in E.O. 1032, and re-established and renamed in 1937 under E.O. 7655. This means that the Service has an obligation to manage uses of the Refuge consistent with the National Wildlife Refuge System Administration Act (16 U.S.C. 668dd-668ee, et seq.) and other laws, regulations, and policies governing the Refuge System, but our management may not

interfere with operation of the reservoir for irrigation purposes. For more information on Refuge history, see Appendix I.

4. **Comment summary:** Lake Lowell and surrounding resources should continue to be managed by state and local governments such as Idaho Department of Fish and Game and Canyon County.

   Response: Deer Flat Refuge was designated in February 1909, three days after water started flowing in the New York Canal to fill the reservoir. Although there was no on-site Refuge staff until 1937, the Refuge has been managed by the Service since 1909. The Service appreciates ongoing partnerships with Canyon County and IDFG to facilitate law enforcement, maintenance, and fish and wildlife management. The Service looks forward to continuing coordination and partnerships with both Canyon County and IDFG.

   Prior to initiation of the CCP process, the Service and Reclamation concluded that the Service has jurisdiction over surface water and public uses on Lake Lowell. Because it was determined that the Service has responsibility for the management of all public uses within the Refuge, including on-water recreational uses, these uses must be legally compatible with the purposes of the Refuge. For more information on Service policy and mandates, see Section 1.6.3.

H.1.2.3 Water Rights

5. **Comment summary:** The Board of Control's water conservation projects should not be viewed by the Service as a source of water for the Service's programs. The water managed by the Board of Control is dedicated by law to its landowners.

   Response: The Service recognizes that it does not possess a water right for the water within Lake Lowell.

6. **Comment summary:** The Board of Control welcomes partnerships and collaboration in order to protect and enhance wildlife habitat protection in Idaho. However, the Project cannot enter into any agreements that would 1) prevent or restrict it from providing irrigation water to its Districts for distribution the Districts'' landowners, or that would 2) prevent or restrict the Board of Control from conducting maintenance and cleaning operations, or that would 3) prevent or restrict the Board of Control from taking emergency action to prevent or minimize damage from flooding events…. Given the uncertain nature of water availability the Board of Control cannot commit to maintain any particular reservoir elevation for non-irrigation purposes, including for the Service.

   Response: The Service understands the irrigation purpose of Lake Lowell and that administrative responsibility for water level management lies with Reclamation and the Board of Control. We also appreciate the Board of Control's invitation to continue to explore a partnership for maintaining a water level appropriate for nesting and foraging habitat for grebes, fish, and other wildlife from April through July, while still meeting the Board of Control's mission of providing water to irrigators. Further discussions between parties would be needed to assist with each other's established purpose and mission.

H.1.2.4 Wildlife and Habitat Management

7. **Comment summary:** Pointing to a provision respecting state authority contained in the National Wildlife Refuge System Administration Act (NWRSAA or Act), as amended, the Idaho Department of Fish and Game (IDFG) states that management of resident fish and wildlife on refuge lands is under the State of Idaho's jurisdiction, including the stocking of resident fish species in Lake Lowell. IDFG states that it looks forward to working with the Service to develop a fisheries management plan, but that any language limiting IDFG's ability to manage the fisheries is unacceptable.

   Response: All uses of national wildlife refuges are subject to the provisions of the NWRSAA. The Secretary is authorized, "under such regulations as he may prescribe," to "permit the use of any area within the System for any purpose … whenever he determines that such uses are compatible with the major purposes for which such areas were established …" (16 U.S.C. § 668dd(d)(1)(A)); see also id. § 668dd(d)(3)(A) [The Secretary shall not permit a use of a refuge "unless the Secretary has determined that the use is a compatible use"]).

   The provision cited by IDFG states: Nothing in the Act shall be construed as affecting the authority, jurisdiction, or responsibility of the several States to manage, control, or regulate fish and resident wildlife under State law or regulations in any area within the System. Regulations permitting hunting or fishing of fish and resident wildlife within the System shall be, to the extent practicable, consistent with State fish and wildlife laws, regulations, and management plans. (Id. § 668dd(m)

   The United States Courts of Appeals for both the Ninth and Tenth Circuits have found that Congress invoked its power under the Property Clause of the Constitution when it enacted the NWRSAA, and that the Act plainly gives the Service the authority to manage national wildlife refuges (Nat'l Audubon Soc'y v. Davis, 307 F.3d 835, 854 [9th Cir. 2002]; Wyoming v. United States, 279 F.3d 1214, 1228 [10th Cir. 2002]). Further, both Federal circuits held that the provision cited by IDFG was not meant to eviscerate Federal authority over refuge management. Rather, they concluded that it reflects Congress's intent for ordinary principles of conflict preemption to apply. This means to the extent that actual conflict persists between State and Federal policies, State law is pre-empted by the NWRSAA (307 F.3d at 854; 279 F.3d at 1234).

   Nevertheless, we have a clear responsibility, not only pursuant to Section 668dd(m) but other provisions of the NWRSAA and our own policies, to coordinate and cooperate with IDFG in administering Deer Flat NWR. We look forward to working with IDFG in this effort.

   Regulations implementing the NWRSAA are found in the Code of Federal Regulations at 50 C.F.R. Subchapter C. Policies implementing the NWRSAA specific to hunting and fishing are found in the U.S. Fish and Wildlife Service Manual at 605 FW 2 and 605 FW 3, respectively. The policy on coordination and cooperative work with State fish and wildlife agencies is found at 601 FW 7. In addition, the Compatibility Policy, which regulates uses on national wildlife refuges in collaboration with the purposes of the NWRSAA can be found in 65 Federal Register 62458-62483 (Oct. 18, 2000). We will do everything we can to accommodate IDFG's proposals consistent with applicable Federal laws and our regulations and policies.

8. **Comment summary:** The Boise Project Board of Control (BPBOC) states that it has authority to remove vegetation on the banks of Lake Lowell as part of its operation and maintenance duties because these trees and brush consume water that belongs to the irrigation districts' landowners and the Federal government does not have water right for aesthetic, wildlife or recreation purposes. BPBOC states that it will continue to carry out that function in the vicinity of the conduit and irrigation works and that the alternative chosen by the Service must recognize the primary authority of the BPBOC to carry out its irrigation and maintenance functions even when those functions might conflict with the goals of the Service.

   Response: We agree that Refuge operations are secondary to operation and maintenance (O&M) of the irrigation project, including control of vegetation where, for example, Reclamation finds that it is unreasonably interfering with canal bank stability or necessary access. Accordingly, nothing in the CCP is intended to interfere with O&M of the irrigation project. However, we understand BPBOC's comment to extend beyond normal O&M activities to removal of vegetation from the reservoir shoreline based on ownership of the water rights. The trees and shrubs growing along the margins of Lake Lowell are a function of the way the reservoir water levels are managed by Reclamation and BPBOC, a situation unrelated to the ownership of water rights. In addition, the comment does not cite any legal authority for this assertion and we are not aware of any. Taken to its logical conclusion, it would mean that downstream water right owners throughout the State of Idaho could remove vegetation on upstream property simply because it might use water. Therefore, unless Reclamation determines that it is necessary for O&M of the irrigation project, removal of vegetation along the reservoir shoreline would be governed by Refuge regulations.

9. **Comment summary:** Providing further protection for waterbirds may increase their population, thus negatively impacting Lake Lowell's fish populations.

   Response: Deer Flat Refuge was established as a refuge and breeding grounds for migratory birds and other wildlife. Protection of migratory birds takes priority over protection of nonnative fish. The Service looks forward to working with IDFG to manage fish populations in order to continue to provide a high-quality fishing experience.

10. **Comment summary**: Referenced studies show that water level fluctuations and water quality problems (especially nutrient loads) were the main concerns for nesting grebes in Idaho, those problems should be addressed first.

    Response: The Service looks forward to working with partners to improve Lake Lowell's water quality; the CCP includes a number of strategies to improve water quality (summarized in Section 2.3.1). Board of Control, in cooperation with Reclamation, manages the water level. The CCP includes a proposal for the Service to consult and collaborate with both agencies to explore the possibility of maintaining a water level appropriate for providing nesting and foraging habitat for grebes, fish, and other wildlife, from April through July, while still meeting the Board of Control's mission of providing water to irrigators (see Section 2.3.1).

11. **Comment summary:** At one time, the Refuge was controlling the carp population by allowing carp to be harvested commercially.

Response: Carp removal has occurred intermittently through a Special Use Permit (SUP) for many years to enhance submergent vegetation and moist-soil plants in Lake Lowell. A commercial fisherman currently uses a beach seine to harvest carp. Current seining operations, which remove an estimated 50 to 125 tons of biomass annually, likely do not remove enough of the carp population (estimated at 4,800 tons of biomass) to result in significant water quality improvements or promote submergent plant growth.

The Refuge looks forward to working with IDFG and other partners to develop and implement methods to reduce carp biomass in Lake Lowell. Potential methods include mechanical removal, chemical treatments, biological treatments, and carp exclusion devices. Carp impacts and potential treatments are further discussed in Wildlife and Habitat Objective 1.1 in Section 2.4.1.

12. **Comment summary:** Stock sunfish to enhance the prey base for piscivorous birds and for anglers at Lake Lowell. Another comment identified that nonnative fish should not be stocked unless they have become an important food source for wildlife.

    Response: The Refuge is committed to developing a cooperative agreement with the State of Idaho for resident fish and wildlife management. The Refuge will continue to coordinate with IDFG regarding stocking fish species identified in Objective 2.4.3.1. Stocking other fish species would require additional planning. The Refuge plans to work in close cooperation and coordination with IDFG for management of fishing opportunities on the Refuge and in setting population management goals and objectives. These strategies will most likely benefit piscivorous birds as well as increase fishing opportunities.

13. **Comment summary**: The Refuge's management of invasive weeds is concerning, the Service has not done an effective job of treating invasive species. All invasives should be aggressively treated, perhaps in partnership with Canyon County Weed Control. The CCP should include specific actions to control invasive species including implementation schedules, and the Service should minimize the use of herbicides and explore alternative methods like the use of goats.

    Response: The Service is aware of the major problems that invasive species and noxious weeds present on all public lands, including the Refuge, and invasive species control is a priority for the Refuge to address. As noted in Section 2.2.2, the Service will use an Integrated Pest Management (IPM) plan (see Appendix G) to identify weed control methods based upon effectiveness, cost, and minimal ecological disruption (which considers minimum potential effects to nontarget species and the Refuge environment).

    The Service will continue to work with various Federal, State, and local agencies to implement invasive species control. Appendix C identifies that a habitat management step-down plan will be developed within 2 years of CCP implementation. The habitat management plan will identify specific areas that need to be prioritized for treatment, as well as integrated pest management strategies to be used.

14. **Comment summary:** The existence of brush piles is a concern, volunteers should be recruited to remove them for fire safety.

Response: Under Objective 2.3.2.1, we identify issuance of firewood collection permits as a strategy to help manage fuel loads in riparian areas by removing some of the dead and downed debris. It could also be used to clear mudflat habitat for migrating shorebirds.

15. **Comment summary:** Predator management on the Refuge is a concern, the Service should reduce the number of crows, magpies, starlings, and other predators.

    Response: As expressed in Section 2.2.2, the Refuge is concerned about controlling invasive species because of their effects on native species and habitat. The Service would continue to work with our State and local partners to control the impacts of nonnative animals (e.g., starlings, bullfrogs, house cats, etc.). While the Refuge purpose is to protect migratory birds, the Service will continue to work with our State and local partners to identify and mitigate impacts of native species (e.g., crows and magpies) that present a management concern.

16. **Comment summary:** The amount of tree removal proposed in Objective 2.3.1.3 is concerning, and a balance between the needs of fish/fishermen and shorebirds should be considered.

    Response: Tree removal is proposed in an area near Farm Field 5 that was historically kept open to provide duck trapping sites and is currently within a closed section of the Refuge. Because of the topography of the area and the narrow vegetation line, these spots are used by migrating shorebirds even when the water level is high. The Service proposes to continue to remove trees from approximately 25 acres of sparsely vegetated riparian zone to keep these areas free from vegetation. There is an estimated 760 acres of riparian habitat on the Lake Lowell Unit, and impacts to fish and fishermen from this action are not anticipated.

H.1.2.5 Trapping

17. **Comment summary:** The Idaho Trappers Association suggested that trapping is a valuable tool for controlling furbearers during nesting season and that the Service should open the Refuge to licensed trappers. Different strategies and dates were also suggested that would allow public commercial trapping in order to benefit waterfowl on the Snake River Islands.

    Response: The Service recognizes that trapping is a valuable tool that land managers use for wildlife management purposes. However, trapping on the Refuge would not be safe because of concerns about injury to domestic pets as well as Refuge visitors.

    The Snake River Islands Unit would continue to be open to public access from June 15 to January 31 on goose-nesting islands and from July 1 to January 31 on heron- and gull-nesting islands. Trappers may use the islands during those months to access trapping sites below high water that are under the jurisdiction of the State of Idaho. Should the Service determine that predators are negatively impacting waterfowl nesting on the Snake River Islands Unit, we will consider all management options to remedy the situation, including the use of licensed fur trappers.

18. **Comment summary:** The Idaho Trappers Association pointed out that the Refuge does not have to determine "appropriateness" of trapping because the form for "Finding of Appropriateness of a Refuge Use" (form 3-2319) states "This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in

a refuge CCP or step-down management plan approved after October 9, 1997" and trapping by licensed fur trappers would clearly fall under the category of "take regulated by the State," and could therefore be found to be an appropriate activity on the Refuge.

Response: Trapping is not a Refuge use that needs to be evaluated under the Service's Appropriate Use Policy. We have considered allowing a commercial/recreational trapping program on the Refuge and have concluded that this use would not be safe.

Public commercial/recreational trapping on the Refuge, especially at the Lake Lowell Unit, has a high likelihood of capturing and causing injury to nontarget wildlife and domestic pets. Visitors who are unfamiliar with trapping procedures could further injure their pets or themselves by trying to free a captured pet or wildlife.

The limited space and high urban use of this Refuge are not conducive to a public trapping program because the potential for conflict between trapping and recreation visitors would be high. Given the potential for disturbance to wildlife-dependent uses and wildlife, this use is not consistent with the purpose of the Refuge or its visitor use goals.

The Snake River Islands would continue to be open to public access from June 15 to January 31 on goose-nesting islands and from July 1 to January 31 on heron- and gull-nesting islands. Trappers may use the islands to access trapping sites below high water that are under the jurisdiction of the State of Idaho.

19. **Comment summary:** The Idaho Trappers Association cautioned that relocating furbearing animals is not recommended from a biological standpoint and that "the American Veterinary Medical Association, the National Association of State Public Health Veterinarians, and the Council of State and Territorial Epidemiologists all oppose relocation of mammals because of the risk of disease transmission, especially amongst raccoons, skunks, and foxes."

    Response: The Service has not proposed relocation of furbearing animals in the CCP.

H.1.2.6 Water Quality

20. **Comment summary:** The Boise Project "believes that a water quality improvement feasibility study was encompassed in the Lake Lowell Addendum to the Lower Boise TMDL and this objective oversteps the authority of The Service."

    Response: The Federal Clean Water Act (CWA; 33 U.S.C. 1251 et seq.) requires that states and tribes restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water-quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible. Section 303(d) of the CWA establishes requirements for states and tribes to identify and prioritize water bodies that are water quality limited (i.e., water bodies that do not meet water-quality standards). Lake Lowell is on this list. For waters identified on this list, states and tribes must develop a total maximum daily load (TMDL) for pollutants, which is set at a level expected to achieve water quality standards. The Idaho Department of Environmental Quality (IDEQ) published the final TMDL for pollutants in Lake Lowell in 2010.

Although water quality issues are not within the management authority of the Refuge, contaminants in Lake Lowell may have an impact on wildlife resources and recreational opportunities at the Refuge. Before assessing ways to reduce contaminants, we must first identify and quantify their presence, and assess their impacts on the public and wildlife. Once there is a better understanding of the contaminants issue, the Refuge would be able to work with partners to address potential problems and identify solutions.

21. **Comment summary:** The U.S. EPA expressed appreciation for the Service's responsiveness to scoping comments, and support for strategies in Section 2.2.1.1 for addressing water quality. They recommend that the Service prioritize carp population reductions and reduce sediment runoff for improved canal maintenance.

    Response: Carp impacts and potential treatments are further discussed in Objective 2.3.1.1 and in a previous comment regarding commercially harvesting carp from Lake Lowell.

22. **Comment summary:** The Board of Control uses best management practices (BMPs) to address siltation and water quality issues and strives to continually improve as more information is learned and new technologies become available. The Board of Control doubts that the Service has greater knowledge and judgment concerning what constitutes the best management practices where irrigation operations and delivery are concerned. The Board of Control also feels the Service has attempted to impede regular maintenance functions on drains leading to Lake Lowell. This interference is inappropriate and oversteps the Service's authorities.

    Response: The Service agrees that the Board of Control may have more knowledge and judgment where maintenance of irrigation operations and delivery are concerned. The Refuge would like to establish a partnership and coordinate with the Board of Control and Reclamation to identify ways to reduce future siltation and correct current siltation issues without damaging wildlife habitat or impeding the delivery of irrigation water.

    The Refuge is also cognizant of the Board of Control's responsibility for maintenance of irrigation operations and delivery. The Board of Control did not provide any specifics and the Refuge is not aware of any interference to impede the irrigation purpose or administrative responsibility for water level management conducted by Reclamation and the Board of Control. The Refuge remains very concerned about water quality impacts on both wildlife and Refuge visitors and plans to be an active partner in working toward improving the water quality of Lake Lowell.

H.1.2.7 Public Use Management—General

23. **Comment summary:** Several specific strategies were suggested for implementing proposed actions. For example: providing restrooms on the south side of Lake Lowell, providing additional trash receptacles at access points, providing summer camps on a variety of suggested topics, providing binocular and camera rentals, expanding the book store in the Visitor Center, conducting more outreach to inform the public that Lake Lowell is part of the Refuge, and constructing an outdoor amphitheater for educational programs.

    Response: The purpose of the CCP is to provide overall long-term management direction, and includes strategies to improve visitors' experiences, including a strategy to "Provide

additional bathroom facilities at high-use access points" (Objective 2.4.1.1). Specific management decisions about recommended strategies will be developed as part of the Visitor Services step-down plan, which is planned to be completed within 5 years and will include public input. The Service acknowledges these comments and will incorporate them as appropriate into the Visitor Services step-down plan.

24. **Comment summary:** Comments were received in support of continuing wildlife-dependent recreational activities, and eliminating some or all wildlife-dependent recreational activities (including elimination of all hunting or specifically youth hunting).

    Response: As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first." The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service must make efforts to facilitate on refuges where the uses are compatible. All of the priority wildlife-dependent recreational activities have been determined to be compatible at the Refuge, and will continue with stipulations identified in the compatibility determinations in Appendix B.

25. **Comment summary:** More clearly mark and improve signage on multi-use trails and provide better directional signage off-Refuge to help people find the Refuge.

    Response: As noted in Objective 2.4.1.1, to better welcome and orient visitors, the CCP includes strategies to install entrance signs at high-use visitor access points and along high-traffic roads bordering the Refuge. And, install signs on main roads and other appropriate locations to identify the Refuge's visitor facilities nearby (e.g., boat launch, fishing area, Visitor Center), and to provide trail signs at all trailheads.

H.1.2.8 Facilities

26. **Comment summary:** Additional visitor facilities are needed. Providing additional recreational facilities described in the Draft CCP/EIS' Preferred Alternative, including more ADA-accessible trails, wildlife observation and photography facilities, docks, and disabled access for all activities is supported.

    Response: The selected alternative includes all of the facilities proposed in comments. Providing a variety of recreational opportunities and facilities provides multiple points of entry for visitors of different comfort and skill levels.

    Installation of the proposed facilities does depend on funding. Funding would be sought through increases in Refuge base funding, special project funds, grants, and the like. See Appendix C for additional implementation information.

27. **Comment summary:** Access roads should be paved or oiled and more parking be provided.

    Response: The Refuge would consider upgrading, expanding, or providing additional access points as funds for road improvements and maintenance become available. Consideration of factors such as the effects on runoff and erosion, on wildlife habitat, and on existing wildlife-

dependent recreational opportunities would be assessed while developing a Visitor Services step-down plan. A Visitor Services Plan is scheduled to be completed within 5 years of CCP implementation and we will request public input during its development. The Service acknowledges these comments and will incorporate them as appropriate into the Visitor Services step-down plan.

28. **Comment summary:** The Refuge should provide additional facilities on the south side of Lake Lowell within areas that are inundated during high water, including providing duck blinds and a trail between Parking Lot 1 and Parking Lot 7.

    Response: Given the fluctuating water levels of Lake Lowell, facilities installed on land below the high water level of the lake require either high expense or management challenges. For example, installing duck blinds was considered, however, it was determined to not be practical, given that water levels fluctuate from year to year and even during waterfowl hunting season. The proposal to install a trail on the south side below high water was also considered, in our Draft CCP/EIS, in Alternative 3. However, the expense of building a boardwalk that would remain accessible during all water levels—nearly six million dollars, was determined to be too high.

29. **Comment summary:** A walking and bicycling path around the entire lake should be considered.

    Response: As noted in Section 2.2 of the Draft CCP/EIS, this idea was considered but rejected, because it would remove habitat and increase disturbance to wildlife and wildlife-dependent recreationists. In addition, the existence of wildlife closure areas on the Refuge would make it impossible to have a bike loop around the entire lake. This proposal may be best explored by other entities as an easement on land adjacent to the Refuge. The Refuge would be happy to discuss connecting existing or proposed new Refuge trails with a trail system installed adjacent to the Refuge by other agencies.

30. **Comment summary:** The College of Idaho Museum of Natural History proposed installing research stations.

    Response: The Refuge looks forward to working with the College of Idaho Museum of Natural History to better understand their proposal and identify how the Refuge and Museum can mutually benefit from potential research stations.

H.1.2.9 Refuge Access

31. **Comment summary:** Providing access to the Refuge through designated entrances only, would alienate law-abiding users who would like to use the most convenient point to gain access, therefore, visitors should continue to be able to access the Refuge over fences adjacent to private property and over fences along roadways, including between the Tio Lane and Gotts Point entrances and off of Lakeshore Drive.

    Response: As noted in Objective 2.4.1.1, we will provide access to the Refuge through designated entrances only. Refuge visitors can currently access recreational activities adjacent to 17 designated entrances scattered around the Lake Lowell Unit, and the infrastructure associated with each access reduces habitat availability as well as recreational

opportunities. By restricting access through designated entrances only, users who are interested in enjoying areas farther away from crowds (e.g., the area between the Tio Lane and Gotts Point entrances) have the ability to do that by walking farther from the designated entrances. Continuing to allow access to the Refuge over fences could result in an increase in habitat impacts (through increased social trailing and spread of invasive plant seeds) and wildlife disturbance, especially given anticipated increased development over the next 15 years that could increase demand for this sort of access from private lands.

32. **Comment summary:** Develop a new designated entrance between the Tio Lane and Gotts Point entrances.

    Response: As noted in Objective 2.4.1.1, we will provide access to the Refuge through designated entrances only. The Service considered but rejected providing another Refuge access in this area. Visitors can currently access duck hunting opportunities through a short walk east of the Gotts Point entrance in the East Side Recreation Area and at several locations in the South Side Recreation Area. Because these areas are a short distance from designated entrances, they can become crowded. Currently, visitors who are interested in enjoying areas farther away from crowds have the ability to do that by walking farther from the designated entrances. Designating another entrance in this area would reduce the variety of duck hunting experiences available on the Refuge.

33. **Comment summary:** The Refuge should work with private landowners along Lake Shore Drive to develop an agreement to provide access across private property to a proposed new entrance and trail providing access to the East Dike Trail and the Tio Lane parking lot from the southeast Refuge boundary.

    Response: Refuge visitors can currently access recreational activities adjacent to 17 designated entrances at the Lake Lowell Unit. The infrastructure associated with each access reduces habitat availability as well as recreational opportunities. Although an additional designated entrance might be considered, the Service considers the financial and habitat impacts of the Refuge access proposed by the commenter to be unwarranted given the availability of access to the same area (Leavitt Tract and East Dike Trail) through an existing entrance that is less than a 3-mile drive away.

34. **Comment summary:** The Refuge should close as much land as possible to overland vehicles such as ATVs with the exception of research vehicles.

    Response: The Refuge does not allow vehicles, including ATVs, to travel off of designated roads, and no change to this restriction is in the CCP.

35. **Comment summary:** Gotts Point should be reopened to vehicles to increase access to the area. A separate comment encourages the Gotts Point closure and validates our desired result for the area, to be safe for families while enjoying water-related activities.

    Response: Gotts Point is currently open to public access from February 1 to September 30. The road to the point was closed to reduce illegal activities and vandalism. The Service proposes to re-open the road to Gotts Point (Objective 2.4.3.1) upon completion of a memorandum of understanding or cooperative agreement with Canyon County to resolve law-enforcement issues and retain the family-friendly nature of the area. Providing vehicle

access to Gotts Point will provide more opportunities for both wildlife-dependent and nonwildlife-dependent recreational opportunities.

36. **Comment summary:** The gate at Gotts Point should be relocated 150 yards farther west to provide a gear drop off area for uses that require substantial equipment.

    Response: The Service plans to re-open the road to Gotts Point when a law-enforcement agreement is in place. Given that the current Gotts Point parking lot allows access to all recreational opportunities in that area (e.g., lakeshore, trails), the Service considers the investment of funds and staff needed to move the gate a short distance to be unwarranted.

37. **Comment summary:** Support for charging fees was expressed, if used to fund fee-payer activities or if recreational access to the Refuge is left unchanged. Opposition to charging fees to access public lands was also expressed.

    Response: In Section 2.2.2, we identify a feasibility assessment will be conducted to evaluate whether to charge an entrance and/or boat launch fee to provide funding to maintain visitor facilities and hire visitor services and law enforcement staff. Determining whether a fee would be implemented will be based on the feasibility assessment and appropriate public input.

H.1.2.10 Hunting

38. **Comment summary:** IDFG requested that fall turkey hunting be allowed on the Snake River Islands Unit because they anticipate a growing turkey population and would like to be able to use hunting as a management tool.

    Response: In Section 2.2.2, opportunities for hunting of additional species (e.g., turkey) will be addressed in future step-down planning efforts occurring in close coordination with IDFG. Opening a new turkey hunt will require both a hunt plan and a National Environmental Policy Act (NEPA) analysis. This process would require additional information and analysis before a decision could be made. The Service looks forward to working with IDFG to evaluate the possibility of opening a turkey hunt on the islands.

39. **Comment summary:** Opposition to the proposed shotgun shell limit for waterfowl hunters on the Lake Lowell Unit was expressed, as was support for the limit to potentially allow more people the opportunity to hunt, and to encourage hunters to wait for birds to come within range before shooting.

    Response: As noted in Objective 2.4.2.1, limiting waterfowl hunters to 25 shotgun shells in possession per hunter per day will help address complaints about sky busting.

40. **Comment summary:** Modify designated Refuge hunting areas to either (1) close to hunting those lands with the most biodiversity of plants and animals; or (2) open the area east of Parking Lot 1 to hunting.

    Response: Existing hunting areas were assessed to determine whether they are appropriate, based on concerns that high-quality habitat be protected as a refuge from hunting and that other wildlife-dependent recreationists have access to areas without hunting. Through this assessment, it was determined that existing designated hunting areas are appropriate. The

area east of Parking Lot 1 is particularly high-quality habitat for waterfowl and other waterbirds and therefore would not be opened to hunting.

41. **Comment summary:** IDFG pointed out that it was unclear whether the youth waterfowl hunt area proposed east of Parking Lot 1 in the Draft CCP/EIS in alternatives 2 and 4 would allow hunting only during the designated youth waterfowl hunt dates set by the Fish and Game Commission or whether youth-only hunting would be allowed in that area during the rest of the hunting season as well.

    Response: After clarifying discussions with IDFG to indicate the Refuge's intent to limit hunting during the designated youth waterfowl hunt dates to the proposed new area and not to allow youth hunting in the rest of the regular waterfowl hunting area between Parking Lots 1 and 8, IDFG and the Refuge decided that the best youth hunting opportunity will be provided by allowing hunting during the designated youth waterfowl hunt dates, in the regular waterfowl hunting area between Parking Lots 1 and 8.

42. **Comment summary:** Lead shot, bullets, and sinkers should be banned to reduce impacts "to avian scavengers, like Bald Eagles, and diving water birds, like grebes and loons" and affects to air, water, and soil quality.

    Response: Lead shot has been and will continue to be banned on the Refuge. Lead shot is the perfect size and shape for dabbling waterfowl to pick up and store in their crop, which can cause a variety of toxicity problems for both the waterfowl that eat the shot and predators that may eventually eat the waterfowl. Lead bullets have not been banned because their larger size prevents their ingestion by most wildlife.

    There are some concerns regarding the toxicity of lead tackle and bullets to certain species, but the extent of these problems does not seem to be as dire or as well supported in literature as the use of lead shot. Whenever possible, refuges try to be consistent with State rules and regulations regarding fish and game in order to avoid confusion. The State of Idaho does not currently ban the use of lead fishing tackle. If new findings surface regarding impacts to wildlife from lead tackle the Service will take appropriate measures.

H.1.2.11 Fishing

43. **Comment summary:** Allow ice fishing in Fishing Areas A and B, 200 yards in front of the Lower and Upper Dams.

    Response: Ice fishing will be allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by the Bureau of Reclamation. Lake Lowell is currently closed to boating from October 1 through April 14 to provide habitat for wintering waterfowl, and reduce disturbance from human-caused flushing events. However, human-powered boats are allowed in Fishing Areas A and B to allow wildlife-dependent recreational opportunities with minimal disturbance to wildlife. Restricting ice fishing to these areas would reduce disturbance to waterfowl using the lake, but would still provide ice fishing opportunities when ice conditions allow. Anglers would be responsible for checking ice conditions and confirming that they are safe.

44. **Comment summary:** Alternatives 3 and 4 in the Draft CCP/EIS would close "several of the best fishing spots on Lake Lowell," and therefore concentrate anglers into lower-quality areas, shorten the boat-fishing season (Alt 3), and increase the time required to access preferred fishing spots because of no-wake zones, thus reducing fishing time.

    Response: The Service selected the Preferred Alternative (Alternative 2) for implementation, as it is presented in the Final CCP/EIS, because it provides the best balance of protecting wildlife and habitat and providing quality wildlife-dependent recreational opportunities.

    NEPA requires us to consider a range of alternatives when developing an EIS. The range of alternatives we identified in the Draft CCP/EIS helped Refuge staff develop, track, and present a variety of ideas for public review and comments, which helped to stimulate useful discussions and ideas that ultimately shaped our selected alternative.

45. **Comment summary:** Several comments indicated that there is some confusion about what fishing access would be allowed in the Draft CCP/EIS Preferred Alternative. Included in these comments were requests to allow fishing at the north end of Murphy's Neck, to create more year-round fishing opportunities, and to clarify regulations for wading anglers from February 1 to July 31 when lakeshore access is restricted to 100 yards of shoreline on either side of trails accessing the lakeshore.

    Response: In the CCP, we allow shoreline fishing at the north end of Murphy's Neck from March 15 through September 30. It is closed the rest of the year to reduce disturbance to wintering waterfowl. We will also increase year-round fishing opportunities by allowing shoreline fishing from any open shoreline during waterfowl hunting season, rather than just from Fishing Areas A and B. This has been clarified in Objective 2.4.3.1. We will also allow wading access to fishing anywhere at Lake Lowell from April 15 to September 30. In areas where walking access to the shoreline is limited to maintained roads and trails during the nesting season, bank fishing is limited to 100 yards of shoreline on either side of trails accessing the lakeshore. Note that anglers can wade anywhere during these times. This has also been clarified in Objective 2.4.3.1. In addition, ice fishing will be allowed in Fishing Areas A and B within 200 yards of the dams, subject to areas posted by the Bureau of Reclamation (see Map 3).

46. **Comment summary:** Lake Lowell should not be closed to bass fishing.

    Response: The Service has not considered closing Lake Lowell to bass fishing. In fact, the CCP process has sought to improve conditions for wildlife-dependent users like bass anglers while balancing the needs of wildlife.

H.1.2.12 Wildlife Observation and Photography

47. **Comment summary:** Access should be allowed in Fishing Areas A and B for all wildlife-dependent activities throughout the year.

    Response: All wildlife-dependent recreational activities are allowed in that area between April 15 and September 30 from any type of boat, and during the rest of the year from human-powered boats. However, local weather conditions make safety a major concern for recreational users who rely on the structural integrity of the ice on Lake Lowell to enjoy their

sport (see Section 2.2.1.1). In addition, ice fishing will be allowed, so there would be additional safety concerns associated with the possibility of falling into fishing holes. Lake Lowell is currently closed to boating from October 1 through April 14 to provide habitat for wintering waterfowl and reduce disturbance from human-caused flushing events. Unlike fishing, which cannot be conducted from the shoreline when the lake is covered with ice, other wildlife-dependent activities can still be conducted from shore. Therefore, all ice-based activities other than fishing would be prohibited.

H.1.2.13 Environmental Education and Interpretation

48. **Comment summary:** The National Park Service requested that the Refuge interpret and mark the Oregon Trail corridor on the Refuge.

    Response: We would be happy to work with the National Park Service's Regional Trails office to identify, mark, and interpret the Oregon Trail corridor on the Refuge.

49. **Comment summary:** To reduce the number of harassment incidents that swallows nesting under the Walter's Ferry Bridge endure, install an interpretive sign at the boat ramp at Walter's Ferry, regarding the benefits of swallows to insect control.

    Response: The Refuge has a kiosk at the Walter's Ferry boat ramp that includes Refuge information and a map of the adjacent section of the Snake River Islands Unit, however, the boat ramp is managed by IDFG. We will provide the comment to IDFG, and we would be happy to partner with IDFG to install interpretive signs at this and other Snake River Islands Unit access points to educate visitors about wildlife.

H.1.2.14 Partnerships

50. **Comment summary:** Refuge staff should work with partner agencies to conduct law enforcement activities, and develop and conduct environmental education activities.

    Response: The Refuge appreciates the assistance of a variety of organizations and local, State, and Federal agencies in maintaining and improving existing Refuge programs. As identified in Objective 2.4.5.1, the Service plans to maintain existing partnerships and build additional partnerships to increase our partners' knowledge of the Refuge's purpose, and leverage resources to increase the effectiveness of the Refuge's programs, including environmental education and interpretation, fishing, hunting, wildlife photography and observation, compatible nonwildlife-dependent surface-water recreation, water quality, urbanization and agriculture, and invasive species.

51. **Comment summary:** The Canyon County Commissioners stated that "Canyon County will not allow its legislative or executive power to be used to enforce the on-water regulations proposed by FWS." In addition, "in the event FWS provides the Refuge with federal law enforcement personnel and resources sufficient to enforce its regulations, Canyon County will cease its provision of Parks assistance and labor (without which the Refuge will apparently be unable to maintain appropriately hygienic conditions in its bathrooms, mowed lawns, or parking lots) to the Refuge."

Response: The Refuge considers Canyon County to be a valuable partner in law enforcement as well as maintenance of public use areas and would like to continue to work with the County. We appreciate that the County currently provides most of the on-water law enforcement at Lake Lowell, and maintenance of recreational facilities at the Lower Dam Recreation Area (e.g., irrigating and mowing lawns, cleaning restrooms, and maintaining buoys).

As noted in Appendix B, if the County discontinued their assistance and labor, there would be additional Refuge costs and labor associated with maintaining various uses, and we would have to re-assess the Refuge's ability to provide the recreational opportunities that are currently available.

H.1.2.15 Nonwildlife-dependent Recreation

52. **Comment summary:** Although recognizing that the sole purpose of the Reclamation project at Lake Lowell is to capture and deliver irrigation flows, the Board of Control states that Reclamation has a duty to provide recreational facilities and opportunities for the public and that the Service must be mindful of Reclamation's responsibility in this regard.

    Response: Reclamation advises us that neither the project authorization nor its statutory authority creates a duty to provide public recreation at Lake Lowell. The 1905 Lake Lowell authorization does not provide any authority for recreation or require Reclamation to ensure that recreational facilities are provided. The Federal Water Project Recreation Act, Public Law 98-72, governs Reclamation's recreation authority if the project authorization does not provide for recreation. However, it is Reclamation's position that this statute encourages, but does not require Reclamation to provide recreational opportunities and facilities in cooperation with non-Federal partners and by using cost-sharing. It does not add recreation as a project purpose to a Reclamation project nor impose a Federal recreation obligation. Significantly for Lake Lowell, P.L. 98-72 also excludes areas that are administered by a Federal agency "in connection with an authorized Federal program for the conservation and development of fish and wildlife" (16 U.S.C. § 460l-12).

53. **Comment summary:** Canyon County states that the Federal government does not have authority to control on-water uses of a reservoir in which it does not have water rights, therefore, the Service has no regulatory authority over surface water uses of Lake Lowell.

    Response: We agree that the Federal government does not have a water right for the water collected at Lake Lowell, and we have not asserted that a water right is the legal basis for the Federal government's authority to regulate surface uses. Rather, the basis for this authority is Federal ownership of the lands underlying the reservoir, the United States Constitution, and Federal statutes.

    The lands under Lake Lowell were withdrawn or acquired by the United States prior to completion of the Reclamation project in 1909.[1] On February 25, 1909, President Theodore

[1] Two parcels were owned by the State. On February 24, 1909, the State granted the United States a right-of-way over and across these parcels in perpetuity for construction and maintenance of the reservoir.

Roosevelt established the Deer Flat Bird Reservation by Executive Order 1032. President Franklin D. Roosevelt issued a new executive order on July 12, 1937 revoking E.O. 1032 and establishing the Deer Flat Migratory Waterfowl Refuge. Although the lands were reserved for refuge purposes subject to use by the Department of the Interior (DOI) for Reclamation operations and incidental purposes, they are included in the National Wildlife Refuge System (16 U.S.C. § 668dd(a)(1)). See also 16 U.S.C. § 668dd(a)(6) (stating that each area included in the refuge system by an executive order will continue to be part of the Refuge System until otherwise specified by an Act of Congress).

The Property Clause contained in Article IV, § 3 of the Constitution gives Congress authority to make rules governing the property of the United States. As it relates to the National Wildlife Refuge System, Congress has exercised this power by enacting a number of laws that authorize the Secretary of the Interior, through the Service, to regulate activities on national wildlife refuges, including waterborne activities. For example, the National Wildlife System Administration Act (NWRSAA), as amended, authorizes the Secretary, "under such regulations as he may prescribe, to … permit the use of any area within the System for any purpose, including but not limited to hunting, fishing, public recreation and accommodations, and access whenever he determines that such uses are compatible with the major purposes for which such areas were established …" (16 U.S.C. § 668dd(d)(1)(A)). The NWRSAA also states that "the Secretary shall not initiate or permit a new use of a refuge or expand, renew or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety" (16 U.S.C. § 668dd(d)(3)(A)(i)). The Refuge Recreation Act permits the Secretary to administer refuge areas for public recreation, but only to the extent that it is "not inconsistent with … the primary objectives" for which the area was established (16 U.S.C. § 460k). It also directs the Secretary to curtail public recreation within areas whenever he considers such action to be necessary. Thus, both the NWRSAA and Refuge Recreation Act provide authority to the Service to control activities on national wildlife refuges. In fact, under the terms of these laws, such activities may not take place unless permitted. These statutory provisions have been implemented by the Service in regulations found at 50 C.F.R. Subchapter C. The regulations describe the process for opening a refuge to public access and use and, in relevant part, prohibit boating and water-skiing unless otherwise permitted (50 C.F.R. §§ 27.32-33).

Likewise, Reclamation's jurisdiction over water-borne activities on its facilities does not depend on ownership of a water right. Federal law provides that the United States holds the right to manage and operate Reclamation projects (43 U.S.C. §§ 491, 498; United States v. Pioneer Irrigation District, 157 P.3d 600, 603) (Idaho 2007). Reclamation's regulations govern the use of Reclamation facilities by the public, including recreation and boating. The preamble to this regulation explains that Reclamation has proprietary jurisdiction over its facilities and property, including water legally stored in such facilities under state law (71 Federal Register 19790, 19791) (Apr. 17, 2006)). However, it is important to note that Reclamation regulations also provide that public conduct on Reclamation lands and waterbodies administered by other Federal agencies under statute or other authority will be governed by the regulations of those agencies (43 C.F.R. § 423.3(d)).

These two parcels were included in the description of the Refuge in both E.O. 1032 and E.O. 7655 and are managed as part of the refuge.

In addition, the State's laws regulating boating and other uses on navigable waters within Idaho (although not purporting to control Federal reservoirs) are not tied to the existence of a water right. Therefore, we are not aware of any legal basis to conclude that water right ownership is a necessary prerequisite to regulating surface uses of Lake Lowell.

54. **Comment summary:** Provide camping facilities, perhaps at Gotts Point.

    Response: Camping is considered appropriate on a national wildlife refuge only when no reasonable (based on time, distance, and expense) lodging opportunities are available off-refuge and when staff resources needed to manage camping do not detract from the quality of another priority wildlife-dependent recreational use. There are other private and public campgrounds nearby that accommodate both recreational vehicles and tent campers with a high level of service; therefore, we will continue to not allow camping.

55. **Comment summary:** Continue to allow swimming at various locations at Lake Lowell, rather than only at designated areas at the Lower Dam Recreation Area and Upper Dam as proposed in the Draft CCP/EIS in the Preferred Alternative.

    Response: We will direct swimmers to designated areas at the Lower Dam Recreation Area and the east end of the Upper Dam to minimize safety concerns and reduce impacts of swimmers on wildlife and wildlife-dependent recreationists. We will also continue to allow swimming from boats in the open water of Lake Lowell that are outside of no-wake zones and fishing or other wildlife-dependent recreation facilities (e.g., docks), or immediately adjacent to boat launch areas. For more information, see rationale for Objective 2.4.1.4.

56. **Comment summary:** Comments supported our proposal to require dogs to be leashed, because of their effect on wildlife and habitat, and concerns for visitors' safety. Another request encouraged the Refuge to allow dogs to be off leash when nobody else is around.

    Response: The CCP requires dogs to be leashed except when accompanying someone engaged in allowed hunting. Leashed pets must remain on designated trails and in the Lower Dam Recreation Area, and visitors with leashed pets must bag and remove fecal material. Although walking with pets is not a wildlife-dependent recreational activity, it is often conducted in conjunction with wildlife-dependent uses like wildlife observation, photography, and interpretation. The potential for wildlife disturbance is minimal when the use is conducted in accordance with the stipulations listed above. See the Walking with Pets (other than hunting dogs) compatibility determination in Appendix B for more information.

57. **Comment summary:** Ice skating should be allowed.

    Response: Because of local weather conditions, safety is a major concern for recreational users who rely on the structural integrity of the ice on Lake Lowell to enjoy their sport (see Section 2.2.1.1). In addition, ice fishing will be allowed, so there would be additional safety concerns associated with the possibility of ice skaters falling into fishing holes. In addition, Lake Lowell is closed to boating from October 1 through April 14 to provide habitat for wintering waterfowl and reduce their disturbance from human-caused flushing events. Unlike fishing, which cannot be conducted from the shoreline when the lake is covered with ice, other wildlife-dependent activities can still be conducted from shore. All ice-based activities other than fishing will therefore be prohibited.

58. **Comment summary:** Refuge staff should plant a new generation of shade trees for years of future nonwildlife related uses at the park areas located at both ends of the lake.

    Response: The Service will maintain shade trees at the Lower Dam Recreation Area because it provides a different habitat type than is found elsewhere on the Refuge (open canopy with limited understory) and particularly benefits waterfowl and raptors, especially in winter.

    The park located adjacent to the east Upper Dam boat launch is a Canyon County park. The Refuge will convey this comment to the Canyon County Department of Parks, Recreation, and Waterways.
59. **Comment summary:** Commenter spent time on Lake Lowell with his father as a child and would like to pass on the same experiences to his children and grandchildren.

    Response: All of the activities that are currently enjoyed on the Refuge would continue to be allowed, with a few changes to protect wildlife and encourage more participation in wildlife-dependent recreation. The CCP allows for a variety of recreation year-round.

60. **Comment summary:** Sailing regattas should be allowed because they do not exclude the general public, increase wildlife disturbance, increase safety concerns, or require additional management resources; they enhance wildlife-dependent activities; and they provide a positive economic impact for the state and local vendors. Some commenters were even concerned that all sailing would be prohibited.

    Response: Changes were incorporated in the CCP to allow sailing regattas with certain stipulations to address concerns about safety and interactions with other users. For further information about the activity and required stipulations, see the appropriate use determination in Appendix A and compatibility determination in Appendix B.

    In addition, as noted in Appendix B, currently most on-water law enforcement and boating-related dock maintenance is provided by the Canyon County Sheriff's Office. If the Sheriff's Office decided to discontinue this assistance, there would be additional Refuge costs for maintaining this use and the ability of the Refuge to provide this use may be impaired.

H.1.2.16 Boating—General

61. **Comment summary:** Extend the boating season beyond the current season (April 15-September 30) by either having an earlier start or a later end to the season, or by allowing boating all year.

    Response: Deer Flat Refuge was established primarily for the protection of migratory birds and other wildlife (see Section 1.7.2). As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System is "wildlife conservation: wildlife and wildlife conservation must come first."

    The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service should make extra efforts to facilitate on refuges, where compatible with the refuge's wildlife and wildlife habitat purposes. However, where conflicts arise between protections for wildlife and habitat and

providing wildlife-dependent recreation, priority must be given to wildlife and habitat. The Service determined that the existing boating season provides appropriate wildlife protections.

62. **Comment summary:** The time that boats have to be off the water should be tied to civil twilight (half-hour after sunset); currently, it approximates twilight, but is not tied to it. The results are that sometimes, boats must be off the water 15 or 20 minutes before it is really necessary, and also that someone has to change the signs that tell the time boats need to be off the water. Instead of posting a time when boats must be off the water, the Refuge should notify boaters that they must be off the water by civil twilight and post a table showing the times of civil twilight throughout the boating season.

    Response: The time boats must be off the water cannot be tied directly to civil twilight, because the Refuge closes to visitors at civil twilight, and boaters need time to trailer and prepare their boats in order to depart before civil twilight. It is especially important that boaters are prepared to depart the Lower Dam Recreation Area by civil twilight, because an automatic gate closes, and can prevent boaters from exiting the parking lot shortly after civil twilight. We considered but rejected extending Refuge hours beyond civil twilight, because of concerns for visitor safety and to reduce potential illegal activity after dark.

    There are currently signs at the major boat ramps (east Upper Dam, west Upper Dam, and Lower Dam Recreation Area) that indicate "Boats must be off water by…" with the time indicated on an interchangeable time sign. These signs were installed at the request of the Canyon County Sherriff's Office Marine Patrol officers to better communicate to boaters the end of boating hours and help officers ensure that boaters would be off the water in sufficient time to allow officers to safely search for and assist or rescue any stragglers who might be having mechanical or safety concerns. They also help boaters plan their departure before the gate closes at the Lower Dam Recreation Area.

    Because Refuge staff insert the appropriate time sign as sunset shifts during the season, it is not always possible to have the boats off-water time match an appropriate time between sunset and civil twilight. Currently, the boats off-water sign is changed so that it indicates a time anywhere from one to thirty minutes after sunset, to provide time to depart before civil twilight.

    Given that boaters require different amounts of time to trailer and prepare their boats for departure, the Service will discuss with the Canyon County Sherriff's Office Marine Patrol the possibility of replacing the "Boats must be off water" signs with "Gate closes at" signs (for the Lower Dam Recreation Area) or "Refuge closes at" signs (for the Upper Dam boat ramps) that would indicate times anywhere from one to thirty minutes after civil twilight. Alternatively, the Service could notify boaters that they must be off-water by civil twilight and post a table showing the times of civil twilight throughout the boating season as suggested by the commenter. Either approach could allow boaters a bit more flexibility to plan their boating and still comply with the Refuge closure time.

63. **Comment summary:** Motorized boating should be eliminated or restricted to no-wake because high-speed motorized boating is unsafe, causes wildlife disturbance, detracts from user experiences, was not foreseen when the Refuge was established, and is available at many other local lakes and reservoirs that are not national wildlife refuges. There should be one day a week or even a half day during which the lake is open only to no-wake activities.

Response: The use of a boat often provides a vehicle for participating in wildlife-dependent recreational activities (e.g., fishing, wildlife observation, and photography), so boating is often allowed on national wildlife refuges. Typically, however, high-speed boating and tow-behind activities are not permitted on national wildlife refuges. As noted in Section 5.5.1, because the Refuge was unstaffed in its early history and because of an erroneous assumption that administrative responsibility for on-water uses rests with Reclamation, recreational activities that would typically not be allowed on a refuge have been allowed at Deer Flat NWR.

Refuge staff worked closely with regional and national staff to identify areas where traditional uses such as high-speed boating can continue, while still providing adequate habitat for wildlife. Nonwildlife-dependent boating visitors provide the Refuge opportunities to reach out to nontraditional user groups and to encourage boating users to observe wildlife and learn about the NWRS. Due to the close proximity of the Refuge to the cities of Nampa and Caldwell, the number and variety of users to this urban Refuge are expected to grow. For many of these people, boating at Lake Lowell may provide an introduction to a national wildlife refuge

The Service considers that with the stipulations identified in the Recreational Boating Compatibility Determination (e.g., seasonal closures and no-wake zones, see Appendix B), high-speed boating and tow-behind activities can be compatible with the Refuge's purpose and the mission of the NWRS. The Service will monitor impacts of boating activities annually to assess compliance with the stipulations, impacts to waterfowl, shorebirds, waterbirds (especially grebes), and other migratory birds as well as wildlife habitat; and conflicts between user groups. Monitoring data would be used to modify these stipulations if necessary, to ensure continued compatibility of these activities.

64. **Comment summary:** Two-stroke motors and unmufflered modified V-8 automobile engines should be banned because of the levels of pollution, exhaust, noise, and speed that they produce. Limit the size of boats.

    Response: The size of boats is already limited by the size of existing boat ramps. There are no plans to expand the ramps to accommodate larger boats. The Service considered banning two-stroke motors, but was informed that some newer two-stroke engines are capable of performance similar to four-stroke engines. Also, where possible, the Service tries to be consistent with local regulations and there are no restrictions on motor type in this area. As identified in Objective 2.4.1.4, the Service will enforce existing Idaho State noise ordinances and promote the use of CARB star-rated motors at the level of two stars and above. The Refuge is open to working with partners to assess the impacts of different kinds of motors on water quality and wildlife/habitat.

65. **Comment summary:** Explain the Service's ability to enforce the proposed noise ordinance. The decibel limit allowed on county and city streets may not be appropriate for a national wildlife refuge.

    Response: The scientific literature related to decibel limits that will reduce disturbance for particular species is limited. As identified in Objective 2.4.1.4, the Service will enforce existing Idaho State noise ordinances to be as consistent as possible with local regulations and increase protections for wildlife from noise disturbance. Service law enforcement

partners with State and local agencies to enforce regulations, and would continue to enforce Refuge regulations to the greatest extent possible.

66. **Comment summary:** Restricting public use on Lake Lowell would negatively impact the environment through increased fossil fuel consumption and carbon dioxide emissions, because some boaters would choose to drive farther to access recreational opportunities at another lake or reservoir.

    Response: All existing recreational activities will continue, with some restrictions, including more no-wake zones and seasonal closures to protect sensitive wildlife habitat. As projected in Table 6-3 in the Draft CCP/EIS, the Service anticipates a reduction in the number of visitors participating in nonwildlife-dependent boating on the assumption that some users would be displaced from the lake because there is less area available for high-speed boating and tow-behind activities.

    However, the Service anticipates that this would have a negligible long-term negative effect on air quality because it is unlikely that a large enough number of visitors would be displaced to cause a larger effect.

67. **Comment summary:** What is the feasibility of enforcing no-wake zones and other regulations given current rate of noncompliance with no-wake zones, current Refuge law enforcement staffing, and the difficulty of identifying distances from protected features that are not marked with buoys? Is the cost of educating the public and purchasing buoys worth the benefit?

    Response: The Service intends to educate the public about the wildlife benefits of no-wake zones and seasonal closures through signs and brochures and hopes that an educated public will comply with regulations. However, we understand that this will not always be the case. Service law enforcement officers will enforce these and other Refuge regulations. Although Service enforcement staff is limited, they will do their best to respond as often as possible.

    The no-wake zones on the east end of the lake and at the Narrows will be clearly marked with buoys placed every 100 to 150 yards, and will be easily identifiable and enforceable. The no-wake zone on the south side of the lake shifts with fluctuating water levels; therefore, it will not be marked with buoys. Officers will use appropriate discretion and provide necessary information when interacting with visitors who are unknowingly violating an unmarked no-wake zone versus those who are flagrantly violating no-wake zones.

68. **Comment summary:** The Refuge should dredge the Narrows and/or dredge or extend boat ramps.

    Response: The Narrows is a narrow area that connects the East and West Pools. The Bureau of Reclamation established what is now called the “equalizer” in this area during the construction of the reservoir. The area is approximately three-quarters of a mile long and approximately 50 feet wide, varying throughout its entirety. The purpose of the equalizer was to maintain flow between the two pools at low surface elevations.

    The lakebed topography in front of the west end of the Upper Dam and Lower Dam ramps does not have the necessary slope to extend current ramps. Dredging and maintenance

dredging is expensive, may adversely impact the environment (e.g., release contaminants bound in lake-bottom sediments), and is often complicated since suitable sites must be located for placement of the dredged material. Dredging more of the existing channel or boat ramps would not provide wildlife value and would only be a temporary correction because wave action and substrate deposition would fill in manipulated areas.

H.1.2.17 Boating—Closures

69. **Comment summary:** Limiting public access to some areas of the lake through seasonal closures and no-wake zones would be unsafe, because it would force more boaters into a small area, and would reduce awareness and appreciation for the Refuge because the Service is restricting access to places visitors currently enjoy.

    Response: The Service sought a balance between wildlife protections and recreational activities by emphasizing seasonal, movable closures to protect wildlife during sensitive times (e.g., nesting, migratory shorebird feeding and resting) rather than permanent on-water closures. Although these seasonal closures will reduce the area available for boating, they will be primarily concentrated in emergent vegetation along the shoreline. The majority of both pools of the lake would be available for high-speed boating, so the total acreage available for high-speed boating would be similar to the status quo alternative in the Draft CCP/EIS. In addition, all activities that have been enjoyed historically will still be allowed.

    By providing information about why seasonal closures and no-wake zones are in place, we can increase visitors' awareness and appreciation of the Refuge. By requiring travel through new or expanded no-wake zones at a no-wake speed, awareness may increase, because opportunities to observe wildlife and habitat will improve.

70. **Comment summary:** Boaters using electric motors, push poles, and other manual propulsion devices should be allowed to enter seasonal nesting closures to allow for wildlife-dependent activities without damaging nesting areas or disturbing wildlife. Commenters also observed that a fully mature emergent weed bed becomes impenetrable, eliminates human access, and creates protection for the nesting colony.

    Response: The seasonal closures were based on recommendations from disturbance literature (see rationale for Objective 2.4.1.4). Any type of human presence in the closure area, whether motorized or nonmotorized, causes wildlife disturbance, therefore, there are no exceptions to the seasonal closures in the CCP.

71. **Comment summary:** Clarify how the proposed 500-yard grebe nesting closures will be implemented. A 1,000-yard closure measured from a nest at the center of the colony should be implemented.

    Response: The sizes of seasonal wildlife closures for important wildlife areas (e.g., nesting, foraging) were determined using the best available science (see Recreational Boating Compatibility Determination in Appendix B). The suggested buffer for nesting grebes is 500 yards. To determine grebe colony boundaries, the Refuge biologist will mark nests within and especially on the periphery of a colony, using a global positioning system (GPS) capable of sub-meter accuracy as part of the regular colony studies. These data points would be exported to a geo-referenced mapping system, and a buffer up to 500 yards would be drawn

around the colony. Buoy locations would then be mapped every 100 to 150 yards and exported back into the GPS unit to be used to place the buoys in the proper location. In the first year that grebes nest, the closure would be based on nests established early in the nesting season. In the second year of a grebe nesting closure, the closure would be based on the full extent of the colony in the first year.

72. **Comment summary:** The closures to protect nesting habitat are supported, in particular the concept of seasonal, movable closures to protect important wildlife areas.

    Response: The Service acknowledges these comments, as well as the scoping comments that proposed the idea of flexible seasonal closures.

73. **Comment summary:** The Service should identify the maximum amount of habitat necessary to protect a given species so that the seasonal, movable closures around sensitive wildlife areas (see Recreational Boating Compatibility Determination in Appendix B) would not end up including most of the emergent beds as proposed in Alternatives 3 and 4 in the Draft CCP/EIS.

    Response: Deer Flat Refuge was established primarily for the protection of migratory birds (see Section 1.7.2). As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first."

    The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service should make extra efforts to facilitate on refuges, where compatible with the refuge's wildlife and wildlife habitat purposes. However, where conflicts arise between protections for wildlife and habitat and providing wildlife-dependent recreation, priority must be given to wildlife and habitat.

    The species the Service is protecting through seasonal closures (e.g., grebes, herons, etc.) require specific types of habitat for nesting. Because of limited availability of suitable habitat (e.g., vegetation, water level, etc.), it is unlikely that they would nest in a way that would result in seasonal closures like those proposed in Alternatives 3 and 4, in the Draft CCP/EIS. This limited availability of adequate habitat is the reason that the Service shifted from proposing permanent closures of emergent beds (as identified during presentations of preliminary draft alternatives) to seasonal, movable closures that provide wildlife protections while also maintaining space available for wildlife-dependent recreation.

74. **Comment summary:** The proposed seasonal closures would restrict access to prime fishing spots and other recreational activities. Unless grebes often re-use the same nesting colony, the proposal to continue grebe nesting closures through July 15 of the following year should be eliminated. Also, seasonal nesting closures should "end at the normal fledging date for the affected species."

    Response: See first paragraph of response to comment 73, for a discussion of relative priorities of wildlife and wildlife-dependent recreation.

Nesting grebes at Lake Lowell have typically used the same area to set up their colonies from year to year. The Refuge is attempting to limit human-caused disturbance in those areas at the beginning of the nesting and boating season when grebes are establishing territories. The seasonal closures will begin and end at appropriate times (e.g., the start of nest territory establishment and typical fledging time for nesting closures and the typical arrival and departure of migrating shorebirds for seasonal shorebird closure) based on best available science and observations at Deer Flat Refuge.

75. **Comment summary:** The Refuge should expand the seasonal closure around the bald eagle nesting area if needed.

    Response: The size of the seasonal nesting closures are based on recommendations presented in peer-reviewed literature that the Refuge considers best available science. If the size or seasonal restrictions prove to be inadequate in the future, the Refuge will take appropriate measures to adjust them accordingly.

76. **Comment summary:** The emergent vegetation on the south side of the lake should be protected by a 50-yard buffer closed to human entry.

    Response: A similar closure was proposed in the Draft CCP/EIS in Alternatives 3 and 4. Our selected alternative, Alternative 2, will adequately protect wildlife while still allowing access to popular fishing areas along the south shore.

H.1.2.18 Boating—No-Wake Zones

77. **Comment summary:** Both opposition and support were expressed for the Narrows no-wake zone. Opposition comments to the no-wake zone included safety concerns when reducing speed in the Narrows in windy conditions, the restriction is unnecessary during high water levels when the Narrows isn't narrow, the no-wake zone will discourage boaters from traveling from the East Pool to the West Pool when water levels are low, thus concentrating usage in the East Pool, and the proposal was not included in the preliminary draft alternatives. Support for the Narrows no-wake zone was expressed, because it would reduce disturbance from wakes to anglers fishing in the Narrows.

    Response: As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first." The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service should make extra efforts to facilitate on Refuges, *where compatible*.

    Compatibility determinations have been developed for both fishing and recreational boating activities (see Appendix B). In order for on-water recreational activities to be compatible, it has been determined that the stipulations laid out in Appendix B must be followed, including the reduction of disturbance provided by no-wake zones and seasonal closures.

    No-wake zones are a common management tool that allows use in sensitive areas. For example, public boat docks are typically surrounded by a no-wake zone to reduce the danger

of fast-moving vessels and the wake they create in such high-use areas. No-wake zones require boaters to slow down and be more aware of their surroundings. The Refuge has a number of sensitive areas, including irrigation structures, boat ramps, swimming areas, high public use areas, and sensitive wildlife habitats.

The Narrows no-wake zone was proposed in the preliminary draft alternatives and in our Draft CCP/EA preferred alternative because it has several sensitive areas. The south shore has a large expanse of smartweed that is used as nesting and foraging habitat by a variety of migratory birds. The north shore has historically had a bald eagle nest in the strip of trees along the lakeshore. Anglers congregate in the middle of the Narrows on a feature known as the "Equalizer" that channels water between Lake Lowell's two pools and holds large quantities of bass.

The Narrows no-wake zone still allows passage to both pools, reduces the amount of wake that affects nesting water birds and stationary anglers, and slows boaters down so they are more aware of their surroundings and can more easily avoid collisions with waterbirds, anglers, and other boats.

78. **Comment summary:** The proposed no-wake zone on the south side of the lake is unnecessary given that after May 30, "access into the emergent weed beds becomes virtually impossible." The no-wake zone should be narrowed to 200 feet rather than 200 yards. Support for the no-wake zone was also expressed, to protect habitat.

    Response: Although it may be difficult to enter the emergent weed beds in late spring and summer, the no-wake buffer actually requires no-wake speeds within 200 yards of the edge of the emergent bed. This would reduce disturbance to nesting, resting, and foraging birds from both the noise and speed of fast-moving boats. See also the general discussion of no-wake zones in the first two paragraphs of the response to comment 76 and compatibility determinations in Appendix B.

79. **Comment summary:** The placement of the proposed expansion of the no-wake zone on the east end of the lake appears to be arbitrary, and its benefit is unclear, this is a preferred area for water skiing. The Boise Sailors Association suggested that the no-wake zone boundary be shifted to the east boundary of the Gotts Point parking lot. Support for this no-wake zone was also expressed, because it will reduce the risk of fishing boats getting knocked against the concrete fish structure east of Gotts Point.

    Response: During the CCP scoping process, the Service received requests from anglers, wildlife watchers, and photographers to provide more areas to conduct their activities with minimal disturbance from high-speed boating activities. The proposed expansion of the no-wake zone also reduces safety concerns associated with the concrete fish structures east of Gotts Point. The expansion of the existing no-wake zone on the east end of the lake was proposed primarily to accommodate these requests and to provide an area with less wildlife disturbance. Some suggested that the no-wake zone be expanded even farther, to start at Parking Lot 2 rather than Parking Lot 1.

    Deer Flat Refuge was established primarily for the protection of migratory birds (see Section 1.7.2). As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended,

the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first."

The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service should make extra efforts to facilitate on refuges, where compatible with the refuge's wildlife and wildlife habitat purpose. Other activities can be allowed if deemed appropriate (see Appendix A) and if they can be implemented without impairing existing or future wildlife-dependent uses. Where conflicts arise between protections for priority wildlife-dependent recreational activities and other recreational activities, priority must be given to the priority wildlife-dependent recreational activities.

Gotts Point is one of the most popular locations at Lake Lowell for shoreline anglers, and this no-wake boundary was devised to include all of Gotts Point to minimize disturbance from wakes for shoreline anglers. Also, having the no-wake-zone boundary terminate at a prominent point is valuable to visitors and law enforcement because it provides a clearer visual reference to help understand and enforce the limits of the no-wake zone.

80. **Comment summary:** The concrete fish structures east of Gotts Point should be removed.

    Response: The cement structures provide habitat for fish and will remain in Lake Lowell.

81. **Comment summary:** Why is it necessary to control boat wakes given that wind creates waves too.

    Response: While wind does produce waves, unpredictable, omni-directional wake created by boats, is more difficult for wildlife to adapt to than waves created by wind. Wildlife species, like colonial surface-water nesters, can generally adapt to waves that result from a prevailing wind. Storm events that are capable of destroying nests and nesting habitat are part of the natural order of things. Although wake from wind can be damaging, the purpose of the proposed no-wake zones is to reduce the amount of human-caused disturbance from wakes in order to improve nesting success.

    As noted in Section 1.6.2.2, according to the Refuge Administration Act, as amended, the fundamental mission of the National Wildlife Refuge System "is wildlife conservation: wildlife and wildlife conservation must come first." The Refuge Administration Act also identifies six priority wildlife-dependent recreational activities for the Refuge System (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) that the Service should make extra efforts to facilitate on refuges, where compatible.

    Compatibility determinations have been developed for both fishing and recreational boating activities (see Appendix B). In order for on-water recreational activities to be compatible, it has been determined that the stipulations laid out in Appendix B must be followed, including the reduction of disturbance provided by no-wake zones and seasonal closures.

82. **Comment summary:** A fishing boat going slow, 5 mph, in a no-wake zone, actually creates a bigger wake than when that same boat is on plane.

Response: Given that the size of a boat's wake at any speed depends on the design of the boat, no-wake zones will require each boater to travel at a speed that does not create a wake—5 mph or a slower speed if that is necessary to not produce a wake. No-wake zones minimize disturbance to wildlife and wildlife-dependent recreationists.

83. **Comment summary:** Certain groups (including law enforcement, administration, and anglers or tournament anglers) should not be required to comply with no-wake zones and closed areas.

    Response: Management activities (e.g., law enforcement) are exempted from regulations as required to achieve management goals, but will be conducted in a way that minimizes wildlife disturbance to the greatest extent possible.

    Priority wildlife-dependent and nonwildlife-dependent recreational activities can be allowed on national wildlife refuges only when determined to be compatible with wildlife and wildlife habitat. To ensure that these activities are compatible, the compatibility determinations (see Appendix B) include stipulations necessary to ensure compatibility. Compatibility determinations for fishing and recreational boating both require compliance with proposed closures and no-wake zones to minimize disturbance to wildlife and habitat. Allowing exceptions for certain users would both increase wildlife disturbance and be unfair to other recreationists not receiving similar exemptions.

H.1.2.19 Economic Effects

84. **Comment summary:** Additional restrictions to current public uses would have a negative economic impact on local businesses (e.g., boat- and fishing-related businesses and convenience stores), state boat license revenue, and local housing values.

    Response: According to the economic effects analysis compiled by the U.S. Geological Survey's (USGS) Policy Analysis and Science Assistance Branch, the selected alternative would have a negligible long-term positive effect on the economy of Ada and Canyon Counties. See the Draft or Final CCP/EIS analysis in Table 6-1 and Section 6.6, Economic Effects.

85. **Comment summary:** Open Lake Lowell to all recreational activities all year to provide an economic benefit to gas stations, boat dealers, sporting goods stores, etc.

    Response: Deer Flat Refuge was established primarily for the protection of migratory birds (see Section 1.7.2). The existing boating season (April 15-September 30) has been in effect for many years and was established to provide adequate habitat, with minimal human disturbance, for migratory birds during migration and over-wintering at Lake Lowell. Reducing the boating closure (October 1-April 14) would increase disturbance to migratory birds and other wildlife, and would contradict the Refuge's purpose.

86. **Comment summary:** Idaho Department of Parks and Recreation expressed concern that the Draft CCP/EIS—Alternatives 3 and 4, would alter the intent of projects funded through Waterways Improvement Fund grants awarded to Canyon County and result in a conversion. Idaho Administrative Procedures Act (IDAPA) Rule 26.01.31.350 regarding conversions requires, "No project funded by Recreational Program Grant Funds shall, without the prior

written approval of the director, be converted to uses other than for the authorized purposes specified in the original recreational program grant application, grant agreement, or Memorandum of Understanding."

Response: Our selected alternative (Alternative 2) would not alter the intent of previously funded Waterways Improvement Fund grants to Canyon County.

87. **Comment summary:** The CCP should "prevent mining, or other industrial exploitation, including above and below ground water diversion."

    Response: Any activity on Refuge lands has to be appropriate and compatible with the purpose of the Refuge to serve as a refuge and breeding ground for migratory birds and other wildlife. It is unlikely that mining or other industrial activities would be considered appropriate and compatible. Water diversion, on the other hand, is the original and overlying purpose for the reservoir (Lake Lowell) and the Service does not have jurisdiction over how that is regulated and used.

88. **Comment summary:** The plan should "forbid the exchange of such lands for other lands offered by any private corporations or individuals for any purpose."

    Response: The Service does have the authority to exchange lands. Any proposal for a land exchange would be evaluated to determine if the subject exchange is in the interests of both the Bureau of Reclamation and the Service in carrying out their respective responsibilities at the Lake Lowell Unit, or in the interest of the Service for the Snake River Islands Unit of the Refuge.

H.1.2.20 Hydropower Facility

89. **Comment summary:** The Board of Control has authority to build hydropower facilities on the Refuge and opposes any element of the CCP that might interfere with this authority, pointing specifically to plans to develop Richard's Point Hydroelectric Project.

    Response: Pursuant to Executive Order 7655, which established the Refuge, the Service's jurisdiction over lands that were withdrawn for the Reclamation project is subject to "Reclamation work and incidental purposes." According to the Bureau of Reclamation, the project encompassing Lake Lowell was authorized with the single purpose of irrigation; hydropower was not an authorized project purpose. Therefore, the Service has operated under the principle that Refuge management cannot interfere with the irrigation purpose of the project and activities associated with the irrigation purpose, such as operations and maintenance activities, but that other activities, such as hydropower, can be allowed only if consistent and compliant with statutory and regulatory authorities governing Refuge management.

    The Service is aware that the President recently signed into law P.L. 113-24, the Bureau of Reclamation Small Conduit Hydropower Development and Rural Jobs Act, we do not know the extent of its applicability to the proposed Richard's Point project. However, we would be glad to discuss this with Reclamation and the Board of Control as appropriate.

H.1.2.21 Editorial Comments

90. **Comment: "**The Draft CCP/EIS references the Idaho Statewide Comprehensive Outdoor Recreation and Tourism Plan (SCORTP) on Page 6-58. The draft EIS states 'According to the 2006-2010 Idaho SCORTP report (IDPR 2006), 73 percent of surveyed Idahoans said that the most they were willing to travel to their favorite outdoor recreation site for less than one day's activity was two hours or more.' The 2006-2010 SCORTP report actually found that the most Idahoans were willing to travel to their favorite outdoor recreation site for less than one day's activity was two hours or less, not more."

    Response: Correction has been made.

91. **Comment:** Draft CCP/EIS, page 5-27, 2nd paragraph. "Recommend changing the sentence 'Based on the assumption that administrative responsibility for on-water uses rested with Reclamation no compatibility determinations were developed for on-water recreation at this time' to something along the lines:

    Based on an erroneous assumption that administrative responsibility for on-water uses rested with Reclamation, no compatibility determinations were developed for on-water recreation at this time. Both the FWS and Reclamation have since confirmed that the USFWS has administrative responsibility for on-water uses as described earlier on page [insert page reference 1 for Lake Lowell]. This is because the USFWS's management of on-water uses will not conflict with Reclamation's off-stream storage of water in Lake Lowell for irrigation purposes; in addition, the USFWS's legal authorities provide that the USFWS needs to manage Lake Lowell for wildlife refuge purposes too."

    Response: Changed as follows: Based on an erroneous assumption that administrative responsibility for on-water uses rested with Reclamation, no compatibility determinations were developed for on-water recreation at this time. Both the Service and Reclamation have since confirmed that the Service has administrative responsibility for on-water uses at Lake Lowell as described earlier on page 1-1. The Federal Water Project Recreation Act, Public Law 98-72, governs Reclamation's recreation authority if the project authorization does not provide for recreation. It does not add recreation as a project purpose to a Reclamation project or impose a Federal recreation obligation. Significantly for Lake Lowell, P.L. 98-72 also excludes areas that are administered by a Federal agency "in connection with an authorized Federal program for the conservation and development of fish and wildlife." (16 U.S.C. § 460l-12).

92. **Comment:** Draft CCP/EIS, page 1-2, 4th paragraph. Add "maintenance" after "operation" in the first sentence, and clarify that the Deer Flat Dams and diversion works are not reserved works in the last sentence.

    Response: Changes have been made.

93. **Comment:** Draft CCP/EIS, page 5-34, Table 5-7. "The following revisions should be made to the table: at Black Canyon Reservoir, Reclamation manages recreation while Idaho Department of Fish and Game manages the adjacent Montour Wildlife Management Area under an agreement with Reclamation. Boise National Forest manages recreation at Arrowrock and Anderson Ranch Reservoirs under an agreement with Reclamation. At

Cascade Reservoir, Idaho Department of Parks and Recreation manages recreation along with Reclamation."

Response: Changes have been made.

94. **Comment:** Draft CCP/EIS, page 1-25, 3rd bullet. This statement should clarify that the Board of Control has the day-to-day responsibility of controlling Lake Lowell's water levels.

    Response: Change has been made.

95. **Comment:** Draft CCP/EIS, page 180 (3-32). "The Implementation Plan was finalized in October 2012."

    Response: Proper citation to final Implementation Plan inserted.

96. **Comment:** Draft CCP/EIS, page 180 (3-32). "Update to 2010 (or 2012) Integrated Report depending on whether it is approved by the time this is finalized."

    Response: Proper citation to 2010 Integrated Report inserted, and text modified as appropriate.

97. **Comment:** Draft CCP/EIS, page 181 and 182 (3-33 and 3-34). "Special Resource Waters are no longer a use designation in our water quality standards. There is no longer a special resource category; we want to protect wildlife everywhere regardless of whether it is a designated wildlife refuge or management area. Wildlife habitat is an assumed use for all surface waters as listed in table 3-14."

    Response: Left unchanged because the term Special Resource Waters was used in the TMDL developed for Lake Lowell (IDEQ 2010) as cited.

98. **Comment:** Windsporters should be permitted short, direct crossing [of no-wake zones] and must not dwell nor conduct their 'play' within that band.

    Response: Objective 2.4.1.4 identifies that kiteboarders and windsurfers are allowed to launch from any open shoreline, but they must comply with no-wake zones.

Appendix I. Refuge Establishment History

- February 25, 1909, President Theodore Roosevelt signed Executive Order (E.O.) 1032 establishing several reservoir sites in the western United States, including the Deer Flat Reservoir, "as preserves and breeding grounds for native birds," subject to Bureau of Reclamation (Reclamation) uses and any other existing rights. The E.O. also states, "It is unlawful for any person to hunt, trap, capture, willfully disturb or kill any bird of any kind whatever, or take the eggs of such birds within the limits of these reservations, except under such rules and regulations as may be prescribed by the Secretary of Agriculture."

- January 12, 1937, Migratory Bird Conservation Commission (MBCC) Memorandum Number 13, "Snake River Migratory Waterfowl Refuge, Canyon and Owyhee Counties, Idaho," stated in the History section: "This unit embraces a group of islands in the Snake River. Its strategic location on that flyway and its proximity to the Deer Flat Reservation makes it an important refuge possibility. The islands within the proposed refuge limits fall in three legal classifications: natural islands surveyed by the General Land Office prior to 1890 when Idaho became a state; natural islands not survey by the General Land Office and therefore public domain; islands formed since 1890, titles to which are vested in Idaho. The purpose is to purchase some 640 acres of privately owned and State owned islands, and obtain jurisdiction over the public lands through E.O. Then arrange with the Idaho State Fish and Game Commission to close a portion of the adjacent river as a sanctuary…."

- July 12, 1937, President Franklin D. Roosevelt issued E.O. 7655 "Establishing Deer Flat Migratory Waterfowl Refuge, Idaho," revoking and superseding E.O. 1032. E.O. 7655 states "to effectuate further the purposes of the Migratory Bird Conservation Act (45 Stat. 1222), it is ordered that all lands owned or controlled by the United States within the following described area comprising 10,252.76 acres, more or less, in Canyon County, Idaho, be, and they are hereby, reserved and set apart for the use of the Department of Agriculture, subject to existing valid rights, as a refuge and breeding ground for migratory birds and other wildlife: Provided, that any private lands within the area described shall become a part of the refuge hereby established upon the acquisition of title thereto or lease thereof by the United States … Most of the above-described lands have been withdrawn for use in connection with the Deer Flat Reclamation Project and are primarily under the jurisdiction of the Department of the Interior; and the reservation herein made of such lands shall be subject to the use thereof by the said Department for reclamation work and incidental purposes.

- Executive Order No. 1032 of February 25, 1909, in so far as it reserved certain lands within a reservoir site in Idaho as the Deer Flat Bird Reservation, as modified, is hereby revoked. This refuge shall be known as the Deer Flat Migratory Waterfowl Refuge" (Federal Register, Volume 2, Number 135, Page 1454, July 15, 1937).

- August 17, 1937, President Franklin D. Roosevelt issued E.O. 7691 "Establishing the Snake River Migratory Waterfowl Refuge, Idaho": "to effectuate further the purposes of the Migratory Bird Conservation Act (45 Stat. 1222), it is ordered that all islands in the Snake River within the exterior limits of the following described area, owned or controlled by the United States, or of which the United States has the use for migratory bird refuge purposes, be, and they are hereby, withdrawn from settlement, location, sale, or entry, and reserved and set apart, subject to valid existing rights, for the use of the Department of Agriculture as a

refuge and breeding ground for migratory birds and other wildlife; *Provided,* that upon the acquisition of title to or lease of any privately-owned island by the United States, or upon the termination of any private right to or appropriation of any public-land island within the area, or upon the acquisition of control by the United States of any island within area, in any other manner, such islands shall be reserved and become part of the refuge….

- This refuge shall be known as the Snake River Migratory Waterfowl Refuge."

- July 27, 1940, Presidential Proclamation No. 2416 (54 Stat. 2720) changed the name of the "Deer Flat Migratory Waterfowl Refuge" to the "Deer Flat National Wildlife Refuge" and changed the name of the "Snake River Migratory Waterfowl Refuge" to the "Snake River National Wildlife Refuge."

- February 20, 1951, MBCC Memorandum Number 9 *Deer Flat National Wildlife Refuge, Canyon County, Idaho*, gave purchase approval for 74.34 acres (Tract 5 for 61 acres from J.B. De Motto and Tract 8 for 13.34 acres, with an easement for electric power line from G.M. Jenkins).

- MBCC Memorandum Number 9 also stated, "The Deer Flat Refuge is an important link in the system of national wildlife refuges in the Pacific Flyway. It is primarily a resting and feeding ground for ducks and geese and a considerable number of geese winter on the area. This refuge will be of even greater importance if proposed power impoundments on the Snake River are completed. Such impoundments will eliminate many small islands in the Snake River that are presently serving as feeding areas for waterfowl. The primary need on this refuge is additional land areas that can be planted to food for waterfowl. There is presented for consideration at this time two tracts of land that can be developed for feeding purposes"

- December 2, 1953, as mitigation for wildlife losses resulting from construction of the C.J. Strike Reservoir, the Idaho Power Company purchased and donated Dilly Island (21.26 acres) to the Service (November 22, 1971, Region 1 Realty Supervisor's memo and January 27, 1964, Service memo to the files).

- January 26, 1955, Public Land Order (PLO) 1060 "Reserving Certain Public Lands As Addition to Deer Flat National Wildlife Refuge" stated "Subject to valid existing rights, the following described public lands in Canyon County, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining but not the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge" (adding 280 acres to the Refuge).

- February 15, 1955, MBCC Memorandum Number 8, "Deer Flat National Wildlife Refuge, Canyon County, Idaho," gave purchase approval for Tract 51 (80 acres) from M.H. Leavitt, Canyon County, Idaho. Exceptions were rights-of-way for ditches, tunnels, telephone and power lines, and mineral rights in the State of Idaho. The option for purchase provided for the conveyance of 15 water shares in the Nampa and Meridian Irrigation District, which is sufficient to irrigate 15 acres of land.

- MBCC Memorandum Number 8 stated, "The Deer Flat Refuge is an important link in the system of national wildlife refuges in the Pacific Flyway, and is one of the principal wintering grounds for mallard and Canada geese in that flyway. Between 500,000 and 800,000 ducks and geese winter on this refuge each year. It is the terminus of a distinct flight from the prairie provinces of Canada. The Irrigation District which operates the reservoir draws down the water heavily in the early summer, and a considerable acreage of flats is exposed for the growth of smartweed and the important dwarfish "tealgrass," both of which are of great appeal to geese and other waterfowl as food. Under the refuge management program, the Fish and Wildlife Service has reclaimed substantial part so these flats of a dense, smothering growth of willows which formerly covered the area. The construction of dams on the Snake and other rivers in this area for flood and power purposes has drawn increased numbers of waterfowl to this vicinity, and has created the problem of providing additional food to take care of the flocks and to prevent crop depredation. Also, there is a pressing need for additional marshlands that can be developed and used for nesting purposes…There is presented for consideration at this time a tract of land located immediately east of the existing refuge. This tract consists of both marsh and agricultural land, and its acquisition will increase the effectiveness of the refuge."

- October 21, 1955, PLO 1239 added one tract of 10.25 acres to the refuge stating, "The lands are withdrawn for reclamation purposes by Departmental orders of December 22, 1903 and February 7, 1906."

- March 7, 1958, PLO 1597 "Reserving Lands for Use of the U.S. Fish and Wildlife Service in Connection with Deer Flat National Wildlife Refuge" added 120 acres to the Refuge: "1. Subject to valid existing rights and the provisions of existing withdrawals, the following described public lands in Idaho are hereby withdrawn from all forms of appropriation under public land laws, including the mining but not the mineral leasing laws, or the act of July 31, 1947 (61 Stat. 367: 30 U.S. Code [U.S.C.] 601-604) as amended, and reserved for use of the Service as an addition to the Deer Flat National Wildlife Refuge. 2. The Bureau of Land Management shall continue to administer and dispose of sand, gravel, and other road building material in the NE ¼, SW ¼, Section 26, pursuant to the act of July 31, 1937, supra subject to such provisions as it shall prescribe to insure that the surface of the lands be restored as nearly as possible to their original condition. 3. This order shall take precedence over but shall not otherwise affect the Department Order of April 2, 1935, establishing Grazing District No. 1."

- April 8, 1963, PLO 3016 "Addition to Deer Flat National Wildlife Refuge" added 26 islands to the refuge (264.41 acres, including a small portion of McCrea Island) on the Idaho side of the Snake River between Homedale and Farewell Bend. "Subject to valid existing rights, all islands owned by the United States within the exterior limits of the following described areas in the Snake River, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws, and reserved for use of the Bureau of Sport Fisheries and Wildlife."

- April 26, 1963, PLO 3047 added 32 acres to the Lake Lowell Unit of the refuge.

- June 28, 1963, PLO 3110, "Abolishment of Snake River National Wildlife Refuge; Transfer of Lands to Deer Flat National Wildlife Refuge," stated "The Snake River National Wildlife

Refuge, heretofore established by E.O. 7691…is hereby abolished, and the lands now comprising the said refuge are transferred to and consolidated with the Deer Flat National Wildlife Refuge. The lands consist of islands in the Snake River and are located within the following described areas….”

- July 31, 1963, PLO 3168, “Withdrawing Public Lands for Use of the Bureau of Sport Fisheries and Wildlife, an Addition to the Deer Flat National Wildlife Refuge,” added 11 islands in Idaho and part of a twelfth (159.53 acres) on the Oregon side of the Snake River between Homedale and Farewell Bend. The PLO stated, “1. Subject to valid existing rights, all islands owned by the United States within the exterior limits of the following described areas in the Snake River, Idaho, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws, and reserved for use of [the Service]…2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R. [Code of Federal Regulations], but shall be subordinate to the use of the lands for wildlife purposes.”

- “but shall be subordinate to the use of the lands for wildlife purposes.”

- June 3, 1965, PLO 3661, “Partial Revocation of the Executive Order No. 7655 (Deer Flat National Wildlife Refuge),” added approximately 0.93 acres to the Lake Lowell Unit of the Refuge, stating “The land is acquired.”

- February 12, 1968, PLO 4366, “Addition to Deer Flat National Wildlife Refuge,” added Fields Island (2.91 acres) to the Refuge, located in both Idaho and Oregon. “1. Subject to valid existing rights, the following described lands, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws (30 U.S.C., Ch. 2), but not from leasing under the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge… 2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R.

- May 28, 1968, PLO 4425, “Addition to Deer Flat National Wildlife Refuge,” added 16.9 acres to the Snake River Islands Unit of the Refuge. “1. Subject to valid existing rights, the following described lands, are hereby withdrawn from all forms of appropriation under the public land laws, including the mining laws (30 U.S.C., Ch. 2), but not from leasing under the mineral leasing laws, and reserved as an addition to the Deer Flat National Wildlife Refuge…. 2. Grazing of domestic livestock on the lands shall be in accordance with provisions of the Taylor Grazing Act of June 28, 1934 (48 Stat. 1269; 43 U.S.C. 315) as amended, and the regulations in 43 C.F.R., but shall be subordinate to the use of the lands for wildlife purposes.”

- November 20, 1968, the Bureau of Sport Fisheries and Wildlife signed a memorandum of understanding (MOU) with the City of Marsing, Idaho, allowing the city use of Marsing Island as a park and recreation area; on February 23, 1972, the Bureau reported the island as excess property to the General Services Administration (GSA) and on May 11, 1972, the MOU between the Bureau and the City of Marsing was terminated. On June 21, 1972,

Marsing Island was assigned to the Reclamation by GSA and later deeded to the City of Marsing.

- October 24, 1975, PLO 5545 added 175 acres to the Lake Lowell Unit of the refuge, stating, "Except for any private lands which may be involved, the lands described in paragraph 1. above remain withdrawn from all forms of appropriation under the public land laws, including the mining laws, for the Payette-Boise Reclamation Project."

- On June 26, 2002, a lawsuit with the State of Idaho regarding ownership of islands in the Snake River was settled. The State of Idaho had filed suit on September 15, 1997, claiming title to islands and portions of islands that were part of the Snake River Island Unit of the Refuge. The suit was based on the State's contention that these islands were formed after statehood (July 4, 1890) and, therefore, belonged to the State. The State laid claim to 63 of the islands that were part of the Refuge at the time. In 1936, certain islands in the Snake River had been identified as under Federal or State ownership by Idaho and Service personnel, ownership determinations that were not founded on science. In its defense, the Service contracted various experts to gather data and refute the State's claim. Work was conducted on the geomorphology, soil, and location of the ordinary high water mark. Based on the findings of these scientific investigations, a settlement was negotiated, whereupon, a few islands previously identified as part of the Refuge became State property, and several islands previously thought to be State property became part of the Refuge.

Document continues on next page.

Appendix J. Contributors

J.1 Core Planning Team

The core planning team consists of persons responsible for the preparation and completion of the CCP/EIS. They are the primary strategists, analysts, and writers. To avoid scheduling and logistical conflicts, the core team has a limited number of participants. This CCP is the result of extensive, collaborative, and enthusiastic efforts by the members of the core planning team below.

Name	Title	Organization
Annette de Knijf	Refuge Manager, Deer Flat NWR	FWS
Jennifer Brown-Scott	Former Refuge Manager, Deer Flat NWR	FWS
Krystal Clair	Outdoor Recreation Planner, Middle Snake Field Office	Reclamation
Stan Culling	Deputy Refuge Manager, Deer Flat NWR	FWS
Steve Dunn	Natural Resource Specialist, Middle Snake Field Office	Reclamation
Charles Houghten	Chief, Lands Division, Region 1	FWS
Elaine Johnson	Former Refuge Manager, Deer Flat NWR	FWS
Susan Kain	Visitor Services Manager, Deer Flat NWR	FWS
Carl Mitchell	Former Wildlife Biologist, Southeast Idaho Refuges Complex	FWS
Addison Mohler	Former Wildlife Biologist, Deer Flat NWR	FWS
Kendra Niemec	Former Deputy Refuge Manager, Deer Flat NWR	FWS
Sharon Selvaggio	Former Planner, Division of Planning and Visitor Services, Region 1	FWS
Amy Wing	Former Planner, Division of Planning and Visitor Services, Region 1	FWS

J.2 Internal Extended Planning Team and Reviewers

In addition to the core planning team, the following FWS staff participated on the extended team. Extended team members provided technical expertise, assisted with data collection, and/or reviewed and provided feedback during drafting of the CCP/EIS.

Name	Title	Organization
Randy Aulbach	Maintenance Worker, Deer Flat NWR	FWS
Brad Bortner	Former Supervisory Wildlife Biologist, Migratory Birds and Habitats Programs, Region 1	FWS
Dar Crammond	Former Hydrologist, Water Resources Branch, Region 1	FWS
Daniel Eckstrom	Former Office Aide, Deer Flat NWR	FWS
Joe Engler	Regional Biologist, Region 1	FWS
Todd Fenzl	Former Zone Law Enforcement Officer	FWS
Robert Flores	Former Refuge Supervisor, NWRS, Region 1	FWS
Mike Gregg	Wildlife Biologist	FWS
Rich Hannan	Deputy Regional Director, Region 1	FWS
Ben Harrison	Former Deputy Regional Chief, National Wildlife Refuge System, Region 1	FWS

Name	Title	Organization
Joan Jewett	Former Public Affairs Specialist, Region 1	FWS
Kay Kier-Haggenjos	Technical Writer-Editor, Region 1	FWS
Kevin Kilbride	Wildlife Biologist, Branch of Refuge Biology, Region 1	FWS
Meggan Laxalt-Mackey	Former Public Affairs Specialist, Snake River Fish and Wildlife Office	FWS
Barbara Locati	Former Administrative Officer, Deer Flat NWR	FWS
Mike Marxen	Branch Chief, Visitor Services and Communications, Region 1	FWS
Kendra Maty	GIS Specialist, Region 1	FWS
Scott McCarthy	Branch Chief, Refuge Planning, Region 1	FWS
Ray Portwood	Zone Law Enforcement Officer	FWS
Chris Reighn	Biologist, Snake River Fish and Wildlife Office	FWS
Robyn Thorson	Regional Director, Region 1	FWS
Nick Valentine	Archaeologist/Museum Specialist, Region 1	FWS
Robin West	Former Regional Chief, NWRS, Region 1	FWS

J.3 External Extended Planning Team and Reviewers

In addition to the core planning team, the following external subject-matter experts participated on the extended team. Extended team members provided technical expertise, assisted with data collection, and reviewed and provided feedback during drafting of the CCP/EIS.

Name	Title	Organization
Bob Carter	Urbanization Specialist	Boise Project Board of Control
Vern Case	Director, Riverside Irrigation District and Chairman	Board of Idaho Water Users Association
Duane Casey	Lake Lowell Water Master	Boise Project Board of Control
David Dahms	Boating Program Manager	Idaho Department of Parks and Recreation
Wendy Davis	Recreation Program Supervisor	Nampa Parks and Recreation
Paul Deveau	Project Manager	Boise Project Board of Control
Jeff Dillon	Regional Fishery Manager	IDFG
Greg Humphreys	Environmental Protection Specialist	Federal Highways Administration
Darrin Johnson	Director	Nampa Parks and Recreation
Ben Keyes	Lieutenant, Marine Patrol Section	Canyon County Sheriff's Office
Lynne Koontz	Economist	USGS
Joe Kozfkay	Fisheries Biologist	IDFG
Susan Law	Alternative Transportation Planner	Federal Highways Administration
Philip Milburn	Wildlife Biologist	ODFW
Steve Nadeau	Regional Wildlife Manager	IDFG
Tim Page	Assistant Project Manager	Boise Project Board of Control
Jake Powell	Wildlife Biologist	IDFG
Scott Reinecker	Southwest Regional Manager	IDFG
Deb Root	Planner	Canyon County Development Services
Natalie Sexton	Wildlife Biologist (Human Dimensions)	USGS

Name	Title	Organization
Rick Ward	Environmental Staff Biologist	IDFG
Craig Wiedmeier	Licensing Supervisor	IDFG

J.4 Involved in Pre-Planning Meetings and Not on Extended Team

The following people participated in wildlife and habitat and/or public use reviews during preplanning and did not subsequently participate on the extended team.

Name	Title	Organization
Paul Bicak	Former Marine Patrol	Canyon County Sheriff's Office
Tom Bicak	Director	Canyon County Parks, Recreation, and Waterways
Jim Budolfson	Retired	Reclamation
Greg Burak	Environmental Staff Biologist	IDFG
Ed Burnett	Director	Canyon County Mosquito Abatement District
A.J. Church	Former Staff	Office of Senator Mike Crapo
Matt Erickson	Conservation Officer	IDFG
Diane French	Former Biological Technician, Deer Flat NWR	FWS
Bruce Haak	Non-game Wildlife Biologist	IDFG
Dennis Hardy	Recreational Maintenance Foreman	IDFG
David Hopper	Fish and Wildlife Biologist, Snake River Fish and Wildlife Office	FWS
Matt How	Visitor Services and Communication, Region 1	FWS
Steve Humphries	Biologist	Ducks Unlimited
Lyndell Jackson	Former President	Friends of Deer Flat National Wildlife Refuge
David Loper	Director, Environmental Health Services	Southwest District Health
Jim Martell	Director	Canyon County Weed and Gopher Control
Jerry Neufeld	Extension Agent	University of Idaho
Lauri Monnot	Watershed Coordinator	IDEQ
Michael Morse	Contaminant Specialist, Snake River Fish and Wildlife Office	FWS
Andy Ogden	Wildlife Habitat Biologist	IDFG
Dan Papp	Former Wildlife Educator	IDFG
Bob Peyton	Assistant Refuge Supervisor, NWRS, Region 1	FWS
Steve Reddy	Extension Agent	University of Idaho
Mike Shipman	Member	Friends of Deer Flat Wildlife Refuge
Amy Ulappa	Former EE Specialist, Deer Flat NWR	FWS
Jim Vannoy	Environmental Health Program Manager	Idaho Department of Health and Welfare

Name	Title	Organization
Linda Watters	Former Assistant Refuge Supervisor, NWRS, Region 1	FWS
Lynnette Wilfling	Member	Friends of Deer Flat National Wildlife Refuge
Bruce Zoellick	Fisheries Biologist	BLM

Appendix K. Fire Management Plan

DEER FLAT NATIONAL WILDLIFE REFUGE

2009

Prepared by: _____ 12/21/2009
Lance Roberts, Fire Management Officer
Southeast Idaho National Wildlife Refuge Complex
Date

Submitted By: _____ 01/26/2010
Jennifer Brown-Scott, Project Leader
Deer Flat National Wildlife Refuge
Date

Reviewed by _____ 2/16/2010
Pam Ensley, Regional Fire Management Coordinator
Pacific Region, U.S. Fish and Wildlife Service
Date

Reviewed by _____ 3/9/2010
Ben Harrison, Division Chief Natural and Cultural Resources
Pacific Region, U.S. Fish and Wildlife Service
Date

Reviewed by _____ 2/11/10
Forrest Cameron, Fish and Wildlife Administrator
Refuge Supervisor
Pacific Region, U.S. Fish and Wildlife Service
Date

Reviewed by _____ 3/11/10
Carolyn Bohan, Assistant Regional Director, Refuges
Pacific Region, U.S. Fish and Wildlife Service
Date

Approved: _____ 3/15/10
FOR: Robyn Thorson, Regional Director
Pacific Region, U.S. Fish and Wildlife Service
Date

Table of Contents

1.0 Introduction

This plan is written as an operational guide for managing the wildland fire and prescribed fire programs at Deer Flat National Wildlife Refuge (Refuge) which includes two fire management units (FMU) the Lake Lowell FMU and the Snake River Islands (FMU). It defines levels of protection needed to ensure safety, protect facilities and resources, and to restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems.

The two FMUs were originally two separate wildlife refuges both serving as a refuge and breeding ground for migratory birds and other wildlife until becoming one in 1963. Habitat protection from wildland fire and the use of prescribed fire along with mechanical fuel reduction to manipulate habitat as outlined in this plan will be used to address the needs of wildlife to meet the resource goals and objectives for the refuge.

1.1 Purpose of the Fire Management Plan (FMP)

This plan is written to meet Department and Service requirements that every area with burnable vegetation must have an approved FMP. (620 DM 1.4) It enables the Refuge to meet a Service requirement that Refuges review and/or revise FMPs at a minimum of five-year intervals or when significant land use changes are proposed. (621 FW 2)

The goal of wildland fire management is to plan and implement actions that help accomplish the mission of the National Wildlife Refuge System, which is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Completion of an FMP enables Deer Flat National Wildlife Refuge to consider a full range of appropriate suppression strategies and to conduct prescribed fires; without it, prescribed fires cannot be conducted and only wildfire suppression strategies may be implemented.

This FMP identifies and integrates all wildland fire management and related activities. It defines a program to manage wildland fires and to assure that wildland fire management goals and components are coordinated.

1.2 General Description of Refuge

Deer Flat National Wildlife Refuge is located in Idaho's Treasure Valley along the southwest border of the city of Nampa. The refuge encompasses 11,860 acres in two units: Lake Lowell and the Snake River Islands. These units lie within two states (Idaho and Oregon) and five counties (Canyon, Payette, Owyhee, Washington in Idaho, and Malheur in Oregon). The Snake River Islands Unit, which includes over 100 islands, are spread over 113 miles of river. The islands range in size from less than an acre to over 50 acres, with total acreage of 1,220 acres. The Lake Lowell unit is an overlay of an off-stream Bureau of Reclamation irrigation project.

With the increase in population and the urban development of previously natural areas, the Refuge sees thousands of visitors each year seeking recreation opportunities. The refuge offers boating, fishing, and wildlife viewing among other activities. High visitor use coupled with the flashy fuels found on the Refuge, create added fire management concerns.

A map of the Refuge can be found in Appendix A of this document.

1.3 Significant Values to Protect

Key Critical Values to Protect

- The Refuge is adjacent to three federally listed Communities at Risk, (Nampa, Marsing, Caldwell).
- Air quality is a concern at the Refuge due to its location in the Treasure Valley, which is a non attainment area for ozone and pm.2.5 (Appendix A).
- Appropriate measures will be taken to protect sites with cultural significance during wildland fire suppression efforts. Prescribed fire mechanical fuels reduction planning will include a review of known sites that may be impacted.
- The Refuge stands as an important sanctuary for outdoor enthusiasts and hosts thousands of visitors every year who wish to pursue recreational opportunities such as boating, fishing, and wildlife viewing among other activities.
- Private property with homes and outbuildings surround the Refuge separated only by a road or fence. Refuge facilities and structures also lie scattered near grass and sagebrush fuels which could put them at risk in the event of a fire.
- The Refuge was designated to protect habitat for migratory birds along the Pacific Flyway. Much of the native habitats found on the Refuge are not fire tolerant. High intensity fires could result in the loss of important habitat for waterfowl, upland birds, and song birds.
- Eagle nesting/roosting areas along the lake need to be protected from unplanned wildfire.
- Water quality issues affecting Lake Lowell from any potential wildfire will be mitigated.

2.0 Policy, Land Management Planning, and Partnerships

2.1 Implementation of Fire Policy

Specific planning documents, legislation, organizations and associated policies provide guidance for fire management actions described in this FMP are summarized below.

2.1.1 Federal Interagency Wildland Fire Policy

This FMP implements these guiding principles of federal wildland fire policy:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fire as an essential ecological process and natural change agent has been incorporated into the planning process. Federal agency land and resource management plans set the objectives for the use and desired future condition of the various public lands.
- Fire management plans, programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.
- Fire management programs and activities are economically viable, based upon values to be protected, costs, and land and resource management objectives,
- Fire management plans and activities are based upon the best available science.
- Fire management plans and activities incorporate public health and environmental quality considerations.
- Federal, State, tribal, local, interagency, and international coordination and cooperation are essential.

- Standardization of policies and procedures among federal agencies is an ongoing objective.

2.1.2 National Fire Plan

This FMP meets the policy and direction criteria in the 2001 National Fire Plan because it emphasizes the following primary goals of the 10 Year Comprehensive Strategy and Cohesive Strategy for Protecting People and Sustaining Natural Resources:

- Improving fire prevention and suppression.
- Reducing hazardous fuels.
- Restoring fire-adapted ecosystems.
- Promoting community assistance.

2.1.3 Department of the Interior (DOI) Fire Policy

This FMP incorporates and adheres to DOI policy stated in 620 DM 1 by giving full consideration to use of wildland fire as a natural process and tool during the land management planning process and by providing for the following:

- Wildland fires, whether on or adjacent to lands administered by the Department, which threaten life, improvements, or are determined to be a threat to natural and cultural resources or improvements under the Department's jurisdiction, will be considered emergencies and their suppression given priority over other Departmental programs.
- Bureaus shall cooperate in the development of interagency preparedness plans to ensure timely recognition of approaching critical wildland fire situations; to establish processes for analyzing situations and establishing priorities, and for implementing appropriate management responses to these situations.
- Bureaus will enforce rules and regulations concerning the unauthorized ignition of wildland fires, and aggressively pursue violations.

2.1.4 U.S. Fish and Wildlife Service Fire Policy

By addressing the range of potential wildland fire occurrences and including a full range of appropriate management responses, this FMP meets FWS wildland fire policy. It is consistent with the FWS Fire Management Handbook and the Interagency Standards for Fire and Fire Aviation Management Operations, which are supplemental policy.

This plan affirms these key elements of FWS fire policy (621 FW 1):

- Firefighter and public safety is the first priority of the wildland fire management program and all associated activities.
- Only trained and qualified leaders and agency administrators will be responsible for, and conduct, wildland fire management duties and operations.
- Trained and certified employees will participate in the wildland fire management program as the situation requires, and non-certified employees will provide needed support as necessary.
- Fire management planning, preparedness, wildfire, and prescribed fire operations, other hazardous fuel operations, monitoring, and research will be conducted on an interagency basis with involvement by all partners to the extent practicable.
- The responsible agency administrator has coordinated, reviewed, and approved this FMP to ensure consistency with approved land management plans, values to be protected, and natural and

cultural resource management plans, and that it addresses public health issues related to smoke and air quality.

- Fire, as an ecological process, has been integrated into resource management plans and activities on a landscape scale, across agency boundaries, based upon the best available science.
- Wildland fire is used to meet identified resource management objectives and benefits when appropriate.
- Prescribed fire and other treatment types will be employed whenever they are the appropriate tool to reduce hazardous fuels and the associated risk of wildfire to human life, property, and cultural and natural resources and to manage our lands for habitats as mandated by statute, treaty, and other authorities.
- Appropriate management response will consider firefighter and public safety, cost effectiveness, values to protect, and natural and cultural resource objectives.
- Staff members will work with local cooperators and the public to prevent unauthorized ignition of wildfires on our lands.

2.1.5 Refuge Specific Fire Management Policy

A Comprehensive Conservation Plan has not been completed for the Refuge. Under the National Environmental Policy Act, a categorical exclusion has been prepared and can be found in Appendix C. In compliance with the ESA, an Intra-Service Section 7 consultation was also completed and is on file at the refuge headquarters.

2.2 Land/Resource Management Policy

2.2.1 Land/Resource Planning Documents

The Deer Flat National Wildlife Refuge operates under the direction of a land management plan that was created in 1995. The Refuge is in the initial planning stages of the Comprehensive Conservation Plan process.

2.2.2 Compliance with Regulatory Acts

Threatened and Endangered Species Compliance

A 2007 Intra-Service Section 7 Biological Evaluation for normal refuge operations including prescribed fire and mechanical fuels reduction projects has been signed by the Refuge Manager; copies are on file at the refuge headquarters.

Cultural Resource Compliance

In order to comply with National Historic Preservation Act of 1966 and Archeological Resources Preservation Act of 1979 regulations, a Request for Cultural Resource Compliance will be completed on a project by project basis and submitted to the regional office. The completed Cultural Resource Compliance documents are on file at refuge headquarters.

NEPA Compliance

A Categorical Exclusion for fire management operations (wildland fire suppression, prescribed fire, and mechanical fuels reduction) was signed by the Refuge Manager and is included in Appendix C of this document. This Categorical Exclusion will be reviewed annually.

2.3.1 Internal Partnerships

FWS Pacific Region Regional Office fire management program determined that all fire management operations in southern Idaho for FWS will be the responsibility of Zone Fire Management Officer currently stationed at the Southeast Idaho National Wildlife Refuge Complex office in Pocatello, Idaho.

Fire Prevention and Education Specialist

The U.S. Fish and Wildlife Service Pacific Northwest Region Refuges Fire Management group and the Branch of Fire Management have a memorandum of understanding (MOU) outlining the jointly funded fire management specialist position. The MOU outlines the responsibilities of both parties related to the position. For the region, the position works as the prevention and education specialist. The Refuge is designated as the official duty station and the Southwest Idaho National Wildlife Refuge Complex Fire Management Officer holds the supervisory responsibility for the position. The signed agreement is located in Appendix F of this plan.

2.3.2 External Partnerships

Deer Flat National Wildlife Refuge participates in multiple external partnerships related to fire management with federal, state, and local agencies and departments. The refuge enters into partnerships and official agreements when there is a mutual benefit to those involved.

BLM Agreement

Due to the lack of a dedicated fire crew stationed at the Refuge, Deer Flat NWR has entered into an intragovernmental agreement with the Boise District Bureau of Land Management. Under the agreement, located in Appendix F of this plan, the BLM will provide wildland fire suppression and dispatch services for lands located within the Refuge. This includes initial attack and preliminary fire investigation. The FWS will pay $2000 to the BLM annually to offset costs.

Local Fire Departments

The Fire Departments of Nampa, Caldwell, Marsing, and Upper Deer Flat border the Refuge and Refuge land falls within their fire protection districts. The Refuge staff is actively pursuing interagency agreements with these departments some of which have existing cooperative agreements with the Bureau of Land Management.

Fire Program Analysis Participation

Deer Flat NWR is a chartered member of the Southwest Idaho Wildland Fire Cooperative Fire Planning Unit formed to support and contribute to the development of landscape scale interagency fire planning and budgeting as directed by national fire policy and the Office of Business Management. Cooperating agencies in the fire planning unit are the Boise and Payette National Forests, Boise District Bureau of Land Management, Idaho Department of Lands Southwest Idaho Supervisory Area, and Southern Idaho Timber Protective Association.

Idaho State Fire Plan Working Group

The Idaho State Fire Plan Working Group (ISFPWG) is a multi-agency collaborative body charged with assisting counties with their County Wildfire Protection Plans and their associated countywide working groups, dissemination of information, and oversight and prioritization of grant assistance programs in order to facilitate the implementation of the National Fire Plan in Idaho. The Regional Fire Outreach Coordinator housed at the Refuge represents the FWS as a part of this group. They participate in

ISFPWG subcommittees as appropriate. Subcommittees include those focused on fire education, restoration, and communication to promote state-wide projects and emphasis items.

County Wildfire Protection Plan
Canyon County has developed a County Wildfire Protection Plan (CWPP) that identifies potential fuel reduction opportunities in the area. As part of Canyon County, Deer Flat NWR is mentioned in the plan. The CWPP is posted at this website Idaho Department of Lands CWPP.

Treasure Valley Fire Prevention and Safety Cooperative
Deer Flat NWR is an active member of the Treasure Valley Fire Prevention and Safety Cooperative partnering with the Boise National Forest, Boise District Bureau of Land Management, Idaho Department of Lands, State Fire Marshal's Office, and the city fire departments of Caldwell, Nampa, Meridian, and Boise. The mission of the Cooperative is to promote an interagency exchange of ideas and resources to deliver consistent messages to the public about fire education topics.

Bureau of Reclamation
A memorandum of understanding (MOU) exists between the Refuge and the Bureau of Reclamation (BOR) to outline joint responsibilities for the operation and management of the lands and waters within the Lake Lowell Fire Management Unit at the Refuge. This MOU can be found on file at the Refuge headquarters.

3.0 Fire Management Unit Characteristics

A fire management unit (FMU) is an area that shares common objectives, physiological/biological/social characteristics and constraints, that result in desired conditions as stated in land management plans (i.e., CCP, HMP), which set it apart from the characteristics of an adjacent FMU.

Considering fire history and occurrence the wildland fire program complexity at Deer Flat NWR is moderate. The CCP for Deer Flat NWR is currently under development and when completed will further define future desired conditions for the refuge. In the interim this FMP will identify the Lake Lowell area of the Refuge as one FMU and the Snake River Islands as the other FMU.

3.1 Area Wide Management Considerations

The following sections addresses management considerations for the FMUs including fire management objectives, constraints, fuels, fire regime and condition classes, standards, fire potential of major vegetation types, and burned area rehabilitation.

3.1.1 Management Goals, Objectives and Constraints from CCP's and other Planning Documents

The CCP process for Deer Flat NWR is currently in the planning/development phase; management goals and objectives were obtained from draft planning documents. The following general fire management goals and objectives have been developed by refuge staff and regional biologists in the interim.

To the extent practicable, use prescribed fire in conjunction with water management, grazing, mowing, and/or other mechanical manipulations and chemical applications, on emergent wetland, woody riparian, herbaceous upland and/or wet meadow vegetation, in order to provide desirable vegetation species composition and/or structure, including, but not limited to:

Goals

- Maintain and protect lacustrine habitats associated with Lake Lowell.
- Enhance, maintain, and protect riparian forest benefiting migratory birds and other riparian-dependent species.
- Enhance, maintain, and protect wetland habitats for the benefit of migratory birds and other wildlife.
- Enhance, maintain, and protect shrub steppe habitats characteristic of the area.
- Protect agricultural crop areas which provide support to migrating waterfowl and resident wildlife as well as providing fuel breaks.
- Gather scientific information (inventories, monitoring, research, and assessments) to support adaptive management decisions under objectives for Goals 1-6.

Objectives

- Use mechanical, physical, biological, and chemical means to eradicate, control or contain invasive plants, woody species, and shrubs such as Russian olive, salt cedar, and scotch thistle.
- Enhance, maintain, and protect riparian forests through use of prescribed fire, mechanical or chemical treatment.
- Enhance, maintain, and protect emergent wetlands through use of prescribed fire, mechanical or chemical treatment to result in 30-70 percent of a mosaic of desired native emergent vegetation including cattail, bulrushes, sedges, rushes, smartweeds, and wild millet to support a diverse assemblage of wetland-dependent wildlife and birds.
- Enhance, maintain, and protect shrub steppe through use of prescribed fire, mechanical or chemical treatment to create a mosaic of shrubs and herbaceous understory.
- Monitoring activities will be conducted to evaluate achievement of objectives for prescribed fire, mechanical or chemical treatments as appropriate.
- Rehabilitation of burned areas will take place to reduce the infestation of invasive species, to protect water quality, and to restore native sagebrush steppe habitat.

3.1.2 Management Goals, Objectives and Constraints from other Sources

The following operational standards are pertinent to the Refuge, as found in the FWS manual (095 FW 3):

- Manage fire suppression to minimize risks to firefighter and public safety.
- An initial action and an appropriate management response are required for every wildfire on or threatening refuge lands.
- The range of appropriate management responses to wildfires may include direct or indirect attack of high and/or low intensities or surveillance and monitoring to ensure fire spread will be limited to a designated area.
- Reduce and maintain fuels in WUI areas to provide for public and firefighter health and safety.
- Reduce and maintain fuels in non-WUI areas to provide for firefighter health and safety and to protect habitats critical to endangered species, migratory birds, and ecosystem integrity.
- Use prescribed fire as a tool to restore ecosystem integrity and endangered species habitat.
- Prepare and implement an effective fire prevention plan to minimize unwanted fires.
- Investigate all unplanned human-caused fires.
- Retardants and foams will not be used within 300 feet of any waterway.
- Minimize and, where necessary, mitigate human-induced impacts to resources, natural processes, or improvements attributable to wildland fire activities.
- Ground disturbed by suppression activities will be rehabilitated.

- Heavy equipment use will be closely monitored to minimize impacts on cultural resources.
- Heavy equipment use will be closely coordinated with the Refuge Manager or resource advisor to limit habitat damage. Due to soft ground conditions many areas of the refuge are unsuitable to heavy equipment usage.
- Prevent the further spread of invasive plants.
- Maintain close working relationship with interagency partners to accomplish wildland fire suppression and prescribed fire treatments.
- Maintain Intergovernmental Agreements with interagency partners for dispatch services.
- Promote public understanding of refuge fire management programs and objectives.

3.1.2.1 Cost Effectiveness

Maximizing the cost effectiveness of any fire operation is the responsibility of all involved, including those that authorize, direct, or implement those operations. Cost effectiveness is the most economical use of the resources necessary to accomplish project/incident objectives. Accomplishing these objectives safely and efficiently will not be sacrificed for the sole purpose of "cost saving". Care will be taken to ensure that expenditures are commensurate with values to be protected. Many factors outside of the biophysical environment may influence spending decisions, including those of the social, political, and economic realms. The following tools will be used to provide information to make the most cost effective decision possible:

- Employ state-of-the-art decision support tools
- Provide a clear description of Refuge objectives in this Fire management Plan to aid in alternative development
- Through cost-share agreements, distribute the decision process to all parties involved in wildland fire management

3.1.3 Common Characteristics of the Fire Management Units

Climate and Topography

The entire Refuge is influenced by its location in the Snake River Valley. Elevation at the visitor center is about 2,550 feet above sea level with an average rainfall between 8 and 11 inches. During the summer the climate is generally arid with little rainfall between May and October. Temperature extremes can range from minus 25 degrees to 110 degrees Fahrenheit. The growing season averages six months. Winds tend to follow the orientation of the valleys with an occasional destructive wind blowing due to the passing of a cold front or thunderstorm.

The FMUs share similar topography with rolling sagebrush hills scattered along relative flat areas.

Deer Flat NWR Climate

	Spring	**Summer**	**Fall**
Average Max Temp (F)	65	91	66
Average Min Temp (F)	37	54	36
Average Mean Relative Humidity (%)	50	37	47
Average Min Relative Humidity (%)	26	17	26

Normal Fire Season

Due to the arid conditions of this area, fires can occur almost any month of the year. The majority of the fires have occurred during June to August time frame. Most fires are human-caused due to high visitor use.

Fire History

From 1997 to 2007 the Refuge has experienced 30 wildfires for a total of 320 acres. The majority and largest fires have occurred in the sagebrush steppe habitat with a few occurring in the dense riparian area next to Lake Lowell. The majority of all of the fires recorded on the Refuge have been human-caused. Fire frequency on the Refuge has ranged from 16 fires in one year (1977) to a gap of five years without a fire (from 1951 to 1956). See fire history spreadsheet in Appendix E.

Wildlife Species

The Refuge is a major waterfowl wintering area in southwest Idaho and eastern Oregon. In spring and summer, water is released from Lake Lowell to irrigate surrounding farm fields. This draw-down of the lake exposes mud flats that provide abundant habitat for shorebirds. The lake also produces a bumper crop of aquatic vegetation for birds to feed on, particularly smartweed. In fall, smartweed seeds provide a feast for migratory ducks heading south. In winter, Lake Lowell is home to as many as 150,000 ducks and 15,000 Canada geese, and to the many bald eagles and other raptors attracted to the bounty provided by the large flocks of waterfowl. The refuge also has marsh areas where the water is manipulated to provide feeding, nesting, and resting habitat for mallards, sora rails, yellow-headed blackbirds, and other wildlife.

Habitats surrounding the lake include riparian forest, shrub-steppe uplands, and crops. The riparian forest is predominantly cottonwood, peachleaf willow, and coyote willow. These forested areas provide food, nesting sites, and cover from predators for a variety of tree-dependent species, including a variety of song birds.

Sagebrush, rabbitbrush, and the bunchgrass Great Basin wild rye dominate the uplands near the lake and on the islands. Herbivores like rabbits, gophers, mule deer, and grasshoppers, feed on upland plants and rely on those plants for nesting sites and cover. Approximately 240 acres of refuge land is irrigated cropland managed to provide food and cover for wildlife.

Local farmers grow corn, beans, peas, wheat, and alfalfa. The farmers keep a share of the crop and leave the rest for wildlife. Pheasants, deer, quail and other wildlife feed and nest in these fields. In fall and winter, local Canada geese, as well as migrant geese and other waterfowl from the north, harvest the abundant food available in refuge fields.

Other species occurring on the refuge include red-tailed hawks, northern harriers, American kestrels, great-horned owls, western screech owls, long-eared owls, and northern saw-whet owls Kestrels, screech owls, and saw-whet owls use wood duck nest boxes extensively for their nesting and winter roosting. The Refuge also has a resident mule deer population. Other refuge resident mammals include red fox, coyote, raccoon, badger, muskrat, fox squirrel, cottontail rabbit, and various small rodents. Beaver use the area along the New York Canal with numerous bank dens but the population is very small. On occasion river otters are sighted on the lake.

The 101 islands of the Snake River FMU are distributed along 113 river miles between the Canyon-Ada County line in Idaho and Farewell Bend in Oregon. The islands provide a variety of habitats, including areas dominated by grasses and sagebrush. The Snake River Islands provide an important nesting habitat

for Canada geese, ducks, herons, shorebirds, gulls, cormorants, and various songbirds. The islands are open to public use with the exception of a closure from February 1 to May 31, to protect nesting birds.

No currently listed threatened or endangered species are known to inhabit the Refuge although rare and sensitive species such as Bald Eagles, utilize the refuge. These species can be especially sensitive to disturbance during their nesting seasons.

Water Quality

Migratory birds and the aquatic life that inhabit the Refuge rely on healthy water. Any use of fire suppression chemicals such as foam or fire retardant will comply with the standards outlined in Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations.

Water quality could also be affected by run-off and sediments which could result from an intense burn on a slope followed by precipitation.

Prescribed Fire & Mechanical History

Prescribed fires have not been conducted at the Refuge in the last 10 years due to concerns with smoke management, proximity to wildland urban interface, and the lack of fire personnel on site. However, 18 mechanical treatments for 1,002 acres have been completed at Deer Flat during the last decade on the Lake Lowell FMU (Appendix E). Treatments include mastication in riparian forests, Russian olive tree removal and chipping, and disking firelines. 11.5 miles of firelines are annually disked to reduce the potential risk of wildfire spreading off of the refuge. The disk lines have been tested during wildfire incidents in the past ten years and have been a key factor during suppression efforts. Mechanical and prescribed burn treatments have been proposed for the Snake River FMU although none have been completed.

Vegetation

The vegetation/habitat for the Refuges is described in the individual FMU characteristics with acreage and percentages. Vegetation types can be generally described as grasslands (FM 1/3), and shrub (FM 2/6), and forest (FM 8/10).

Fuel Model 1: Agricultural field.

Fuel Model 1: Grassland.

Fuel Model 1: Lacustrine emergent.

Fuel Model 2: Sagebrush and grass.

Fuel Model 3: Emergent.

Fuel Model 6: Sagebrush.

Fuel Model 6: Willow.

Fuel Model 10: Cottonwood forest.

Fire Behavior

Fire behavior outputs in the table below were from the BehavePlus 3.0.2 program. In this model, fires are assumed to be spreading as a series of steady state ignitions through uniform fuels under uniform weather conditions. Spread is also assumed to be from surface fire only. The fire behavior outputs are modeled to represent a potential summer fire (July/August). Weather data used in the modeling is 20 year data from the Boise South RAWS station (102601) located at the Boise Airport. Weather inputs to the BehavePlus runs: July, Temp 70-89, RH 11-38, 1-hr fuel moisture/FDFM 2/5%, 10-hr fuel moisture 7%, 100-hr fuel moisture 8%, live herbaceous moisture 78%, live woody moisture 79% wind speed 5/15 mph, time of day 1400, slope 0-5%.

Fire Behavior Outputs by NFFL Fuel Models

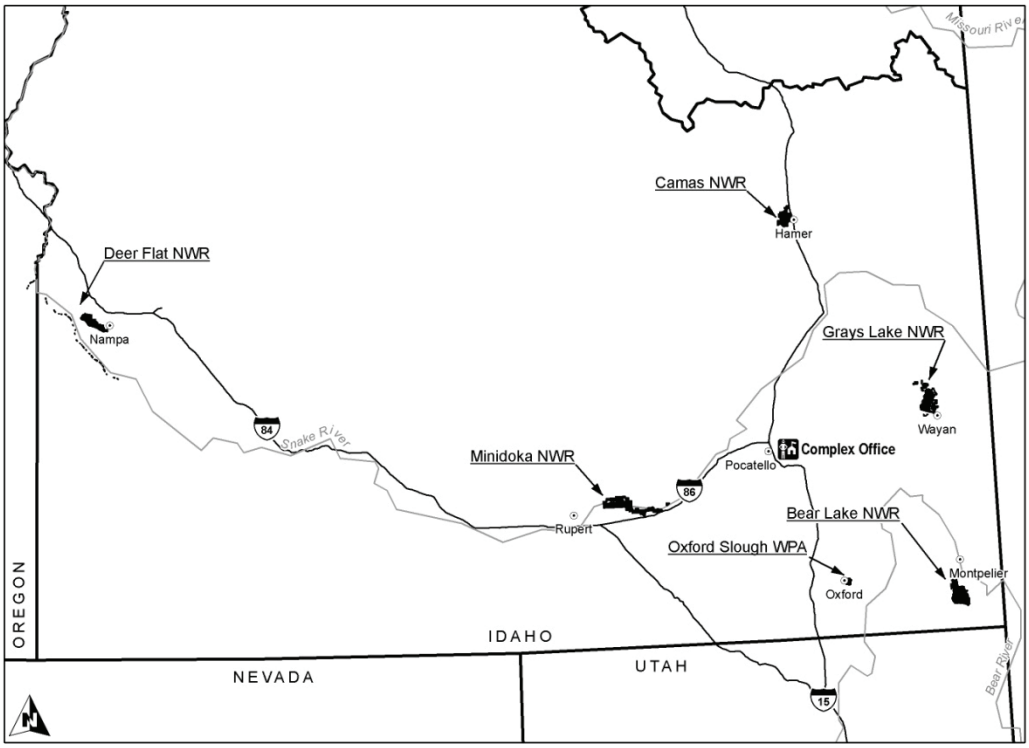
Fuel Model	Rate of Spread (ch/hr)	Flame Length (ft)
1	99-665	4-12
2	34-314	6-18
6	36-207	6-15
8	2-10	1-3
10	10-55	5-13

3.2 Fire Management Units

Fire Management Units (FMUs) are areas which have common wildland fire management objectives and strategies, are manageable units from a wildland fire standpoint, and can be based on natural or manmade fuel breaks. There are two FMUs at Deer Flat NWR.

Fire Management Units

FWS Fire Management Units within the FMP	Total Acres	Burnable Acres
Lake Lowell	10,548	5,039
Snake River Islands	1,220	1,220
Totals	11,768	6,259



3.2 Lake Lowell Fire Management Unit

3.2.1 Lake Lowell FMU Characteristics

Deer Flat National Wildlife Refuge was established in 1909 as a resting and breeding ground for migratory birds and other wildlife with an emphasis on wintering waterfowl. The Lake Lowell FMU is located in the state's largest metropolitan area, the Treasure Valley, which creates a complex situation for fire managers. This FMU lies entirely in Canyon County which has a rich history in farming and agricultural activities. In recent years, population and urbanization are increasing rapidly with agricultural areas being developed throughout the county. County managers anticipate an average annual increase in population of 5.5 percent over the next several years. Much of the Refuge is bordered by private property with homes and outbuildings directly adjacent to refuge land resulting in a wildland urban interface situation raising concerns about managing fire on the Refuge. The potential for a fire to burn off of the Refuge onto private property must be considered during all fire activities at Deer Flat NWR. Four fire departments have jurisdictional responsibility for this private land (Appendix A).

The habitats in the Lake Lowell FMU include wetlands (lacustrine and emergent), cottonwood and willow forests, shrub steppe uplands, and cultivated agricultural areas, (see table below).

Fuel Model Composition Lake Lowell FMU

Vegetation Type	Fuel Model	Acres	Percent
Cultivated Agricultural Land	FM 1	328	2.5%
Lacustrine, Emergent Wetland	FM 1	1,248	12%
Emergent Wetland	FM 3	43	.04%
Cottonwood Forest	FM 8/10	1,131	11%

Willow Forest	FM 6	1,152	11%
Shrub Wetland	FM 6	342	3.2%
Shrub steppe Upland	FM 6	762	7%
Lake Lowell open water		5,480	52%
Administrative sites		62	.05%
Total		**10,548**	100

3.2.2 Lake Lowell FMU Fire Environment

All fire operations in the Lake Lowell FMU must consider the wildland urban interface situation which exists. A thorough safety and risk management analysis must be completed to ensure firefighter and public safety.

With the number of visitors the Refuge gets annually, the presence of the public is almost certain during fire operations. The traffic and other considerations must be considered when making tactical decisions.

Mainly due to the invasion of non-native cheatgrass, the shrub steppe upland vegetation around the Refuge has a history of frequent, fast moving intense fires. The heavy down/dead fuel loading in the Cottonwood Forest surrounding Lake Lowell has posed control and mop-up problems during past wildfire incidents.

Along the shore of the lake, a band of debris or organic layer exists that can complicate mop-up efforts with long term smoldering requiring lots of water to extinguish. The band is affected by the level of the water in the lake. As the lake level goes up the layer of organic matter may be submerged. As the lake level goes down particularly in summer/fall when water levels are low, the band may require consideration.

3.2.3 Lake Lowell FMU Objectives and Constraints

- Due to concerns with the wildland urban interface situation around Lake Lowell, wildfires in this FMU will be aggressively suppressed.
- Hazardous fuels treatments will be applied where appropriate; mechanical treatments will be considered over prescribed burning to limit the smoke impacts to the valley.
- The waterfowl nesting season at the Refuge ranges from mid-April to late summer. Prescribed fire and mechanical fuel reduction treatments will not usually take place during this time to avoid disturbing nesting habitat.
- Downed and standing dead trees will be protected when feasible to provide nesting and foraging habitat for migratory birds.
- Firebreaks, disk lines, or native plant vegetated areas (greenbelts) will be created and/or maintained to mitigate the risk of wildfire moving into areas of concern such as the wildland urban interface or rare and sensitive habitats.
- Prescribed fire, mechanical treatment (disking, moving, etc.), or chemical treatment will be used to set back succession or to remove extensive emergent stands.

3.2.4 Lake Lowell FMU Values to Protect

- High priority will be given to any wildfire on the Refuge threatening private property. The Federally designated Community at Risk of Caldwell, Nampa, and Marsing are adjacent to the Refuge.

- Sagebrush/grassland habitats located on the north side of the Refuge.
- Sensitive areas of the Refuge are the riparian habitat along Lake Lowell.
- Cultural resource sites (documented at refuge headquarters).
- Refuge structures scattered along the north shore of the lake including refuge headquarters, residences, maintenance area, etc.

3.3.1 Snake River Island FMU Characteristics

The Snake River Islands FMU, which includes over 100 islands, is spread over 113 miles of river. The islands range in size from less than an acre to over 50 acres, with total acreage of 1,220 acres. Islands within the Snake River are the primary nesting area of southwest Idaho's "local/resident" Canada goose population. Geese nest on nearly all of the refuge islands.

A wide variety of raptors use the islands throughout the year including American kestrel, great horned owl, long-eared owl, northern harrier, osprey, screech owl, barn owl, saw-whet owl, prairie falcon, red-tailed hawk, and turkey vulture.

Islands in this FMU vary greatly in their vegetative cover. Islands at the upstream end are fairly open in the middle and are dominated by shrubs such as sagebrush and greasewood. Islands in the downstream section are more heavily vegetated with some large stands of cottonwood with an open grassy middle. All of the islands have some willow invasion along their edge depending upon the amount of river washing. Russian olive is also an aggressive invader on many of the islands. A vegetation acreage break down for this FMU is not available, vegetation/fuel models present include FM 1,2,6,8.

3.3.2 Snake River Island FMU Fire Environment

Access to and from any fire operation on one of the Snake River Islands will have to be made by boat or helicopter which could slow response time or make determining a safety zone before approaching the fire critical.

Consideration must also be given to the proximity to the mainland and expected fire behavior. In one known case, a fire has spotted from one of the islands to the mainland near Marsing. Historically, the shore has been sparsely populated with private structures, but development has increased and the number of homes has increased creating more concern should a fire ignite.

3.3.3 Snake River Islands FMU Objectives and Constraints

- The full range of appropriate management response (AMR) will be considered to any unplanned ignition; however, due to island being surrounded by water and access problems the suppression strategy typically will be a limited perimeter control strategy. A more aggressive strategy will be used if the fire spots off the island onto the shore and poses a threat to values to protect.
- Use prescribed fire, mechanical, and/or chemical manipulation to enhance habitat where appropriate.
- Any mechanical or prescribed fire treatment completed will have to be followed up with chemical treatments to limit the spread of invasive vegetation.
- The waterfowl and raptor nesting season at the refuges ranges from mid-April to late summer. Prescribed fire and mechanical fuel reduction treatments will not usually take place during this time to avoid disturbing nesting habitat.
- Downed and standing dead trees will be protected when feasible to provide nesting and foraging habitat for migratory birds.

3.3.4 Snake River Islands FMU Values to Protect

- Habitat for water fowl nesting.
- River bank private property.

4.0 Wildland Fire Operational Guidance

The procedures used to *implement* the fire management plan (FMP) for Deer Flat NWR are covered in this section. Information pertaining to this management is either directly provided or references are cited as to where it may be located.

USF&WS wildland fire management policy states that every wildland fire will be assessed following a decision support process that examines the full range of appropriate management responses (AMR).

This policy also provides that wildland fires may be managed for one or more objectives based on land and resource management plan direction. When two or more wildland fires burn together they will be managed as a single wildland fire and may also be managed for one or more objectives based on land and resource management plan direction as an event moves across the landscape and fuels and weather conditions change.

As stated before, the purpose of fire suppression is to put the fire out in a safe, effective, and efficient manner. Fires are easier and less expensive to suppress when they are contained to small areas on the Complex. Thus, the following procedures will be followed for all wildland fires to ensure optimum resource protection and firefighter safety.

4.1.1 Appropriate Management Response

Evaluation and selection of an appropriate management response to a wildfire will include:

- Consideration of risks to public and firefighter safety.
- Threats to the values to protect.
- Costs of various mitigation strategies and tactics.
- Potential resource benefits.

Wildfires will be staffed or monitored during active burning periods as needed to ensure that appropriate mitigation actions can be made to protect values threatened.

All wildfires will be supervised by a qualified incident commander (IC) whose responsibility is to:

- Assess the fire situation and make a report to dispatch as soon as possible.
- Use guidance in this FMP or a delegation of Authority to determine and implement an appropriate management response.
- Determine organization, resource needs, strategy and tactics.
- Brief incoming and assigned resources on the organization, strategy and tactics, weather and fire behavior, LCES (lookouts, communication, escape routes, and safety zones) and radio frequencies.
- Order resources needed for the AMR through the designated dispatch office.
- Manage the incident until relieved or the incident is under control.

The FMP and a Delegation of Authority can provide a general strategy to an IC, who has discretion to select and implement appropriate tactics within the limits described for the FMU(s), including when and

where to use minimum impact suppression tactics (MIST) unless otherwise specified. All resources, including mutual aid resources, will report to the IC (in person or by radio) and receive an assignment prior to tactical deployment.

Critical protection areas, such as refuge headquarters, neighboring residences and ranches, and adjacent private croplands, will receive priority consideration in fire control planning efforts. In all cases, the primary concerns of fire suppression personnel shall be the safety, and if needed, all individuals not involved in the suppression effort may be evacuated.

General AMR Constraints

- Close proximity to private property and residences, (WUI and Communities at Risk).
- Lack of a cultural resource inventory. Limited cultural resource surveys have been completed at the refuge, (completed surveys are on file at the refuge office).
- Soft ground/moist-soil conditions which preclude the use of conventional fire equipment.
- Tracts of continuous vegetation, lack of adequate fire/fuel breaks, and lack of interior and boundary refuge roads.

Interagency Operations

As mentioned in 2.3.2 the Refuge coordinates with the BLM in fire management operations. The Refuge coordinates with this agency for dispatch services through Boise Interagency Logistics Center. Any wildfire AMR actions would be coordinated through the appropriate dispatch centers with neighboring federal agencies.

4.1.2 Preparedness

Deer Flat NWR is not funded for a dedicated fire crew. The Regional Fire Education Specialist is currently stationed at the refuge ½ time and may be available to coordinate initial attack activities. The FWS has an Intragovernmental agreement with Boise BLM for initial attack fire response. The SE Idaho NWRC FMO and Deer Flat NWR Project Leader will meet with federal and local cooperators (BLM and Nampa Fire Department) annually prior to fire season, to review the respective agreements. This may include contact information and fire suppression policies and procedures.

The normal fire season for the refuge was discussed in section 3.1.3; prior to and during fire season the following tasks will be implemented and completed.

- The Complex FMO will work with the Refuge Project Leader to update Delegations of Authority with suppression constraints.
- Fire qualified personnel work with the Complex FMO to schedule annual medical examinations prior to the start of fire season.
- Fire qualified personnel will complete fitness testing, complete the annual refresher, and are issued full personal protective equipment (PPE) prior to the start of fire season.
- Prior to fire season the Refuge step-up plan will be reviewed by the Complex FMO and the Refuge Project Leader; the plan will be implemented during fire season according to daily fire weather forecasts.

Annual Refuge Fire Readiness Activities

Activities – Complete before end of month	J	F	M	A	M	J	J	A	S	O	N	D
Update Interagency Fire Agreements/AOP's		*x*										
Winterize Fire Management Equipment										*x*		
Inventory Fire Engine and Cache			*x*									
Update Delegation of Authority			*x*									
Annual Fire Physical		*x*										
Annual Refresher Training			*x*									
Annual Fitness Testing			*x*									
Review and Update Fire Management Plan				*x*								

Supplies and Equipment
Deer Flat NWR maintains a small fire cache at the shop for use on fires including tools, nomex, pumps, and water handling equipment. Prior to the fire season all refuge fire suppression equipment will be inspected to determine readiness. All equipment will be brought to a duty ready status. Equipment will be checked to ensure the refuge has enough gear to meet the normal unit strength requirements.

Communications
The Refuge utilizes BLM communications systems, including repeaters and radio frequencies for fire operations. The FWS has a radio frequency use MOU with the Idaho State BLM which is included in Appendix F. Canyon County Fire Radio Frequencies are included in Appendix G.

4.1.3 Detection
The fire detection system relies on reports of fires by the public, law enforcement agencies and refuge staff. Regardless of how any fires are discovered they need to be reported to the Refuge Project Leader, Complex FMO, and Boise Dispatch (384-3400) immediately so suppression actions can be started without delay. Information for fire size-up/information to be provided to Boise Dispatch Center can be found in the Initial Attack Size Up document in Appendix G.

4.1.4 Dispatch, Initial Response, and Initial Attack
The Refuge is a cooperator in the response area for the Boise Dispatch Center. Mobilization of fire resources to and from the Refuge is handled through Boise Dispatch.

As stated above (Appendix F), the Boise District Bureau of Land Management will provide primary initial attack services for Deer Flat NWR. Initial attack shall include a determination of fire cause. The Project Leader will coordinate with Boise Dispatch for the need for further fire investigation. The Zone Law Enforcement Officer will also be informed of any suspected human-caused fire.

All fire communications will operate on the assigned frequencies located in Appendix F.
Upon discovery of a fire, all subsequent actions will be based on the following:

- The Project Leader or designee will provide the IC with a Delegation of Authority.
- The Incident Commander (IC) will locate, size-up, and coordinate suppression actions. The IC will start the Incident Organizer to document actions, fire behavior and weather conditions.
- Provide for firefighter and public safety.
- Considering the current and predicted fire conditions, the IC will assess the need for additional suppression resources and estimate the final size of the fire. The potential for spread outside of the refuge should be predicted, as well as the total suppression force required to initiate effective containment action at the beginning of each burning period.
- The IC will assess the need for law enforcement personnel for traffic control, investigations, evacuations, etc. and make the request to the dispatch center.
- Document decisions in the Incident Organizer and provide the FMO a copy after the incident is out.
- Should a wildland fire move into an extended attack the IC will coordinate with the Refuge staff and Boise Dispatch Center to complete a Wildland Fire Decision Support System

4.1.5 Extended Attack and Large Fire Management

The Wildland Fire Decision Support System (WFDSS) process will be used when a wildfire escapes initial attack. The refuge staff will request assistance from the Regional Office fire management staff or BLM partners to prepare the analysis.

Extended attack fires will be managed in accordance with the Interagency Standards for Fire and Aviation Operations (Redbook).

4.1.6 Aviation Operations

Aircraft may be used in all phases of fire management operations. All aircraft must be National Business Center Aviation Management Directorate or Forest Service approved. Air operations at Deer Flat NWR will be coordinated through Boise Dispatch Center and must adhere to all DOI aviation policy.

4.1.7 Reviews and Investigations

Reviews and investigations are used by wildland fire and aviation managers to assess and improve the effectiveness and safety of organizational operations. Brief descriptions of various reviews and associated procedures and requirements, including those for serious wildland fire accidents, entrapments, and fire trespass are listed in the corresponding Red Book chapter.

Incident Commanders and Single Resource Bosses will ensure After Action Reviews (AAR) take place in a timely manner and that any significant issues are brought to the attention of the Complex FMO and Refuge Project Leader.

4.1.9 Reports

The Complex FMO or designee will complete and file an Individual Fire Report (DI-1202) in the FWS Fire Management Information System (FMIS) for the following types of fires within 10 days of a fire being declared out:

- All wildfires on FWS and FWS-protected lands.
- Wildfires threatening our lands on which we take action.

- All escaped prescribed fires. When a fire exceeds and cannot be brought back into prescription, it will be declared a wildfire. A separate new report will be filed to report acres burned by the wildfire from the time of declaration to the time of being declared out.
- All false alarms responded to by Refuge fire staff.

4.2 Hazardous Fuels Management

All prescribed fire treatments on the Refuge will follow guidance outlined in the Interagency Standards for Fire and Fire Aviation Operations (chapter 17) and the Interagency Fire Planning and Implementation Procedures Reference Guide. See 3.1 for specific prescribed fire objectives.

4.2.1 Prescribed Fire program for Hazardous Fuels and Habitats

The overall objective in the use of prescribed fire in refuge resource management will be to reduce hazard fuels and to promote habitat diversity. Refuge staff will carefully analyze the needs of hazardous fuels reduction in each FMU in relation to habitat objectives on the refuge. Variables to be considered in each proposed treatment area include previous treatments, vegetation type, endangered species, and hazardous fuels reduction.

The prescribed fire program activities at the Refuge qualify as categorical exclusions consistent with Departmental NEPA regulations at 43 CFR 46.210, 43 CFR 46.205,and Departmental NEPA procedures at 516 DM 8.

4.2.1.1 Program Overview

Prescribed fire can be a useful tool for restoring and maintaining natural conditions and processes at the Refuge. Research burning may also be conducted when determined to be necessary for accomplishment of research project objectives. The goals of prescribed fire are for hazard fuel reduction and to meet resource management objectives. Specific management needs for the Refuge will be determined annually by the Refuge staff and Complex FMO. Burn objectives, fire frequency rotation, firing methodology, and prescriptions will vary from year to year. Burn plans will be updated to reflect any variations. The Refuge Project Leader will approve prescribed fire plans after review of the plan by the Complex FMO.

Due to the proximity to the wildland urban interface and smoke concerns, no prescribed fire treatments have been implemented at the Refuge in the last 10 years. Prescribed fire can be a viable habitat treatment tool for the refuge if smoke and WUI issues are properly mitigated.

The prescribed burn window for the Refuge is generally late-fall to early-Spring. This can depend on the loading and type of vegetation being burned. Detailed prescribed burn plans will be developed for each planned treatment which will address fuel loading, weather conditions, adjacent properties, and potential smoke concerns. Specific FMU hazardous fuels objectives and history is described in chapter 3.

Some specific objectives for the Refuge program include:

- Conduct a vigorous hazardous fuels reduction program with the highest professional and technological standards
- Identify the hazardous fuels reduction method most appropriate to specific situations and areas
- Efficiently accomplish resource management objectives through the application of prescribed fire, mechanical, and chemical fuel reduction methods
- Continually evaluate the hazardous fuels reduction program to better meet program goals by refining prescriptions treatments and monitoring methods, and by integrating applicable technical and scientific advancements

4.2.1.2 Effect of National and Regional Preparedness Levels

Prescribed fires may be ignited during National Preparedness Level 4 or 5 as specified in the National Interagency Mobilization Guide. The normal prescribed burn window for the Refuge is early spring and late fall; national and regional preparedness levels are low at this time of year.

4.2.1.3 Project Planning

The FMO will coordinate with the Project Leader to identify high priority fuels treatment projects. All prescribed fire treatments on the Refuge will follow guidance outlined in the Interagency Fire Planning and Implementation Procedures Reference Guide.

All prescribed fires will have prescribed burn plans. The prescribed burn plan is a site specific action plan describing the purpose, objectives, prescription, and operational procedures needed to prepare and safely conduct the burn. The treatment area, objectives, constraints, and alternatives will be clearly outlined. The required burn plan elements are outlined in the Interagency Fire Planning and Implementation Procedures Reference Guide and will be included in all Refuge burn plans.

The Prescribed Fire Plan Preparer will conduct a field reconnaissance of the proposed burn location with the Project Leader to discuss objectives, special concerns, and gather all necessary information to write the burn plan.

Every Prescribed Fire Plan must receive a technical review. The Technical Reviewer and Prescribed Fire Plan Preparer must be qualified or have been previously qualified as a Prescribed Fire Burn Boss at an experience level equal to or higher than the complexity being reviewed. The Technical Reviewer must be someone other than the primary preparer of the plan. An off-unit technical review is encouraged to provide an additional independent perspective. It is acceptable for other specialists to review certain portions of the plan however; a primary Technical Reviewer must be designated as technical review signatory. Either the Prescribed Fire Plan Preparer or Technical Reviewer must be currently qualified, less physical fitness requirement.

The Project Leader has final approval authority for all Prescribed Fire Plans, unless special circumstances warrant higher review and concurrence (such as may occur during higher Preparedness Levels or for extremely large, complex projects). Although the Project Leader has final approval authority for the Prescribed Fire Plan and the "GO/NO-GO" checklist, the Prescribed Fire Burn Boss has the responsibility to make the on-site tactical decisions to safely complete the project. The Prescribed Fire Burn Boss ensures that all prescription, staffing, equipment, and other plan specifications are met before, during, and after the prescribed fire.

4.2.1.4 Project Implementation

Execution of prescribed burns will only be undertaken by qualified personnel. The Prescribed Burn Boss will fill all required positions to conduct the burn with qualified personnel. All personnel listed in the burn plan must be available for the duration of the burn or the burn will not be initiated.

Weather information from the National Weather Service, RAWS station, and other local weather stations will be monitored by the burn boss the week before planned ignition to determine if suitable conditions exist for project completion. A spot weather forecast will be requested, (via the internet) from the Boise NWS office for each day of planned ignition. The burn boss or designee will monitor onsite weather every 2 hour during unit ignition.

When all prescription criteria are within the acceptable range, the Prescribed Burn Boss will select an ignition time based on current and predicted weather forecasts. The Burn Boss will
Ensure that the Agency Administrator GO/NO-GO Checklist is valid and complete and sign the Prescribed Fire GO/NO-GO Checklist the morning of planned ignition.

A thorough briefing will be given by the Prescribed Burn Boss and specific assignments and placement of personnel will be discussed, (using briefing outline in Prescribed Fire Plan). A spot weather forecast will be obtained on the day of ignition and all prescription elements will be rechecked to determine if all elements are still within the approved ranges. If all prescription elements are met, a test fire will be ignited to determine on-site fire behavior conditions as affected by current weather. If conditions are not satisfactory, the test fire will be suppressed and the burn will be rescheduled. If conditions are satisfactory the burn will continue as planned.

A prescribed fire must be declared a wildfire by those identified in the burn plan when that person(s) determines that the contingency actions have failed or are likely to fail and cannot be mitigated. An escaped prescribed fire must be declared a wildfire when the fire has spread outside the project boundary, or is likely to do so, and cannot be contained by the end of the next burning period. A prescribed fire can be converted to a wildfire for reasons other than an escape. An appropriate management response will be made to such incidents and a formal analysis (WFDSS) undertaken when needed. The Project Leader will be notified of an escaped prescribed fire.

The public will be informed of upcoming planned prescribed fires through press releases in local newspapers. Neighbors to the refuge will be called and local law enforcement agencies and fire departments will be call and informed of the burn before planned ignition. Notification calls will be documented and saved in the Prescribed Plan file.

4.2.1.5 Smoke Management

The US Fish and Wildlife Service in south Idaho participates in the Montana/Idaho Airshed Group. The group members include all of the federal agencies, state land management agencies, and private forest products companies. The intent of the Airshed Group is to limit negative impacts from prescribed burns through scientific monitoring of weather conditions and formal coordination of burns.

Prior to the burn season the Fire Management Officer submits a list of planned burn projects to the Missoula Monitoring Unit via internet. This information creates a data base describing the type of burn, number of acres in each unit, and unit location and elevation. Each burn unit is assigned an identification number. The day before the planned ignition, the burn boss accesses the internet data base to submit a proposed prescribed burn for the following day. The program coordinator and a meteorologist provide timely restriction messages for airsheds with planned burning.

The Missoula Monitoring Unit issues daily decisions which can restrict burning when atmospheric conditions are not conducive to good smoke dispersion. Restrictions may be directed by airshed, elevation or by special impact zones around populated areas. The burn boss will access the daily decision notice from the monitoring unit via the internet. Prescribed burn projects will not be conducted if the Missoula Monitoring Unit posts a burning restriction for the airshed in which the refuge is located.

Deer Flat NWR is located in the Treasure Valley which is a non-attainment area for air quality, (Ozone and PM 2.5). Any prescribed fire treatments conducted will take special consideration for the non-attainment area. Critical and other smoke sensitive areas will be addressed with more detail in each burn plan. See Non-Attainment Map in Appendix A.

4.2.1.6 After Action and Escaped Fire Reviews

The Burn Boss will ensure an informal After Action Review (AAR) is conducted for each operational period on a prescribed fire.

All prescribed fires declared a wildfire will have an investigative review initiated by the Project Leader. The level and scope of the review will be determined by policy and procedures of the Interagency Standards for Fire and Aviation Operations and the FWS Fire Management Handbook.

4.2.1.7 Reports

Burn plans will specify information to be included in a project file. The Burn Boss will ensure this information is provided to the Project Leader and/or Zone Fire Management Officer as specified. This includes documenting conditions and fire behavior during the prescribed fire to assess how well actual fire characteristics fit those predicted, documenting any unanticipated difficulties encountered during implementation, and assessing how well the fire accomplished the intended objectives.

The Burn Boss will complete an Individual Fire Report (DI-1202) with the Complex FMO, who will file an Individual Fire Report (DI-1202) electronically within 10 days of it being declared out. The Complex FMO or assistant will also complete a prescribed fire critique and FFI monitoring report within one month of project completion.

4.2.2 Non-Fire Hazardous Fuels Treatment Program

Non-fire treatment strategies are those that do not involve the use of prescribed fire to meet stated objectives. For the Refuge, mechanical and chemical treatment strategies are available as non-fire management tools. The following objectives for non-fire treatments of hazardous fuels at the Refuge include:

- Establish defensible space along wildland-urban interface boundary and around Refuge improvements and structures.
- Protect habitat from wildfire trespass.
- Restore early successional habitats to promote native species while minimizing invasive species encroachment.
- Maintain fuel loadings within natural ranges of variability for major vegetation types.
- Aid in control of invasive plants and weeds that contribute to the fuel hazard.

Any work requiring heavy equipment, such as mowing, hydro-axe work, fuel break construction, or vegetation removal, should be done with low ground-pressure vehicles to the extent possible when the site is dry enough to prevent damage to soils. Non-fire treatments may be restricted during the nesting season from mid May to early August in areas that provide important habitat for trust wildlife resources.

The Refuge has an active program of mowing and disking fire breaks along the refuge boundary. Fire breaks are mowed/disked generally in late spring to early summer, (see Appendix A for disk line map).

4.2.3 Process to Identify Hazardous Fuels Treatments

The development of prescribed fire and non-fire hazardous fuel management priorities will be an ongoing process determined annually between the refuge staff and Project Leader based on changing habitat conditions on the Refuge, changes in management objectives, and changes in management techniques or new information. The Complex FMO and Refuge staff will coordinate with federal and state partners and

review existing County Wildfire Protection Plans (CWPP) when developing potential hazardous fuels treatments in WUI areas.

4.3 Emergency Stabilization and Rehabilitation

Emergency stabilization (ES) and burned area rehabilitation (BAR) are part of a holistic approach to addressing post wildfire issues which also includes suppression activity damage repair and long-term (>3 years) restoration.

ES is planned actions performed by burned area emergency response (BAER) teams within one year of wildfire containment to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources.

BAR is efforts undertaken within three years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire. The process concludes with long-term restoration.

The incident management team, local fire resources, or refuge staff begins the process by repairing suppression activity damage. These actions are charged to the fire suppression accounting code. Fire suppression activity damage rehabilitation involves short-term actions to repair and rehabilitate damage to lands, resources, and facilities caused by the wildland fire suppression effort or activities. This includes dozer lines, camps, and staging areas; damaged facilities (fences, buildings, bridges, etc.); handlines; roads; etc. The Project Leader should ensure this work is complete before incident demobilization, or as soon thereafter as possible or practicable. Damage caused by backfires and burnouts to stop fire spread falls under fire damage restoration and does not qualify as damage caused by suppression action.

The Project Leader will coordinate with the Incident Commander, Complex FMO, and Regional Office fire staff to determine if an ES or BAR plan is needed for a Wildland fire incident. The Project Leader will form an interdisciplinary team which could include fire and resource specialists to develop and write the ESR Plan. The ES or BAR plans must include provisions for monitoring and evaluation of treatments and techniques, and a procedure for collecting, archiving, and disseminating results. For multi-agency fires, we will do joint planning and implementation. Plans must ensure that the treatments proposed are environmentally, culturally, and socially acceptable, and comply with legal requirements. Each ES or BAR Plan will include a cost/risk analysis of proposed emergency rehabilitation treatment actions to assist agency administrators and reviewing authorities in assessing the proposed actions. The level and sophistication of the analysis should be commensurate with the scope and complexity of the plan.

ES plans should be submitted to the Regional Fire Management Coordinator (RFMC) within 7 calendar days of the wildfire containment. If additional time is needed, extensions may be negotiated with the (RFMC). BAR plans must be submitted before the end of the fiscal year in which the wildfire fire occurs.

Additional ES and BAR guidance may be found in the FWS Directives (095 FW3) and the Interagency Burned Area Emergency Response Guidebook.

4.4 Prevention, Mitigation, and Education

The fire education program for the Refuge will include fire prevention, mitigation, and information specific to the ecological aspects of fire and its interaction with refuge habitats. The program will be aimed at increasing public understanding of the complexities of the overall fire program and will seek to

influence attitudes and behavior of adults and children. Attention will be given to social groups, elected officials, schools, and all other interested parties of any age.

Fire education messages will include how and why fire burns the way it does and the effects – both negative and positive – that fire has on plant, wildlife, and human populations. Focus will be given to the effect fuel, weather, and topography have on fire behavior clearly demonstrating the effect manipulation of fuels can have on the opportunity for a fire to burn through a given area.

All education efforts will be consistent with approved Service national and regional messaging. These efforts will be interagency when appropriate.

The fire prevention goal for the Refuge will be to prevent unwanted human-caused fires. High visitor use due to close proximity to large population areas increases the likelihood of careless human ignitions. Although campfires are not allowed on the Refuge, abandoned campfires are one of the concerns to be addressed in fire prevention efforts. Debris burning on neighboring private land, smoking, and fires ignited from vehicles also share some concern and will be addressed in conjunction with other agencies to protect human life and property, natural resources, and prevent damage to cultural resources or physical facilities.

During the typical fire season prevention efforts will be elevated commensurate with fire danger. Refuge employees must be kept informed about changes in the fire situation. Visitor contacts, signing, handouts and interpretive programs may be utilized to increase visitor and neighbor awareness of fire hazards. Due to lack of staffing on the Refuge, collaboration with interagency partners such as local fire departments, the Bureau of Land Management, the Forest Service, and the Idaho Department of Lands is critical for maintaining a fire prevention presence with the public. The Refuge will support interagency fire prevention efforts through use of severity funding, increased personnel presence, large scale campaigns, etc.

During periods of extreme or prolonged fire danger emergency restrictions regarding refuge operations or area closures may become necessary. Such restrictions will usually be consistent with those implemented by cooperators as outlined in the Southern Idaho Fire Restrictions and Closures Guide. The Complex FMO will recommend when such restrictions may be necessary. Closures will be authorized by the Project Leader in consultation with the Complex FMO.

The Refuge is bordered by private property which could be at risk to wildfire should one start on the refuge. Light fuels such as cheatgrass in some areas near private property elevate the risk of rapid fire spread. These areas will be addressed in (CWPP) and treated by chemical, mechanical or prescribed fire means as appropriate to reduce the risk. Refuge personnel will work with interagency partners to educate the community on fire mitigation techniques, consequences of doing or not doing the prescribed treatment, and issues related to any resulting smoke. A message of personal responsibility and Firewise principles will be included in any public contacts regarding fire mitigation.

Fire Investigation

Fire management personnel will attempt to locate and protect the probable point of origin and record pertinent information required to determine fire cause. They will be alert for possible evidence, protect the scene and report findings to the fireline supervisor.

Prompt and efficient investigation of all suspicious fires will be carried out. However, fire management personnel should not question suspects or pursue the fire investigation unless they are currently law enforcement commission qualified.

Personnel and services of other agencies may be utilized to investigate wildland fire arson or fire incidents involving structures. All fire investigations should follow the guidelines outlined in 4.1-2 of the Fire Management Handbook (2000).

For fires of suspicious origin the IC or Project Leader may request a Fire Investigator through Boise Dispatch.

Public Information and Education

Educating the public on the value of fire as a natural process and as an effective tool to reduce risk to communities and resources from wildfire is important to increasing public understanding and support for the fire management program. The Refuge will use the most appropriate and effective means to explain the overall fire and smoke management program as well as other mitigation techniques such as mechanical and chemical treatments. This may include supplemental handouts, signs, personal contacts, auto tour routes, or media releases. When possible, interpretive presentations will address the fire management program and explain the role of fire in the environment.

The public will be notified of planned prescribed burning in advance of any actions via news releases and direct phone contact to neighboring residences. The role of wildland fire and prescribed fire may be incorporated into presentations that are given to various user groups and visiting public.

5. Monitoring and Evaluation

Monitoring and evaluation are part of the Refuge fire management program. They provide the means by which Refuge personnel are able to determine if applicable sections of the fire management plan are being implemented as planned and if fire-related goals and objectives are being achieved.

5.1 Fire Management Plan

5.1.1 Annual Fire Management Plan Review

This FMP will be reviewed annually and updated as needed, upon local agency administrator approval. Revisions of FMPs with Regional review and concurrence are required every five years and following completion of a new (or significantly revised) CCP or habitat management plan.

5.1.2 Fire Management Plan Terminology

Terms in the FMP are defined in the National Wildfire Coordinating Group Glossary, located at http://www.nwcg.gov/pms/pubs/glossary. Any terms used not in the glossary are defined below.

5.2 Treatment Effectiveness

Basic monitoring to determine habitat response will generally use photo-points, which will be re-visited and photographed during subsequent seasons. Comparisons over time will aid in determining if burn objectives and resource objectives are being met. More complex monitoring efforts may be undertaken for research-related prescribed burns, or to answer questions about the effects of prescribed fire on specific wildlife or other habitat parameters. Such monitoring can require vegetation transects, breeding bird point counts, presence/absence of target species, etc. An excellent reference resource for monitoring procedures can be found within the Fire Monitoring Handbook, USDI, and National Park Service, 2007.

List of Appendices

Appendices A-J are available at request from the Refuge.

Appendix K: Annual Updates

FWS REVIEW CHECKLIST (LONG FORM) FOR DEER FLAT NATIONAL WILDLIFE REFUGE FIRE MANAGEMENT PLANS

Name of Plan Reviewed for Annual Update Process: Deer Flat National Wildlife Refuge	Review Date: 4/16/2012
Refuge or Unit Name (Include Complex if applicable): Deer Flat National Wildlife Refuge	
Fire Staff Reviewer(s) Name and Phone Number: Lance Roberts, 208-237-6615 ext.107	Fire Staff Reviewer(s) Signature (for review approval):
Refuge Reviewer(s) Name and Phone Number: Jennifer Brown-Scott, 208-467-9278	Refuge Reviewer(s) Signature (for review approval):
Amendment Completed and attached to Plan	Date:
Review information sent to Regional Office	Date:
Review date entered in Database (Regional Office)	Date:

Please review the Fire Management Plan (FMP) and complete the columns as follows: A check-mark in the "No Update" column means that this portion of your FMP has been reviewed and determined not to need an update; if a row requires an update (answering yes to the question (s)), check the "Update Needed" column and provide an explanation of the changes in the "Notes/Comments" section. This information will be included in the amendment (including chapter, section and comments) to be attached to the plan annually following the review. Be sure to adequately describe the changes so they are easily understandable to the outside reader. Put an N/A in the "No Update" column for lines that do not pertain to your refuge/unit to make it easier for future reviewers to complete the annual review process.

If the reviewers determine that the changes are substantial and the original intent of the document is compromised, then a revision of the document should be completed. The review discussion between the line officer and the fire staff may support that conclusion but the responsibility for making this decision rests with the unit line officer.

If the reviewers determine that the changes are substantial and the original intent of the document is compromised, then a revision of the document should be completed. This responsibility for making this decision rests at the Unit Line Officer level.

FWS Update Checklist
for the Deer Flat NWR Fire Management Plan

Page 1 of 4

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
		Chapter 1. Introduction			
X		1.1	Purpose of the Fire Management Plan		
X		1.2	General Description Of Refuge		
X		1.3	Significant values to Protect		
		Chapter 2. Policy, Land Management Planning, and Partnerships			
		2.1	**Fire Policy**		
X		2.1.1	Federal Interagency Policy change?		
X			• Terminology changes?		
X		2.1.3	DOI policy change? (e.g., Departmental manuals).		
X		2.1.4	Service policy change?		
X		2.1.5	Regional/unit-specific policy change?		
		2.2	**Land/Resource Management Planning**		
		2.2.1	Planning Documents:		
X			• Does Habitat Management Plan (HMP) align with FMP at unit? Is it being revised? Does management wan HMP and FMP revisions to take place simultaneously?		
X			• Is the Comprehensive Conservation Plan (CCP) currently being developed? Revised?	CCP date:	
			• Others: (list) •		
X		**2.2.2**	Environmental Compliance – are your compliance documents up to date in the following areas?		
X			• National Environmental Policy Act (NEPA)	What type? Categorical Exclusion	
X			• Endangered Species Act (ESA)	Date of consultation:	
X			• National Historic Preservation Act (NHPA)		
X			• Archaeological Resources Protection Act (ARPA)		
			• Others: (list) •		
		2.3	**Partnerships**		
		2.3.1	Internal Partnerships changes? (Use spaces below to add new partnerships)		
	X		• Fire Prevention and Education Specialist	This position is no longer filled.	
			•		
		2.3.2	External Partnerships changes?		
	X		• Boise BLM fire assistance agreement	New Intergovernmental agreement signed and 2012 Annual Operating Plan attached	
	X		• Local Fire Departments	The refuge has a Cooperative Fire Protection Agreement with the Nampa Fire Department	
	X		• Idaho State Fire Plan Working Group	The Fire Prevention and Education Specialist is vacant and will not be filled, no FWS representation currently on this group.	
	X		• Treasure Valley Fire Protection and Safety Cooperative	The Fire Prevention and Education Specialist is vacant and will not be filled, no FWS representation currently on this group.	
		Chapter 3. Fire Management Unit Characteristics			
		3.1	**FMP-wide Management Considerations**		

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
X		3.1.1	Management Goals, Objectives and Constraints from CCPs and other planning documents.		
X		3.1.2	Management Goals, Objectives, and Constraints from other Sources.		
X		3.1.3	Common Characteristics of the FMUs		
			•		
		3.2	**Fire Management Units**		
X		3.2.1	Lake Lowell FMU Characteristics		
X		3.2.2	Lake Lowell FMU Fire Environment		
X		3.2.3	Lake Lowell FMU Objectives and Constraints		
X		3.2.4	Lake Lowell FMU Values to Protect		
X		3.3.1	Snake River Island FMU Characteristics		
X		3.3.2	Snake River Island FMU Fire Environment		
X		3.3.3	Snake River Island FMU Objectives and Constraints		
X		3.3.4	Snake River Island FMU Values to Protect		
		Chapter 4. Wildland Fire Operational Guidance			
		4.1	**Management of Unplanned Ignitions**		
X		4.1.1	Appropriate Management Response		
	X	4.1.2	Preparedness	The Fire Prevention and Education Specialist is vacant and will not be filled, currently no fire qualified personnel are stationed at the Refuge.	
X		4.1.3	Fire Detection		
X		4.1.4	Dispatch, initial Response and Initial Attack		
X		4.1.5	Extended Attack and Large Fire Management		
X		4.1.6	Aviation Operations		
X		4.1.7	Reviews and Investigations		
X		4.1.8	Reports		
		4.2	**Hazardous Fuels Management**		
X		4.2.1	Prescribed Fire Program for Hazardous Fuels and Habitats		
X		4.2.1.1	Program Overview		
X		4.2.1.2	Effect of National and Regional Preparedness Levels		
X		4.2.1.3	Project Planning		
X		4.2.1.4	Project Implementation		
	X	4.2.1.5	Smoke Management	Updated to include FWS directives regarding clean air/prescribed fire and current Airshed Group operation language.	
X		4.2.1.6	After Action and Escaped Fire Reviews		
X		4.2.1.7	Reports		
X		4.2.2	Non-fire Hazardous Fuels Treatment Program		
X		4.2.3	Process to Identify Hazardous Fuels Treatments		
X		4.3	Emergency Stabilization and Rehabilitation		
X		4.4	Prevention, Mitigation and Education		
X		5.0	Monitoring and Evaluation		
X		5.1	Fire Management Plan		

No Update or N/A	Update Needed	Section	Title – Content	Notes/Comments	Date
X		5.1.1	Annual FMP Review		
X		5.1.2	Fire Management Plan Terminology		
X		5.2	Treatment Effectiveness		
		Appendices			
	X	A	Maps	Updated maps	
	X	B	Refuge Staff Fire Contact List	Updated	
X		C	Categorical Exclusion for Fire Management Operations		
X		D	Deer Flat NWR Climate Charts and Graphs		
X		E	Prescribed and Wildfire History		
	X	F	Interagency Agreements & Delegations	Updated	
	X	G	Initial Attack Fire Size Up	Updated	
X		H	Behave Plus Runs		
	X	I	Radio Frequency List	Updated	
	X	J	Step-up Plan	Updated	
		K	FMP Review Checklist	Added for 2012	

Appendix L. Lake Lowell Recreation Data

Document continues on next page.

Deer Flat National Wildlife Refuge—Lake Lowell Water Based Recreation Data Summary

By Rudy M. Schuster

U.S. Department of the Interior
U.S. Geological Survey

Contents

Figures

Tables

Deer Flat National Wildlife Refuge—Lake Lowell Visitor Use Data Summary

By Rudy M. Schuster

Introduction

Established in 1909, Deer Flat National Wildlife Refuge is one of the oldest refuges in the National Wildlife Refuge System. The Refuge has two units, Lake Lowell and the Snake River Islands. The Lake Lowell Unit is 10,636 acres and includes the almost 9,000-acre Lake Lowell and surrounding lands. The Refuge offers the six priority wildlife-dependent activities (fishing, hunting, wildlife observation, wildlife interpretation, wildlife photography and environmental education) as defined in The National Wildlife Refuge System Administration Act as amended by the Refuge System Improvement Act of 1997 as well as other non-wildlife-dependent activities. The purpose of this study is to describe use characteristics of recreational boaters on Lake Lowell. This study does not address use in other parts of the Refuge or other recreational activities.

The sampling and data collection consisted of observations of boat activity made from fixed vantage points on the west and east pools of Lake Lowell to develop vessels-at-one-time (VAOT) estimates for three areas: the West Pool, the Headquarters section of the East Pool, and the East section of the East Pool. A complete description of the sampling locations and a map are provided below.

Traffic counters were also used to collect data on the number of vehicles entering the parking lots. Data were collected between April 15 and September 30, 2011.

Sampling Methods: Lake Lowell

Boater Observation Data Collection Methods

Observers were located on-shore at three vantage points (see Figure 1) that provided a view of activity on the Lake. The observers collected data in 20 minute intervals (three times an hour). Based on the sampling blocks (described below), there was a maximum of 10 observation periods when vessels were counted per sampling day, per observer. Boat activity was recorded the first time the boat was observed during the 20 minute observation period. However, any individual boat could be counted again at the next observation period. Thus, each observation is a stand-alone VAOT estimate for that observation period. The following data was collected at each observation period: time of day, type of vessel, and vessel size, activity, and speed. Compliance with the no-wake postings were recorded within the no-wake portion of the East section of the East Pool only since neither the Headquarters section of the East Pool or the West Pool have large no-wake zones. Data were collected on a field data sheet. Following each survey, weather conditions, average wind speed, average temperature, and water surface conditions were also recorded to summarize the conditions during the survey period. A copy of the boater observation data collection sheet can be found in Appendix 1. The observation categories are listed in Table 1.

Table 1. Categories for variables on observation collection sheet

Variable	Categories							
Vessel Type	Motorboat	Pontoon boat	Human powered	Sail boat	Personal watercraft	Kite board	Wind surfer	Other

Speed	Idle	Slow	Plowing	Cruising	Planing	Under Sail	Paddling
Activity	Travel	Milling	Skiing & Tubing	Fishing	Recreation-other		
Size	Less than 16 feet	16 to 25 feet	26 to 39 feet				

Travel was defined as a vessel moving through the survey area in a single direction from one point to another. Milling was assigned to vessels transitioning through the survey area in several directions (greater than two headings) with no apparent destination. Vessels classified as ski/tubing or fishing included only those that were actively engaged in those activities. The mere observation of fishing poles, skis, wakeboards, inner tubes, or other recreational equipment on a vessel did not result in an activity being classified as fishing or ski/tubing. Vessels classified as recreational included wind surfers and kite boarders, or vessels anchored with people swimming nearby or picnicking and not fishing and/or observing wildlife.

Speed classifications were qualitatively determined for each vessel pass observed in the survey area based largely on Gorzelany (2005). Speed classifications assigned to vessels under power included Idle, Slow, Plowing, Cruising, and Planing. Wind powered (i.e. under sail) and human powered (i.e. oar/paddle) speeds were recorded as applicable following the same criteria listed below. Speed classifications were defined as follows:

- Idle Speed – The minimum speed that maintains steerage of a vessel, or the speed at which a vessel is normally docked. Little or no displacement of water is observable from either the bow or stern, and the vessel remains level in the water at all times. This speed is estimated at approximately one to three miles per hour.
- Slow Speed – The speed at which all vessels are completely off plane and fully settled in the water. Some minimal water displacement at either the bow or stern (or both) may be observed. This speed is estimated at approximately five to seven miles per hour.

- Plowing Speed – An intermediate speed between cruising speed and slow speed. The bow of the vessel typically rides higher than the stern, and substantial displacement of water occurs. Depending on the size and type of vessel, plowing may occur at a variety of speeds. This speed designation is used specifically for vessels with planing-type hulls. For the purpose of this study, Plowing Speed is estimated at approximately eight to 10 miles per hour.
- Cruising Speed – A qualitative speed designation uniquely applied to a relatively fast moving vessel with a non-planing type hull (i.e. a pontoon boat or displacement hull vessel). This speed classification is identified by noticeable water displacement from the bow and/or stern and an observed speed faster than the previously defined speed classifications. Vessels at Cruising Speed are estimated to travel at speeds between 11 and 20 miles per hour.
- Planing Speed - A vessel traveling at sufficient speed to partially raise the bow out of the water. The majority of planing vessels are estimated to travel at speeds in excess of 15mph, however vessel planing speeds vary widely depending on vessel size and hull design.

Vessel speed was qualitatively determined and is therefore subject to individual observer interpretation. Physical and environmental factors, including wind speed/direction, may affect vessel speed as well as the degree of water displacement from the bow and/or stern. Observers were instructed to consider these factors and request the opinion of their fellow observer (when possible) if they were undecided between two vessel speeds. In instances where a decision between two speeds was difficult, observers selected the slower speed. This may provide a potential underestimate or more conservative assessment.

Boater compliance was evaluated for the no wake zone in the east section of the east pool and classified as either compliant (a vessel which is maintaining a speed that did not produce a wake) or non-compliant (a vessel that was determined to be producing a wake in an area posted as "no wake"). This assessment was made by the observer in the field.

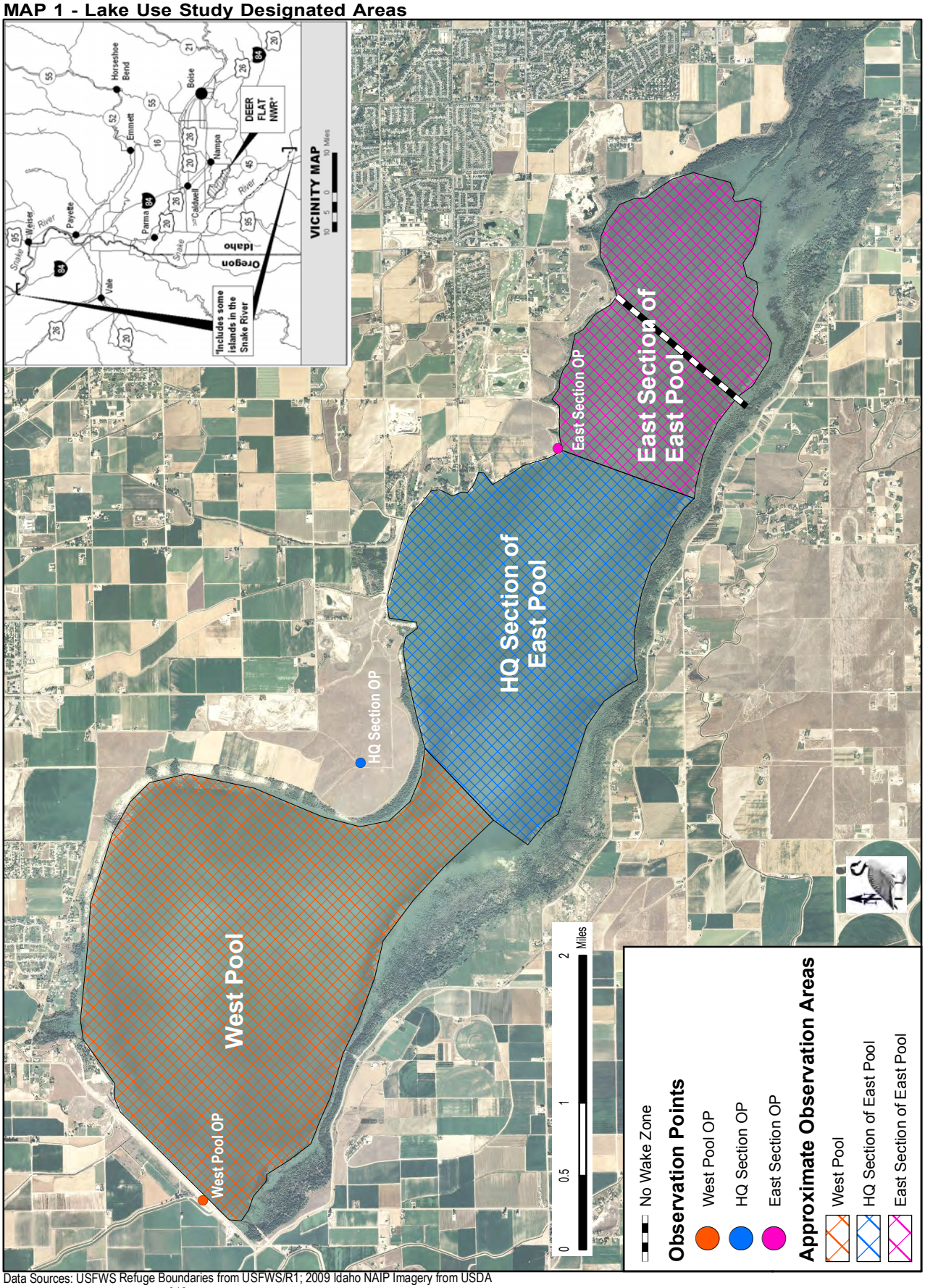
Efforts were made throughout the survey to ensure the quality and consistency of the data collected. Training sessions were conducted at each site prior to study commencement. The training session allowed the observers to gain familiarity with the field data collection sheets, data collection methods, and geographic characteristics unique to each survey site. Binoculars and spotting scopes were available to observers.

Boater Observation Sampling Locations, Time Blocks, & Sampling Schedule

Use levels on the Lake were organized into three categories: 1) Low use, 2) High use, and 3) Peak use days. *Peak use days* are times that are known to be the highest levels of use on the lake (e.g. Memorial Day, Labor Day). *High use days* are non-holiday days when use levels are known to be high (e.g. weekends in August, opening day). Finally, *low use days* are week days and other less popular times. For the purposes of this study, these use estimates were made based on the expert judgment of Refuge management.

Lake Lowell was organized into the following three use zones for the purpose of this study. The west pool was observed from the *Lower Dam* observation point. Two vantage points were necessary in the east pool due to the topography of the area; the east section of the east pool was observed from the *Viewing Platform* east of the Visitor Center (Headquarters section of the East Pool or Headquarters section) and the *Gotts Point* observation point (East section of the East Pool or East section). Refer to Map 1.

MAP 1 - Lake Use Study Designated Areas



Data Sources: USFWS Refuge Boundaries from USFWS/R1; 2009 Idaho NAIP Imagery from USDA
File: 12-005-9 Map Date: 05/03/2012

The plan included allowing observers to be in the field collecting data between 7am and 9pm. Five time blocks were used for the study. The blocks were three hours long; except for block 5 that was a two hour block. The time blocks used were: 7am to 10am; 10am to 1pm; 1pm to 4pm; 4pm to 7pm; and 7pm to 9pm. These time blocks accounted for the variation in recreation activity styles (e.g., morning fishing, afternoon water skiing, after dinner cruising). Actual observation times in the field were dependent on the random schedule generated and the availability of observers from the Refuge. The full sampling schedule can be found in Appendix 2. The schedule was stratified into the three zones on the Lake as described in the sampling location section. A combination of purposive and random methods were used to design the schedule. Peak use days were purposively sampled. Peak days represent potential boater conflicts and other stresses on the system that are important for management to identify and understand. Low and high use days were randomly selected.

The following definitions apply to the sampling schedule. A *Sampling Day* is a single date that sampling took place (e.g. April 15 or July 4). A S*ampling Block* is the three hour block that the field technician spends in the field. A *Sampling Episode* is when data is being collected from one of the vantage points (e.g. on April 15 observations will be made at the Gotts Point vantage point). An *Observation period* is when the field technician records boat data on the lake. One observation period occurs every 20 minutes, allowing for a maximum of 10 observation periods during each three hour sampling block.

There are a total of 169 potential sampling days between April 15, 2011 and September 30, 2011: 9 holiday days (3 holiday weekends), 42 regular weekend days, and 118 regular weekdays. The original sampling plan included the following. Each of the 3 lake zones would be sampled twice on peak use holiday weekends. This would result in a total of 6 sampling days during peak use times. Each zone would be sampled 3 times in each time block during high use days, resulting in 15 sampling days during

high use days. Finally, each zone would be sampled 4 days in each time block during low use times, resulting in 20 sampling days on low use days.

Minor modifications were necessary due to issues such as weather, availability of field personnel, and other unforeseen issues. Prior to each field day the data collection team consulted local weather forecasts to avoid poor weather that may influence boat traffic patterns or compromise personal safety. When possible, the next available sampling day of the same use type in the same use zone was selected to replace the missed sampling episode.

The final sampling schedule resulted in the following number of observations at each location: 903 observations at the west pool; 740 observations at the Headquarters section of the East Pool; and 453 observations at the East section of the East Pool. The data collection methods produced a diversity of types of use days (low, medium, and high), times of day, and locations on the Lake. However, the results may not apply to locations, days, and times of the day that were not included in the analyses.

Parking Lot and Vehicle Count Method

An NC-200 Portable Traffic Analyzer which utilizes Vehicle Magnetic Imaging was used to count vehicles entering the parking areas. These devices count vehicles in only one direction of travel. Traffic counters and support for using the counters was provided by U.S. Department of Transportation, Central Federal Lands Highway Division (CFLHD) located in Lakewood Colorado.

A sampling schedule was designed to collect traffic data from each of the use level days at five different parking areas. The parking areas were: 1) Upper Dam West Entrance, 2) Upper Dam East Entrance, 3) Parking Lot 1, 4) Lower Dam Recreation Area Entrance, and 5) Parking Lot 7. Traffic data collection consisted of setting up the counter and collecting data for 14 continuous days. This occurred twice for each parking area. The 14 day sampling periods included all three use level designations (low use days, high use days, and peak use days). The two week periods were: May 19 to June 1 and

September 1 to September 14. A technical issue meant that data were collected at Parking Lot 7 only in September.

A single set-up configuration was designed for each of the parking areas and used during both sampling episodes. A research technician was stationed at the parking area to do a one-time calibration of the traffic count method. For a two-hour period the observer counted the number of vehicles entering the area and the number of boats. Observer vehicle counts were compared to traffic counter data to confirm the accuracy of the counters.

A ratio of vehicles with trailers and without was established to estimate the total number of vessels entering the system on the sample days. The ratio was created using data from regular parking lot vehicle counts performed by Refuge staff and volunteers. One parking lot count consisted of a Refuge volunteer spending one hour in each parking lot and counting the number of vehicles, trailers, number of people per vehicle, and their apparent activity. Data were used from a total of 87 parking lot counts across all lots with traffic counters. Counts were conducted throughout the 2011 season (May to September), distributed across times of the day (morning, afternoon, evening), and conducted on weekdays and weekends. Specific day and time blocks for parking lot counts were determined by a pre-existing random sampling schedule established by the refuge.

Ratio weights were established by dividing the average number of trailers by the average number of vehicles observed during the observations for that lot. For example, if 100 vehicles entered a parking area and 50 of them were pulling trailers, the ratio weight used for that lot would be 0.50. A weight of 0.50 indicates that half of the vehicles were pulling trailers. Outliers in the data were adjusted because there is the possibility of peak use levels during holiday events. Any values beyond three standard deviations from the average were brought into the third standard deviation based on data for each individual lot. Only two outliers were identified and adjusted.

Results

Number of Vessels Observed

This section reports the number of vessels-at-one-time (VAOT) observed in the East section of the East Pool, Headquarters section of the East Pool, and West Pool for the particular time block. The range provides a sense of the variation in Lake use. The observations were made at 20 minute intervals. The data are stratified by the use level categories: weekday low use, weekend high use, and holiday peak use. The results are shown in Tables 2, 3, and 4.

East section of the East Pool

Use in the East section of the East Pool during low use and high use days was not very different; with the exception of one day when the peak number of vessels on a weekend day was 11. The highest number of vessels observed on the East section of the East Pool was 23 during the 4th of July weekend.

Table 2. East section of the East Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/13/11	Weekday low use	1:00 pm to 3:40 pm	2	7	5
8/15/11	Weekday low use	4:00 pm to 6:40 pm	1	1	
9/16/11	Weekday low use	10:00 am to 12:40 pm	1	2	1
4/30/11	Weekend high use	1:00 pm to 3:40 pm	1	3	2
6/4/11	Weekend high use	10:00 am to 12:40 pm	6	11	5
7/16/11	Weekend high use	7:00 pm to 8:40 pm	3	8	5
8/14/11	Weekend high use	10:00 am to 12:40 pm	2	8	6
7/2/11	Holiday peak use	4:00 pm to 6:40 pm	11	23	12
9/5/11	Holiday peak use	10:00 am to 12:20 pm	1	8	7

Headquarters section of the East Pool

Peak use in the Headquarters section of the East Pool on low use days ranged from 1 to 11 vessels. Peak use on weekend high use days ranged from 4 to 51 vessels. However, the report of 51 is not consistent with other counts from this area. The observer indicated that the number was accurate and that July 10th 2011 was an unusually high use day. Holiday peak use days were similar to other weekend high use days; peak use ranged from 6 to 14. Use levels in the Headquarters section of the East Pool were consistent across the three use strata.

Table 3. Headquarters section of the East Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/5/11	Weekday low use	10:00 am to 12:40 pm	1	11	10
5/23/11	Weekday low use	1:00 pm to 4:00 pm	1	2	1
6/24/11	Weekday low use	10:00 am to 12:40 pm	3	10	7
7/19/11	Weekday low use	7:40 pm to 8:20 pm	3	4	1
8/10/11	Weekday low use	1:00 pm to 3:40 pm	2	10	8
9/1/11	Weekday low use	12:00 pm to 12:20 pm	1	1	
9/26/11	Weekday low use	4:00 pm to 6:00 pm	1	3	2
4/24/11	Weekend high use	10 am to 12:40 pm	1	4	3
6/18/11	Weekend high use	1:00 pm to 1:20 pm	3	4	1
7/10/11	Weekend high use	4:30 pm to 7:00 pm	30	51	21
8/6/11	Weekend high use	10:00 am to 12:40 pm	5	11	6
8/28/11	Weekend high use	4:00 pm to 7:00 pm	1	13	12
5/30/11	Holiday peak use	1:00 pm to 4:00 pm	1	6	5
9/3/11	Holiday peak use	10 am to 12:40 pm	3	14	11

West Pool

Peak use in the West Pool on low use days ranged from 1 to 21 vessels. The peak of 21 vessels on August 5th 2011 was again not consistent with other low use day observations. The next highest report was 9. Weekend high use peak use ranged from 1 to 23 vessels. Finally, peak use on holiday peak use days ranged from 3 to 19 vessels. In general, the low use days are lower than both the weekend and holiday days. The weekend and holiday days were similar. The highest number of vessels observed in the West Pool was 23 at one time.

Table 4. West Pool: Low and Peak number of vessels during observation period

Date	Use Level Designation	Time interval	Low # vessels observed	Peak # vessels observed	Range
5/3/11	Weekday low use	9:00 pm to 9:40 pm	1	2	1
5/18/11	Weekday low use	11:00 am to 12:40 pm	2	1	1
6/29/11	Weekday low use	1:00 pm to 3:20 pm	2	2	
7/11/11	Weekday low use	10:00 am to 12:40 pm	3	5	2
8/5/11	Weekday low use	7:00 pm to 9:00 pm	10	21	11
8/23/11	Weekday low use	7:00 pm to 9:00 pm	1	9	8
9/21/11	Weekday low use	1:00 pm to 3:40 pm	4	8	4
4/16/11	Weekend high use	3:00 pm to 6:00 pm	3	19	16
5/7/11	Weekend high use	4:00 pm to 7:00 pm	1	1	
6/12/11	Weekend high use	10:00 am to 12:40 pm	1	21	20
7/24/11	Weekend high use	7:00 pm to 9:00 pm	4	21	17
8/20/11	Weekend high use	1:00 pm to 3:40 pm	6	23	17
5/29/11	Holiday peak use	10:00 am to 12:40 pm	1	3	2
7/3/11	Holiday peak use	7:00 pm to 8:40 pm	11	19	8

Boater Characteristic Description

Results of the boater characteristics data are reported in both raw numbers and percentages of boats observed. Percentages allow for comparison across the three pools. The observers collected data in 20 minute intervals; one observation every 20 minutes.

Vessel Type

Results of the vessel type data are shown in Table 5. The majority of vessels on Lake Lowell are motorboats. The Headquarters section of the East Pool has the most pontoon boats (3%) compared to the West Pool and East section of the East Pool (2% and <1%, respectively). The distribution of human powered boats was similar. Less than 1% of all boats observed were sailboats in the Headquarters section of the East Pool and none were observed in the West Pool or East section of the East Pool. The largest percentage of personal watercraft were observed in the Headquarters section of the East Pool (7%); closely followed by the West Pool (6%) and finally the East section of the East Pool (4%). No windsurfers were observed.

Table 5. Vessel type summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Motorboat	799	88%	613	85%	415	92%	1827	88%
Pontoon Boat	19	2%	19	3%	1	<1%	39	2%
Human powered[1]	27	3%	30	4%	16	3%	73	3%
Sailboat			6	<1%			6	<1%
Personal watercraft	57	6%	54	7%	19	4%	130	6
Kite surfer								
Wind surfer								
Other	1	<1%					1	<1%
Total observations	903		722		451		2073	

[1]Kayak\canoe\float

Vessel Size

The vessel size data are shown in Table 6. Almost all of the vessels are 25 feet long or less. The majority are 16 to 25 feet long. The smaller vessels (<16 feet) appear to use the West Pool and Headquarters section of the East Pool more than the East section of the East Pool. Less than 1% of the vessels observed were larger than 25 feet. Most of them were observed in the West and Headquarters section of the East Pools.

Table 6. Vessel size summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Less than 16 feet	134	14%	99	14%	37	8%	270	13%
16 to 25 feet	759	84%	615	85%	414	92%	1788	86%
26 to 39 feet	7	<1%	8	<1%			15	<1%
Total observations	900		722		451		2073	

Location in the Pool

The location data are shown in Table 7. The totals indicate that the majority of boaters were observed in open water. The East section of the East Pool had the largest variation with 64% on open water, 15% in emergent beds, 18% on the edge of emergent beds, and 3% at the bank. The West Pool had the second most variation and the Headquarters section of the East Pool was the most homogeneous.

Table 7. Location summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Open Water	652	72%	602	83%	288	64%	1542	74%
Emergent bed	105	12%	24	3%	69	15%	198	9%
Edge of emergent bed	76	8%	40	6%	83	18%	199	9%
Bank	15	2%	7	<1%	11	3%	33	2%
Dock	55	6%	48	7%			103	5%
Total observations	903		721		451		2075	

Recreational boating activity

The recreational activity data are shown in Table 8. Most boats were engaged in some kind of activity when observed; the totals show that only 21% of observed vessels were traveling or milling. The most popular activity was fishing (38% of total observations). Fishing was the most popular activity on both the West Pool and the East section of the East Pool and second most popular on the Headquarters section of the East Pool. Skiing and tubing was the second most popular activity overall. Skiing and tubing was the most popular activity on the Headquarters section of the East Pool and second most popular on the West Pool and East section of the East Pool. Travel was the third most popular activity on all three pools.

Table 8. Activity summary data for all observations

	West Pool		Headquarters section		East section		Total	
	#	%	#	%	#	%	#	%
Travel	179	20%	149	21%	61	13%	389	19%
Milling	17	2%	17	2%	9	2%	43	2%
Skiing & Tubing	198	22%	209	29%	96	21%	503	24%
Fishing	360	40%	195	27%	238	53%	793	38%

Recreation[1]	91	10%	96	13%	45	10%	232	11%
Docked	57	6%	56	8%	2	1%	115	6%
Total observations	902		722		451		2075	

[1]Vessels classified as recreational included wind surfers and kite boarders, or vessels anchored with people swimming nearby or picnicking and not fishing and/or observing wildlife.

Activity summary for locations in pools

Tables 9, 10, and 11 show that the majority of people in all three Pools were located in open water (East section 72%; HQ section 83%, West Pool 64%). The most popular activities in open water were consistent in the three pools: skiing & tubing, fishing and travel. Almost all of the boats in the emergent beds and on the edge of the emergent beds were being used for the activity of fishing.

Table 9. Location of Activities in West Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	162	25%	16	2%	196	30%	191	29%	84	13%	2	<1%	652
Emergent Bed	4	4%					100	95%	1	1%			105
Edge of Emergent Bed	6	8%	1	1%	2	3%	67	88%					76
Bank	5	33%					1	7%	6	40%	3	20%	15
Dock	2[2]	4%					1	2%			52	95%	55

1Percentage of vessels being used for this activity of the total number of vessels observed in this location
2 Two vessels were observed pulling away or approaching the dock and were classified as traveling while in proximity to the dock.

Table 10. Location of Activities in Headquarters section of the East Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	145	24%	17	3%	209	35%	136	23%	91	15%	4	1%	602
Emergent Bed	4	17%					20	83%					24
Edge of Emergent Bed							39	97%	1	3%			40
Bank									4	57%	3	43%	7
Dock											48	100%	48

1Percentage of vessels being used for this activity of the total number of vessels observed in this location

Table 11. Location of Activities in East section of the East Pool

	Travel		Milling		Skiing & Tubing		Fishing		Recreation		Docked		Total
	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#	%[1]	#
Open Water	60	21%	9	3%	95	33%	80	28%	44	15%			288
Emergent Bed	1	1%					67	97%	1	1%			69
Edge of Emergent Bed							83	100%					83
Bank					1	9%	8	73%			2	18%	11
Dock													

1Percentage of vessels being used for this activity of the total number of vessels observed in this location

Compliance with no wake zone

The compliance data for the no wake zone in the East section of the East Pool are shown in Table 12. Vessels were classified as either Compliant – A vessel which is maintaining a speed that did not produce a wake, or Non-compliant – A vessel that was determined to be producing a wake in an area posted as "no wake." Vessel speed was qualitatively determined and is therefore subject to individual observer interpretation. Physical and environmental factors, including wind speed/direction, may affect vessel speed as well as the degree of water displacement from the bow and/or stern. Observers were instructed to consider these factors and request the opinion of their fellow observer (when possible) if they were undecided between two vessel speeds. In instances where a decision between two speeds was difficult, observers selected the slower speed. This may provide a potential underestimate or more conservative assessment. A total of 346 vessels were observed in the East section of the East Pool no wake zone. Of the vessels in the no wake zone, 88% were compliant and 12% were not.

Table 12. Compliance summary for vessels in East section of the East Pool no wake zone

	#	%
Compliant	303	88%
Non-compliant	43	12%
Total observations	346	

Vessel Speed

The largest percentage of the observed vessels were idling (see Table 13). This is consistent with the recreational activity summary indicating that most vessels were fishing. The second largest category was planing. This is also consistent with skiing and tubing being second most popular activities and travel as the third most popular.

Table 13. Vessel speed summary data for all observations

	West Pool		Headquarters		East section of the East Pool		Total	
	#	%	#	%	#	%	#	%
Idle	439	49%	271	38%	268	59%	978	47%
Slow	118	13%	76	10%	16	4%	210	10%
Plowing	19	2%	11	1%	11	3%	41	2%
Cruising	31	3%	44	6%	22	5%	97	5%
Planing	296	33%	319	44%	128	28%	743	36%
Under sail			1	<1%			1	<1%
Paddling					6	<1%	6	<1%
Total observations	903		722		451		2076	

Summary of boater characteristics

The following description is based on the summary data in tables 5 through 13. The typical vessel on Lake Lowell is a motorboat between 16 to 25 feet in length and can be found in open water.

The most common activities people in the vessels participate in are fishing or skiing and tubing. Most of the vessels are not moving (fishing or standing) and many are moving at a planing speed while skiing and tubing. Of the vessels that do enter the no wake zone in the east section of the east pool, most comply with the no wake regulation.

Parking Lot Traffic Counter Data

The traffic counter data are displayed in Tables 14 through 29. One table is provided for each 14-day sampling episode and one summary table for each parking lot sampled. Vehicle trailer ratios were created as described in the methods section and used to estimate the number of trailers entering the system based on the traffic counts. This provides an estimate of the vessels being launched on Lake Lowell on a given day. The vehicle to trailer ratio weights, that indicate what portion of the vehicles in the parking lot are apparently pulling trailers, are shown in Table 14 for each parking lot. Parking Lot 1, the Lower Dam Entrance, and the Upper Dam East entrance had the largest trailer traffic of the five lots. Parking Lot 7 had the lowest vehicle to trailer ratio.

Table 14. Vehicle to trailer weighting ratios[1] from parking lot counts from 4/15-9/30/11

Parking Lot	Ratio/weight
Upper Dam West Entrance	0.52
Upper Dam East Entrance	0.70
Parking Lot 1	0.78
Lower Dam Recreation Area Entrance	0.73
Parking Lot 7	0.14

1Weighting ratios indicate the proportion of vehicles in the parking lot pulling trailers.

The summary descriptive statistics for the traffic counter data collected during all of the days in each of the parking lots is shown in Tables 15 and 16. The range and standard deviation are indicators of the variability in use at each parking lot. Given the difference in parking lot size it is not appropriate to

directly compare the variability between the lots. Within each lot a low range and standard deviation indicate that the amount of use at the parking lot is relatively consistent. A high range and standard deviation would suggest that use levels are variable.

Table 15. Summary descriptive statistics for vehicle traffic counts from magnetic counter

Parking Lot	Range	Minimum	Maximum	Average	Standard Deviation
Upper Dam West Entrance	105	32	137	70	28.9
Upper Dam East Entrance	180	62	242	110	38.2
Parking Lot 1	50	4	54	22	12.0
Lower Dam Recreation Area Entrance	601	99	700	240	147.9
Parking Lot 7	29	14	43	27	9.3

Table 16. Minimum, maximum and average number of trailers estimated using trailer weight ratios

Parking Lot	Minimum	Maximum	Average
Upper Dam West Entrance	17	71	36
Upper Dam East Entrance	43	169	77
Parking Lot 1	3	42	17
Lower Dam Recreation Area Entrance	72	511	175
Parking Lot 7	2	6	4

Parking lot traffic count results: Upper Dam West Entrance

The traffic counter data for the Upper Dam West Entrance are displayed in Tables 17, 18, and 19. The number of vehicles entering the Upper Dam West parking lot on low use weekdays ranged from 32 to 68 with 17 to 35 trailers respectively; and the average number of vehicles on low use days was 53 with 28 trailers. There was not much difference between the weekend high use and peak use day results. The number of vehicles on weekend high use days ranged from 69 to 124 (36 to 64 trailers). The

number of vehicles on peak use days ranged from 62 to 137 (32 to 71 trailers). The average for high use days was 99 and peak use days was 100 (52 and 51 trailers, respectively).

Table 17. Parking lot traffic count results: Upper Dam West Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	40	21
5/20/11	Friday	Weekday low use	70	36
5/23/11	Monday	Weekday low use	33	17
5/24/11	Tuesday	Weekday low use	57	30
5/25/11	Wednesday	Weekday low use	38	20
5/26/11	Thursday	Weekday low use	39	20
5/27/11	Friday	Weekday low use	32	17
5/31/11	Tuesday	Weekday low use	78	41
6/1/11	Wednesday	Weekday low use	54	28
5/21/11	Saturday	Weekend high use	114	59
5/22/11	Sunday	Weekend high use	69	36
5/28/11	Saturday	Holiday peak use	62	32
5/29/11	Sunday	Holiday peak use	72	37
5/30/11	Monday	Holiday peak use	109	57

[1]The vehicle to trailer weighting ratio is 0.52

Table 18. Parking lot traffic count results: Upper Dam West Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	68	35
9/2/11	Friday	Weekday low use	47	24
9/6/11	Tuesday	Weekday low use	74	38
9/7/11	Wednesday	Weekday low use	59	31
9/8/11	Thursday	Weekday low use	64	33
9/9/11	Friday	Weekday low use	55	29
9/12/11	Monday	Weekday low use	51	27

9/13/11	Tuesday	Weekday low use	57	30
9/14/11	Wednesday	Weekday low use	51	27
9/10/11	Saturday	Weekend high use	90	47
9/11/11	Sunday	Weekend high use	124	64
9/3/11	Saturday	Holiday peak use	110	57
9/4/11	Sunday	Holiday peak use	112	58
9/5/11	Monday	Holiday peak use	137	71

[1]The vehicle to trailer weighting ratio is 0.52

Table 19. Average number of vehicles per day Upper Dam West Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	100	52
Weekend high use	99	51
Weekday low use	53	28

[1]The vehicle to trailer weighting ratio is 0.52

Parking lot traffic count results: Upper Dam East Entrance

The traffic counter data for the Upper Dam East Entrance are displayed in Tables 20, 21, and 22. The number of vehicles entering the Upper Dam East parking lot on low use weekdays ranged from 62 to 123 with 43 to 86 trailers respectively; and the average on low use days was 90 vehicles with 63 trailers. There was overlap of the high use day and peak use day ranges. However, there appears to be the potential for extreme peak use levels at this parking area. The number of vehicles on weekend high use days ranged from 131 to 156 (92 to 109 trailers). The number of vehicles on peak use days ranged from 79 to 242 (55 to 169 trailers). The average for high use days was 142 and peak use days was 145 (99 and 102 trailers, respectively). The highest vehicle use count observed in this lot during the data collection was 242 on September 5, 2011.

Table 20. Parking lot traffic count results: Upper Dam East Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	85	60
5/20/11	Friday	Weekday low use	123	86
5/23/11	Monday	Weekday low use	65	46
5/24/11	Tuesday	Weekday low use	110	77
5/25/11	Wednesday	Weekday low use	88	62
5/26/11	Thursday	Weekday low use	63	44
5/27/11	Friday	Weekday low use	65	46
5/31/11	Tuesday	Weekday low use	97	68
6/1/11	Wednesday	Weekday low use	62	43
5/21/11	Saturday	Weekend high use	156	109
5/22/11	Sunday	Weekend high use	134	94
5/28/11	Saturday	Holiday peak use	79	55
5/29/11	Sunday	Holiday peak use	111	78
5/30/11	Monday	Holiday peak use	152	106

[1]The vehicle to trailer weighting ratio is 0.70

Table 21. Parking lot traffic count results: Upper Dam East Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	80	56
9/2/11	Friday	Weekday low use	107	75
9/6/11	Tuesday	Weekday low use	88	62
9/7/11	Wednesday	Weekday low use	92	64
9/8/11	Thursday	Weekday low use	102	71
9/9/11	Friday	Weekday low use	106	74
9/12/11	Monday	Weekday low use	102	71
9/13/11	Tuesday	Weekday low use	90	63
9/14/11	Wednesday	Weekday low use	106	74
9/10/11	Saturday	Weekend high use	148	104

9/11/11	Sunday	Weekend high use	131	92
9/3/11	Saturday	Holiday peak use	149	104
9/4/11	Sunday	Holiday peak use	140	98
9/5/11	Monday	Holiday peak use	242	169

[1]The vehicle to trailer weighting ratio is 0.70

Table 22. Average number of vehicles per day Upper Dam East Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	145	102
Weekend high use	142	99
Weekday low use	90	63

[1]The vehicle to trailer weighting ratio is 0.70

Parking lot traffic count results: Parking Lot 1

The traffic counter data for Parking Lot 1 are displayed in Tables 23, 24, and 25. The number of vehicles entering Parking Lot 1 on low use weekdays ranged from 4 to 34 with 3 to 27 trailers respectively; and the average on low use days was 19 vehicles with 15 trailers. There was not much difference between the high use day and peak use day ranges. The number of vehicles on weekend high use days ranged from 13 to 54 (10 to 42 trailers). The number of vehicles on peak use days ranged from 12 to 47 (9 to 37 trailers). The average for high use days (31 vehicles) was higher than the average for peak use days (24 vehicles) (24 and 19 trailers, respectively). The highest vehicle count for Parking Lot 1 was observed during a regular high use weekend and not during a holiday peak use weekend (54 vehicles on May 22, 2011).

Table 23. Parking lot traffic count results: Parking Lot 1, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	34	27
5/20/11	Friday	Weekday low use	30	23
5/23/11	Monday	Weekday low use	25	20
5/24/11	Tuesday	Weekday low use	20	16
5/25/11	Wednesday	Weekday low use	21	16
5/26/11	Thursday	Weekday low use	24	19
5/27/11	Friday	Weekday low use	29	23
5/31/11	Tuesday	Weekday low use	33	26
6/1/11	Wednesday	Weekday low use	22	17
5/21/11	Saturday	Weekend high use	43	34
5/22/11	Sunday	Weekend high use	54	42
5/28/11	Saturday	Holiday peak use	28	22
5/29/11	Sunday	Holiday peak use	16	12
5/30/11	Monday	Holiday peak use	47	37

[1]The vehicle to trailer weighting ratio is 0.78

Table 24. Parking lot traffic count results: Parking Lot 1, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	4	3
9/2/11	Friday	Weekday low use	18	14
9/6/11	Tuesday	Weekday low use	13	10
9/7/11	Wednesday	Weekday low use	6	5
9/8/11	Thursday	Weekday low use	18	14
9/9/11	Friday	Weekday low use	16	12
9/12/11	Monday	Weekday low use	15	12
9/13/11	Tuesday	Weekday low use	8	6
9/14/11	Wednesday	Weekday low use	12	9
9/10/11	Saturday	Weekend high use	13	10
9/11/11	Sunday	Weekend high use	13	10

9/3/11	Saturday	Holiday peak use	16	12
9/4/11	Sunday	Holiday peak use	12	9
9/5/11	Monday	Holiday peak use	23	18

[1]The vehicle to trailer weighting ratio is 0.78

Table 25. Average number of vehicles per day Parking Lot 1

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	24	19
Weekend high use	31	24
Weekday low use	19	15

[1]The vehicle to trailer weighting ratio is 0.78

Parking lot traffic count results: Lower Dam Recreation Area Entrance

The traffic counter data for the Lower Dam Recreation Area Entrance are displayed in Tables 26, 27, and 28. The number of vehicles entering the Lower Dam Recreation Area parking lot on low use weekdays ranged from 99 to 353 with 72 to 258 trailers respectively; and the average on low use days was 157 vehicles with 115 trailers. There was overlap between the high use day and peak use day ranges. There was also an extreme peak use value observed at this lot. The number of vehicles on weekend high use days ranged from 312 to 486 (228 to 355 trailers). The number of vehicles on peak use days ranged from 197 to 700 (144 to 511 trailers). The average for high use days was 387 and peak use days was 390 (283 and 285 trailers, respectively). The highest vehicle count observed during the data collection was 700 on September 5, 2011.

Table 26. Parking lot traffic count results: Lower Dam Recreation Area Entrance, 5/19/11 to 6/1/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
5/19/11	Thursday	Weekday low use	162	118
5/20/11	Friday	Weekday low use	353	258
5/23/11	Monday	Weekday low use	129	94
5/24/11	Tuesday	Weekday low use	174	127
5/25/11	Wednesday	Weekday low use	117	85
5/26/11	Thursday	Weekday low use	137	100
5/27/11	Friday	Weekday low use	112	82
5/31/11	Tuesday	Weekday low use	176	128
6/1/11	Wednesday	Weekday low use	200	146
5/21/11	Saturday	Weekend high use	405	296
5/22/11	Sunday	Weekend high use	486	355
5/28/11	Saturday	Holiday peak use	197	144
5/29/11	Sunday	Holiday peak use	216	158
5/30/11	Monday	Holiday peak use	357	261

[1]The vehicle to trailer weighting ratio is 0.73

Table 27. Parking lot traffic count results: Lower Dam Recreation Area Entrance, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	138	101
9/2/11	Friday	Weekday low use	192	140
9/6/11	Tuesday	Weekday low use	161	118
9/7/11	Wednesday	Weekday low use	143	104
9/8/11	Thursday	Weekday low use	170	124
9/9/11	Friday	Weekday low use	115	84
9/12/11	Monday	Weekday low use	144	105
9/13/11	Tuesday	Weekday low use	111	81
9/14/11	Wednesday	Weekday low use	99	72
9/10/11	Saturday	Weekend high use	344	251
9/11/11	Sunday	Weekend high use	312	228

9/3/11	Saturday	Holiday peak use	380	277
9/4/11	Sunday	Holiday peak use	489	357
9/5/11	Monday	Holiday peak use	700	511

[1]The vehicle to trailer weighting ratio is 0.73

Table 28. Average number of vehicles per day Lower Dam Recreation Area Entrance

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	390	285
Weekend high use	387	283
Weekday low use	157	115

[1]The vehicle to trailer weighting ratio is 0.73

Parking lot traffic count results: Parking Lot 7

The traffic counter data for Parking Lot 7 are displayed in Tables 29 and 30. Data were only collected for one two-week period in this lot. The number of vehicles entering Parking Lot 7 on low use weekdays ranged from 14 to 36 with 2 to 5 trailers respectively; and the average on low use days was 23 vehicles with 3 trailers. There was not much difference between the high use day and peak use day ranges. The number of vehicles on weekend high use days ranged from 23 to 42 (3 to 6 trailers). The number of vehicles on peak use days ranged from 26 to 43 (4 to 6 trailers). The average for high use days was 32 and peak use days was 35 (4 and 5 trailers, respectively).

Table 29. Parking lot traffic count results: Parking Lot 7, 9/1/11 to 9/14/11

Date	Day of week	Use Level Designation	Number of vehicles	Trailer Estimate[1]
9/1/11	Thursday	Weekday low use	19	3
9/2/11	Friday	Weekday low use	31	4
9/6/11	Tuesday	Weekday low use	18	3
9/7/11	Wednesday	Weekday low use	22	3
9/8/11	Thursday	Weekday low use	29	4

9/9/11	Friday	Weekday low use	36	5
9/12/11	Monday	Weekday low use	21	3
9/13/11	Tuesday	Weekday low use	19	3
9/14/11	Wednesday	Weekday low use	14	2
9/10/11	Saturday	Weekend high use	42	6
9/11/11	Sunday	Weekend high use	23	3
9/3/11	Saturday	Holiday peak use	26	4
9/4/11	Sunday	Holiday peak use	43	6
9/5/11	Monday	Holiday peak use	37	5

[1]The vehicle to trailer weighting ratio is 0.14

Table 30. Average number of vehicles Parking Lot 7

Use Level Designation	Average number of vehicles	Trailer Estimate[1]
Holiday peak use	35	5
Weekend high use	32	4
Weekday low use	23	3

[1]The vehicle to trailer weighting ratio is 0.14

Parking lot traffic count summary

The Lower Dam Recreation Area was the highest use lot and exhibited the largest variation in use levels with the highest individual count of vehicles (700 vehicles on September 5, 2011). Parking Lots 1 and 7 were similar in terms of use with averages of 22 and 27 respectively. However, Parking Lot 1 displayed greater variation in use with a range of 50 vehicles compared to 29 vehicles in Lot 7. Sampling occurred on both Memorial Day (5/28 to 5/30 2011) and Labor Day (9/3 to 9/5 2011) weekends. Parking lot counts were consistently higher on Labor Day weekend compared to Memorial Day weekend.

References Cited

Gorzelany, J.F., 2005 Recreational boater traffic surveys of Broward County, Florida: technical report submitted to Florida Fish and Wildlife Conservation Commission, 89 pp.

Appendix 1: Lake Use Observation Data Sheet

Lake Lowell Recreational Lake Use Study

Page #: of:

ZONE:	WEATHER:
DATE:	WIND SPEED / DIRECTION:
TIME WINDOW:	AVERAGE TEMPERATURE:
OBSERVER(S):	LAKE SURFACE CONDITION:

CODES

TYPE: motorboat (1), pontoon boat (2), human powered -kayak/canoe/float (3), sailboat (4), personal watercraft (5), kite boarder (6), wind surfer (7), other (8)

SIZE: less than 16 ft (1), 16 - 25 (2), 26 - 39 (3), 40 - 64 (4), 65 - 109 (5)

SPEED: Idle (0), Slow (1), Plowing (2), Cruising (3), Planing (4), Under sail (5) Paddling (6)

LOCATION: Open water (1), Emergent bed (2), edge of emergent bed (3), bank (4), Dock (5)

ACTIVITY: Travel (1), Milling (2), Skiing & tubing (3), Fishing (4), Recreation (5), Docked (6),

COMPLIANCE: Compliant (0), Non-compliance (1), Not Applicable (NA)

RECORD #	TIME	TYPE	SIZE	ACTIVITY	LOCATION	SPEED	COMPLIANCE	COMMENTS

Appendix 2: Boater Observation Sampling Schedule

date	use level	survey location	time block
Sunday, April 24, 2011	high	2=HQ Platform	2=10am to 1pm
Tuesday, April 26, 2011	low	1=lower dam	1=7am to 10am
Saturday, April 30, 2011	high	3=Gotts Point	3=1pm to 4pm
Thursday, May 05, 2011	low	2=HQ Platform	2=10am to 1pm
Saturday, May 07, 2011	high	1=lower dam	4=4pm to 7pm
Friday, May 13, 2011	low	3=Gotts Point	3=1pm to 4pm
Sunday, May 15, 2011	high	2=HQ Platform	1=10am to 1pm
Wednesday, May 18, 2011	low	1=lower dam	1=10am to 1pm
Monday, May 23, 2011	low	2=HQ Platform	4=4pm to 7pm
Sunday, May 29, 2011	peak	1=lower dam	2=10am to 1pm
Monday, May 30, 2011	peak	2=HQ Platform	3=1pm to 4pm
Saturday, June 04, 2011	high	3=Gotts Point	1=10am to 1pm
Tuesday, June 07, 2011	low	3=Gotts Point	5=7pm to 9pm
Sunday, June 12, 2011	high	1=lower dam	2=10am to 1pm
Thursday, June 16, 2011	low	1=lower dam	4=4pm to 7pm
Saturday, June 18, 2011	high	2=HQ Platform	3=1pm to 4pm
Friday, June 24, 2011	low	2=HQ Platform	2=10am to 1pm
Wednesday, June 29, 2011	low	3=Gotts Point	3=1pm to 4pm
Saturday, July 02, 2011	peak	3=Gotts Point	4=4pm to 7pm
Sunday, July 03, 2011	peak	1=lower dam	5=7pm to 9pm
Sunday, July 10, 2011	high	2=HQ Platform	4=4pm to 7pm
Monday, July 11, 2011	low	1=lower dam	2=10am to 1pm
Saturday, July 16, 2011	high	3=Gotts Point	5=7pm to 9pm
Tuesday, July 19, 2011	low	2=HQ Platform	5=7pm to 9pm
Sunday, July 24, 2011	high	1=lower dam	5=7pm to 9pm
Thursday, July 28, 2011	low	3=Gotts Point	1=10am to 1pm
Friday, August 05, 2011	low	1=lower dam	5=7pm to 9pm
Saturday, August 06, 2011	high	2=HQ Platform	1=10am to 1pm
Wednesday, August 10, 2011	low	2=HQ Platform	3=1pm to 4pm
Sunday, August 14, 2011	high	3=Gotts Point	2=10am to 1pm
Monday, August 15, 2011	low	3=Gotts Point	4=4pm to 7pm
Saturday, August 20, 2011	high	1=lower dam	3=1pm to 4pm
Tuesday, August 23, 2011	low	1=lower dam	5=7pm to 9pm
Sunday, August 28, 2011	high	2=HQ Platform	4=4pm to 7pm
Thursday, September 01, 2011	low	2=HQ Platform	1=10am to 1pm
Saturday, September 03, 2011	peak	2=HQ Platform	1=10am to 1pm
Monday, September 05, 2011	peak	3=Gotts Point	2=10am to 1pm
Friday, September 16, 2011	low	3=Gotts Point	2=10am to 1pm
Saturday, September 17, 2011	high	3=Gotts Point	5=7pm to 9pm
Wednesday, September 21, 2011	low	1=lower dam	3=1pm to 4pm
Monday, September 26, 2011	low	2=HQ Platform	4=4pm to 7pm

Appendix 3: Parking Lot Count Data Sheet

LAKE LOWELL PARKING LOT COUNTS

Date:_____ Weekend Weekday

Area: Lower Dam Upper Dam West Upper Dam East Parking Lot 1 or 7

Time Block: 7am to 9 am 1pm to 3pm 5pm to 7pm

Observer: _____

Time Start: _____ Time End:_____

Weather:_____

Time	Car	Truck/Van	Vehicle w/ Trailer			Motor-cycle	RV	Approx Length	Activity	Comment
			Motorized Boat	Nonmotorized Boat	Jet ski					

Activity: 1 = Fishing 2 = Water Skiing 3 = Jet skiing 4 = Sailing 5 = Other Recreation

Appendix M. Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge

Document continues on the following page.

DRAFT for REVIEW

Regional Economic Impacts of Current and Proposed Management Alternatives for Deer Flat National Wildlife Refuge

By Lynne Koontz, Catherine M. Cullinane Thomas, and Erik Larsen

Introduction

The National Wildlife Refuge System Improvement Act of 1997 requires all units of the National Wildlife Refuge System to be managed under a Comprehensive Conservation Plan (CCP). The CCP must describe the desired future conditions of a Refuge and provide long range guidance and management direction to achieve refuge purposes. The Deer Flat National Wildlife Refuge (Refuge) is in the process of developing a range of management goals, objectives, and strategies for the CCP. The CCP must contain an analysis of expected effects associated with current and proposed Refuge management strategies.

For CCP planning, a regional economic analysis provides a means of estimating how current management (No Action Alternative) and proposed management activities (Action Alternatives) affect the local economy. This type of analysis provides two critical pieces of information: 1) it illustrates the Refuge's contribution to the local community; and 2) it can help in determining whether economic effects are or are not a real concern in choosing among management alternatives.

It is important to note that the economic value of the Refuge encompasses more than just the impacts on the regional economy. The Refuge also provides substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill, 2007). However, quantifying these types of nonmarket values is beyond the scope of this study.

This report first presents a description of the local communities and economy near the Refuge. Next, the methods used to conduct a regional economic impact analysis are described. An analysis of the final CCP management strategies that could affect stakeholders and residents and the local economy is then presented. The management activities of economic concern in this analysis are:

- Purchases of goods and services within the local community;
- Personnel salary spending;
- Revenues generated from Refuge Revenue Sharing; and
- Spending in the local community by Refuge visitors

Regional Economic Setting

Located southwest of Boise, Idaho, the Refuge has two units, Lake Lowell and the Snake River Islands. The Lake Lowell Unit encompasses more than 10,500 acres, including the almost 9,000-acre Lake Lowell and surrounding lands. The Snake River Islands Unit contains about 1,200 acres on over 100 islands. These islands are distributed along 113 river miles from the Canyon-Ada County Line in Idaho to Farewell Bend in Oregon.

Refuge visitors can enjoy a variety of wildlife-dependent recreational activities, (i.e., wildlife-watching and photography, hunting, fishing, and environmental education and interpretation), as well as non-wildlife dependent recreational activities, including recreational boating, horseback riding, and dog walking. These recreational opportunities attract outside visitors and bring in dollars to the community. Associated visitor activities—such as spending on food, gasoline, and overnight lodging in the area—provides local businesses with supplemental income and increases the local tax base. Management decisions for the Refuge about public use, expansion of services, and habitat improvement may either increase or decrease visitation to the complex and, thus, affect the amount of visitor spending in the local economy.

For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30-60 mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured and the multiplier effects. After consultation with the Refuge staff, it was decided that only the Lake Lowell Unit would be considered for the economic analysis due to the relatively small amount of visitation to the Snake River Islands Unit. The Lake Lowell Unit lies within Canyon County, Idaho. The city of Boise, located in Ada County, is approximately 28 miles from the Refuge. Most of the economic activity related to the Lake Lowell Unit is located within Canyon and Ada counties. Therefore, this two-county area comprises the local economic region for this analysis. The next sections describe the socioeconomic characteristics and trends in the two-county region.

Population and Density

Table 1 summarizes the population characteristics of Idaho and the local two-county area. In 2010, the U.S. Census Bureau estimated the total population for the two counties to be 581,288, or 37% of Idaho's total population. Ada County was the most heavily populated county in both the study area and the state with 392,365 residents in 2010. Canyon County (188,923 residents) was the second most populous county of the state in this same year (United States Census Bureau, 2012; Idaho Department of Labor, 2011a; Idaho Department of Labor, 2011b). In the years leading up to the economic recession of the late 2000s, the two-county area experienced rapid population growth, with the respective populations of Ada and Canyon Counties increasing by 24% and 36% between the years of 2000 and 2008 (United States Census Bureau, 2012). The rapid population growth in the study area throughout the majority of the past decade has been motivated by several factors, including a healthy labor market, relatively low real estate prices, ample opportunity for outdoor recreation, and easy access to the Boise Metro Area (Idaho Department of Labor, 2011b; Cauchon, 2007).

Table 1. Population Estimates for the State and Counties Near the Refuge

Area	Population (2010)†	% Change (2000-2010)†	Persons per Square Mile (2010) †	Expected Population Growth (2010-2030) ‡
Idaho	1,567,582	21.1%	19	31%
Ada County	392,365	30.4%	373	42%
Canyon County	188,923	43.7%	322	34%

Source: † (United States Census Bureau, 2012) and ‡ (Church, 2003)

In the final two years of the decade, population growth in the study area slowed due to repercussions of the national economic recession, with the populations of Ada and Canyon Counties averaging only 2.0% and 3.0% growth, respectively, during these years (United States Census Bureau, 2012). Despite slowed growth from 2008 to 2010, the Treasure Valley and Boise Metro Area remain among some of the fastest growing regions of the state over the past decade; they are expected to continue to be so over the coming decades (Bureau of Economic Analysis, 2010; Church, 2003).

In 2010, the population densities of both counties in the region were between 300-400 persons per square mile, with Ada County being more densely populated (373 persons per square mile) than Canyon County (322 persons per square mile) (United States Census Bureau, 2012). Both counties had substantially higher population densities than the state of Idaho as a whole (nineteen persons per square mile in 2010). In the case of Ada County, the high population density is largely due to the city of Boise, which accounted for over half (52%) of the county's 2010 populace (United States Census Bureau, 2012). Similarly, the cities of Nampa (81,557 residents) and Caldwell (46,237 residents) collectively accounted for 68% of the population of Canyon County in 2010 (United States Census Bureau, 2012). Rural areas are more sparsely populated than the data shown in Table 1.

Population Projections

Future population projections for the two-county area as well as the state of Idaho are characterized by in-migration over the next twenty years. The population of Idaho is expected to increase by 31% over the course of the next two decades, and, by 2030, it is projected to reach nearly two million (Church, 2003). During these years, Idaho is anticipated to be one of the fastest growing states, with growth rate projections consistently among the top ten in the nation (United States Census Bureau, 1996). In 2010, the most populated regions in Idaho included parts of the Treasure Valley and Boise Metro Regions (i.e., Ada and Canyon Counties) (United States Census Bureau, 2012). These regions, which correspond to some of the state's largest population centers (e.g., the cities of Boise, Nampa, Caldwell), are expected to remain the most populated areas statewide over the next two decades. The Treasure Valley and Boise Metro Region is expected to be the fastest growing region in the state over the next twenty years, with Valley, Boise, Ada, and Canyon Counties averaging a growth rate of 42% over this time horizon. The two counties that make up the study area are expected to remain among the fastest growing counties in the state, with Ada and Canyon Counties projected to be the first and eighth fastest growing counties statewide over the next two decades (Church, 2003).

Gender, Age and Racial Composition

In 2010, the median age of residents in Canyon County (31.6 years) was lower than the state median of 34.6 years and the Ada County median of 34.8 years (United States Census Bureau, 2012) (United States Census Bureau, 2012). In 2010, the racial demographics of Ada County were very similar to those of the state (Table 2). In Canyon County the percentage of Hispanic or Latino residents was approximately 13% higher while the percentage of white residents was 6% lower than the state average (United States Census Bureau, 2012).

Table 2. Racial Demographics for the State and Counties Near the Refuge (2010)

Area	**Idaho**	**Ada County**	**Canyon County**
		% of Total Population	
White alone	89.0%	90.3%	83.0%
Hispanic or Latino	11.2%	7.1%	23.9%
Two or more races	2.5%	2.9%	3.0%
Asian alone	1.2%	2.4%	0.8%
Black or African American alone	0.6%	1.1%	0.6%
American Indian and Alaska Native alone	1.4%	0.7%	1.0%
Native Hawaiian and other Pacific Islander alone	0.2%	0.2%	0.2%

Source: (United States Census Bureau, 2012)

Economic Conditions and Trends

Unemployment and Poverty

Since the early 1990s, trends in the unemployment rate in the state of Idaho have generally paralleled the national average, with unemployment trending downward in the late 1990s to reach levels below the national average by the mid-2000s before increasing again in the latter half of the same decade (Bureau of Labor Statistics, 2011a). The period of expansion in the early 2000s may be attributed to several factors, including the growth of several service industries, the continued development of the state's technology sector, and increasing demand for local government and construction services as the state's population continued to grow (Idaho Division of Financial Management, 2004). In 2008, Idaho's unemployment rate trended sharply upward as the state began to feel the recessionary effects of a sluggish national economy, with the construction, manufacturing, financial services, administrative and support services, and retail trade industries suffering the greatest job losses in the state's economy (Idaho Department of Labor, 2011c; Idaho Department of Labor, 2009). Since 1990, unemployment in the study area exhibited similar trends as statewide unemployment, with Ada County and Canyon County averaging unemployment rates of 4.0% and 5.8%, respectively, over the past two decades (Bureau of Labor Statistics, 2011a). Between 2008 and 2010, unemployment in the two-county area saw a sharp increase, particularly in Canyon County where the combined effects of slowed population growth, a struggling housing market, and rising lumber, concrete, and fuel prices decreased the local demand for labor (Idaho Department of Labor, 2011a).

Table 3 summarizes measures of unemployment, poverty, and income in the two-county area. In 2010, the median household income in Idaho as a whole was $43,490, which was about $6,500 lower than the national median household income of $50,046 (United States Census Bureau, 2012). Median household income in the region averaged $46,672, with the median income in Ada County ($50,612) being substantially higher than that in Canyon County ($42,732).

Table 3. Unemployment, Poverty, and Household Income for the State and Counties Near the Refuge

Area	Median Household Income 2010	Unemployment Rate 2010	Net Change in Unemployment Rate 2007-2010	Percent of Persons Below Poverty 2010
Idaho	$43,490	9.5%	6.5%	25.0%
Ada County	$50,612	8.9%	6.4%	29.8%
Canyon County	$42,732	11.3%	7.8%	16.2%

Source: United States Census Bureau, 2012

As shown in Table 3, poverty levels in Canyon County (16.2%) were below the state average of 25% in 2010. In contrast, poverty levels in Ada County (29.8%) were greater than the state average in 2010. The two-county area averaged 23% of its population below the 2010 poverty line (United States Census Bureau, 2012).

Employment and Income by Industry

Table 4 summarizes employment by industry for the two-county area. In 2009, total employment in the local area represented 339,730 jobs with about 77% of these jobs located in Ada County. Sixty percent of the total employment in the study area came from five main sectors (Bureau of Economic Analysis, 2010): professional, scientific, management, administration, and waste services; educational, health, and social services; retail trade; finance, insurance, real estate, and rental and leasing; and public administration. In 2008, the two largest employers in Ada County were Micron Technology and Hewlett Packard; these companies remain some of the largest local employers in Ada County (Ada County Accounting Department, 2008; Idaho Department of Labor, 2011b). In Canyon County, the largest local employers in the past decade have been in the education, manufacturing, health care, food processing, and wood processing sectors. These employers currently include the Caldwell and Nampa School Districts, the St. Alphonsus Medical Center, Plexus, the Amalgamated Sugar Company, and Woodgrain Milwork Incorporated (Idaho Department of Labor, 2011a; City of Nampa Department of Planning and Zoning, 2003).

Professional, scientific, management, administration, and waste services accounted for the largest percentage of total employment in the region, with 15.6% of total local employment coming from this sector. In the two-county area, most jobs in education, health, and social services (77%) and public administration (87%) were located in Ada County, which is home to both the state capital and Boise State University. These sectors were the second and fifth largest sectors of the local economy, respectively, and accounted for 13.1% and 10.3% of total employment in the combined two-county area (Bureau of Economic Analysis, 2010).

On the whole, farm employment accounted for a relatively small share (1.5%) of total employment in the region. Employment from this sector, however, did account for a larger share of total employment located in Canyon County (4% of total in-county employment) than Ada County (less than one percent). On the whole, Ada County was much less dependent on farm earnings (less than one percent of total in-county farm earnings) than the state as a whole, which had about 4.0% of its total earnings coming from farming; the opposite is true of Canyon County, which had 4.7% of its total earnings from farming (Bureau of Economic Analysis, 2010).

Table 4. Employment by Industry for the Counties Near the Refuge

	Ada County	**Canyon County**	**Two-County Area**
Total Employment (jobs) in 2009	**262,868**	**78,862**	**339,730**
Percent of Employment by Sector			
Professional, scientific, management, admin., and waste services	17%	9%	16%
Educational, health, and social services	13%	13%	13%
Retail trade	11%	13%	11%

Finance, insurance, real estate, and rental & leasing	11%	8%	10%
Public administration	10%	11%	10%
Arts, entertainment, recreation, accommodation, and food services	9%	6%	8%
Manufacturing	6%	10%	7%
Construction	6%	8%	7%
Other Services (except public administration)	5%	6%	5%
Wholesale trade	4%	3%	4%
Transportation and Warehousing	2%	4%	3%
Agriculture, forestry, fishing and hunting, and mining	1%	6%	2%
Information Services	2%	1%	2%

Source: (Bureau of Economic Analysis, 2010)

Land Use and Ownership Changes Surrounding Refuge Lands

Current Land Use

Idaho's Treasure Valley lies within a flat lowland known as the Snake River Plain. The Treasure Valley stretches across the southwest corner of the state and is bounded by the Boise Front Range to the northeast and the Owyhee Mountains to the southwest (Petrich, Wilkins, Tondee, & Morse, 2002). This valley closely coincides with the two-county study area, and it houses some of Idaho's largest metropolitan areas, including the cities of Boise, Caldwell, and Nampa, which collectively accounted for about 21% of the state's 2010 population (United States Census Bureau, 2012). As of 2008, about 30% of the land in the two-county area near the Refuge was federally owned, with the majority of federal land ownership accounted for by Bureau of Land Management holdings (21% of all land in the two-county area). About 65% of the land in the study area was privately owned and the remaining 4% was State-owned (Conservation Biology Institute, 2006 [data complied using the Economic Profile System-Human Dimensions Toolkit (EPS-HDT) developed by Headwaters Economics]).

Ada County is largely covered by grassland and shrubland, which account for about 75% of all land cover in the County. Mixed cropland is also prevalent, accounting for 17% of the land cover (NASA, 2006 [data complied using EPS-HDT]). As of 2008, urban development accounted for 6% of all land cover in the County, with the greater Boise area (i.e., the cities of Boise, Eagle, Garden City, Kuna, Meridian, and Star) accounting for 332,646 residents, or about 85% of the county's total 2010 population (United States Census Bureau, 2012). Land ownership in Ada County in 2008 was 49% private, 43% Federal, 7% State, and 1% under other ownership (*i.e.* Tribal, City, County, or Other) (Conservation Biology Institute, 2006 [data complied using EPS-HDT]).

Canyon County is less urbanized with about 3% of the county's land cover being urban development in 2008. Mixed croplands accounted for about 75% of the county's land cover, grassland accounted for 14%, and shrubland accounted for 4% (NASA, 2006 [data complied using EPS-HDT]). Water

accounted for an additional 2% of land cover in Canyon County with the majority of this coming from Lake Lowell, which covers a total of 14.5 square miles of the county's land (NASA, 2006 [data complied using EPS-HDT]; United States Bureau of Reclamation, n.d.). In 2010, the largest municipalities in Canyon County included Nampa (81,557 residents), Caldwell (46,237 residents), and Middleton (5,524 residents), which collectively accounted for about 34% of the county's total population (United States Census Bureau, 2012). Land ownership in Canyon County in 2008 was 93% private, 6% Federal, 5% State owned, and 1% under other ownership (*i.e.* Tribal, City, County, or Other) (Conservation Biology Institute, 2006 [data complied using EPS-HDT]).

Changes in Land Use

As populations grow, the spread of American cities across the rural landscape has several potential environmental impacts including, for example, decreased watershed permeability, increased noise and air pollution, and the loss of arable land and open spaces (McMahan, Weber, & Sauder, 2002). In addition to these environmental impacts, urban sprawl may have significant economic impacts on local communities through increased costs of public community services such as emergency response, infrastructure, or public works and utilities (Chen, 2000; Speir & Stephenson, 2002). Population growth in Idaho over the past decades has been cause for the continued conversion of rural lands to urban purposes. Between 1982 and 1997, Idaho ranked 35th in the nation for the most rural acres converted for urban growth purposes, with 205,000 acres of rural land being converted (Goodwin, 2003). About half (45%) of this transformation took place between 1992 and 1997, with over 27,000 of these acres occurring in the two-county study area during this five year period. Land conversion in Ada and Canyon Counties between 1992 and 1997 occurred faster than in any other region in Idaho, with Ada County converting land at a rate of 4,480 acres per year and Canyon County averaging 2,600 acres per year (United States Department of Agriculture, 2000). Between 1997 and 2007, an additional 130,100 acres of land was developed statewide, resulting in 557,600 total acres of developed land in Idaho and representing a 61% increase from 1982 levels (United States Department of Agriculture, 2009). These trends of urbanization and sprawl are likely to continue in the future as statewide and local area populations are projected to continue growing over the next few decades.

Economic Impacts of Current and Proposed Management Activities

Methods for a Regional Economic Impact Analysis

Economic input-output models are commonly used to determine how economic sectors will and will not be affected by demographic, economic, and policy changes. The economic impacts of the management alternatives for the Refuge were estimated using IMPLAN (Impact Analysis for

Planning), a regional input-output modeling system developed by the USDA Forest Service. IMPLAN is a computerized database and modeling system that provides a regional input-output analysis of economic activity in terms of 10 industrial groups involving more than four hundred economic sectors (Olson and Lindall, 1999). The IMPLAN model draws upon data collected by the Minnesota IMPLAN Group from multiple federal and state sources including the Bureau of Economic Analysis, Bureau of Labor Statistics, and the U.S. Census Bureau (Olson and Lindall, 1999). For the Refuge analysis, the year 2009 IMPLAN 3.0 data profiles for Ada and Canyon counties were used for the local area analysis. The IMPLAN county level employment data estimates were found to be comparable to the US Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System data for the year 2009.

Because of the way industries interact in an economy, activity in one industry affects activity levels in several other industries. For example, if more visitors come to an area, local businesses will purchase extra labor and supplies to meet the increase in demand for additional services. The income and employment resulting from visitor purchases from local businesses represent the *direct* effects of visitor spending within the economy. Direct effects measure the net amount of spending that stays in the local economy after the first round of spending; the amount that doesn't stay in the local economy is termed a leakage (Carver and Caudill, 2007). In order to increase supplies to local businesses to meet increased demand, input suppliers must also increase their purchases of inputs from other industries. The income and employment resulting from these secondary purchases by input suppliers are the *indirect* effects of visitor spending within the economy. Employees of the directly affected businesses and input suppliers use their incomes to purchase goods and services. The resulting increased economic activity from new employee income is the *induced* effect of visitor spending. The indirect and induced effects are known as the secondary effects of visitor spending. "Multipliers" (or "Response Coefficients") capture the size of the secondary effects, usually as a ratio of total effects to direct effects (Stynes, 1998). The sums of the direct and secondary effects describe the total economic impact of visitor spending in the local economy.

For each alternative, regional economic effects from the IMPLAN model are reported for the following categories:

- **Employment** represents the change in the number of jobs generated in the region from a change in regional output. IMPLAN estimates for employment include both full time and part time workers, which are measured in total jobs.
- **Labor Income** includes employee wages and salaries, including income of sole proprietors and payroll benefits.
- **Value Added** measures contribution to Gross Domestic Product. Value added is equal to the difference between the amount an industry sells a product for and the production cost of the product, and is thus net of intermediate sales.

This economic impact analysis provides the potential economic effects associated with the implementation of the management alternatives for the Deer Flat National Wildlife Refuge. The CCP provides long range guidance and management direction to achieve the Refuge purposes over a 15-year timeframe. The planning team developed and analyzed four alternatives including current management. The economic impacts reported in this report are on an annual basis in 2011 dollars. Large management changes often take several years to achieve. The estimates reported for all the alternatives represent the final average annual economic effects after all changes in management have been implemented.

Impacts from Refuge Revenue Sharing

Under provisions of the Refuge Revenue Sharing (RRS) Act, local counties receive an annual payment for lands that have been purchased by full fee simple acquisition by the Service. Payments are based on the greater of 75 cents per acre or 0.75% of the fair market value of lands acquired by the Service. The exact amount of the annual payment depends on Congressional appropriations, which in recent years have tended to be less than the amount to fully fund the authorized level of payments. In fiscal year 2010 (FY10), actual RRS payments were 21% of authorized levels. FY10 RRS payments (made in 2011) totaled $4,547 to communities in Canyon County. Table 5 shows the resulting economic impacts of RRS payments under all alternatives. Accounting for both the direct and secondary effects, RRS payments for Alternatives 1, 2, 3, and 4 would generate total annual economic impacts of $1.9 thousand in labor income and $2.8 thousand in value added in the local two-county area.

Table 5. Annual Impacts from Refuge Revenue Sharing Payments for all Alternatives.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternatives 1, 2, 3, and 4			
Direct effects	0	$1.4	$1.8
Secondary effects	0	$0.5	$1.0
Total economic impact	0	$1.9	$2.8

Impacts from Public Use and Access Management

Refuge Visitor Expenditures in Local Economy

Spending associated with recreational visits to national wildlife refuges generates significant economic activity. The FWS report Banking on Nature: The Economic Benefits of National Wildlife Refuges

Visitation to Local Communities, estimated the impact of national wildlife refuges on their local economies (Carver and Caudill, 2007). According to the report, more than 34.8 million visits were made to national wildlife refuges in FY 2006 which generated $1.7 billion of sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated nearly 27,000 jobs, and over $542.8 million in employment income (Carver and Caudill, 2007). Approximately eighty-two percent of total expenditures were from non-consumptive activities, twelve percent from fishing, and six percent from hunting (Carver and Caudill, 2007).

The priority "Big-Six" wildlife dependent uses are offered on the Lake Lowell Unit including: hunting, fishing, wildlife observation and photography, interpretation, and environmental education. Additionally, several other non-priority uses occur on the Refuge including non-wildlife dependent boating, swimming, jogging, and picnicking.

This section focuses on the regional economic impacts associated with Refuge visitation. Annual visitation estimates are based on several Refuge statistic sources including: visitors entering the Visitor Center/Office, counting vehicles at dispersed access sites, and general observation by Refuge personnel. Annual visitation estimates are on a per visit basis. Visitor spending profiles are estimated on an average per day (8 hours) basis. Because some visitors only spend short amounts of time visiting the Refuge, counting each visit as a full visitor day would overestimate the economic impact of Refuge visitation. In order to properly account for the amount of spending, the annual number of visits were converted to visitor days. Results from a recent visitor survey conducted during the summer of 2011(Sexton et. al., 2012) showed that Refuge visitors spend on average: five hours for fishing and non-wildlife dependent boating; four hours for swimming; and three hours for wildlife related non-consumptive activities (wildlife watching & photography, environmental education, and interpretation) and land-based non-wildlife dependent activities (walking, jogging, picnicking). Refuge personnel estimate that big game and waterfowl hunters spend six hours while upland game and other migratory bird hunters spend approximately 4 hours on the Refuge.

To determine the local economic impacts of visitor spending, only spending by persons living outside of the local two-county area are included in the analysis. The rationale for excluding local visitor spending is twofold. First, money flowing into Ada and Canyon counties from visitors living outside the local area (hereafter referred to as non-local visitors) is considered new money injected into the local economy. Second, if residents of the local two-county area visit the Refuge more or less due to the management changes, it is likely that they will correspondingly change the spending of their money elsewhere in that local area, resulting in no net change to the local economy. These are standard assumptions made in most regional economic impact analyses at the local level. However, it is possible that potential Refuge management actions that would restrict boating and other non-priority recreation at the Refuge could result in visitors from the local area shifting their expenditures from Canyon County to Ada County or possibly going outside of Ada and Canyon counties to boat and recreate at reservoirs outside of the two-county area. To address the contribution of local Refuge

visitation, Appendix A provides a contribution analysis of local visitor expenditures in the two-county area. Refuge personnel determined the percentage of non-local Refuge visitors based on . Table 6 shows the estimated percent of current Refuge visits and visitor days by visitor activity.

Table 6. Estimated Current Annual Refuge Visitation.

Visitor Activity	Total annual number of visits	Number of hours spent at the Refuge	Total annual number of visitor days[a]	Percentage of non-local visits (%)	Number of non-local visitor days[a]
Priority Uses:					
Fishing	45,300	5	28,313	7%	1,982
Big game hunting	75	6	56	8%	5
Waterfowl hunting	5,000	6	3,750	8%	300
Other migratory bird hunting (mourning dove)	100	4	50	8%	4
Upland game hunting	1,100	4	550	8%	44
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	55,900	3	20,963	10%	2,096
Non-priority uses:					0
Non-wildlife dependent boating	49,400	5	30,875	13%	4,014
Swimming and other beach activities	38,700	4	19,350	13%	2,516
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking))	27,800	3	10,425	13%	1,355
Total Visitation	*223,375*		*114,331*		*12,315*

[a]One visitor day = 8 hours.

The Refuge staff used several sources to project changes in visitation by activity over the next 15 years for each alternative. The Refuge staff estimated visitor projections based on the following considerations: Idaho and national visitation trend data; changes in recreational programs, facilities, and resources under each alternative; and changes observed in visitation at Deer Flat NWR over the last 10 years (Refuge staff experience/judgment). Table 7 shows projected annual average number of visits and visitor days for each activity and alternative.

Table 7. Annual Average Number of Refuge Visits and Visitor Days by Activity and Alternative

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Total Visits				
Priority Uses:				
Fishing	48,430	48,430	23,260	12,710

Big game hunting	125	125	125	125
Waterfowl hunting	5,350	5,350	3,090	4,280
Other migratory bird hunting (mourning dove)	110	110	50	40
Upland game hunting	1,180	1,180	550	410
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	93,410	125,560	123,080	103,850
Non-priority uses:				
Non-wildlife dependent boating	55,080	50,040	21,480	0
Swimming and other beach activities	60,290	54,260	40,700	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	32,280	30,970	27,140	11,500
Total Annual Visits	*296,255*	*316,025*	*239,475*	*132,915*
Total Visitor Days				
Priority Uses:				
Fishing	30,269	30,269	14,538	7,944
Big game hunting	94	94	94	94
Waterfowl hunting	4,013	4,013	2,318	3,210
Other migratory bird hunting (mourning dove)	55	55	25	20
Upland game hunting	590	590	275	205
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	35,029	47,085	46,155	38,944
Non-priority uses:				
Non-wildlife dependent boating	34,425	31,275	13,425	0
Swimming and other beach activities	30,145	27,130	20,350	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	12,105	11,614	10,178	4,313
Total Visitor Days	*146,724*	*152,124*	*107,356*	*54,729*
Non-local Visitor Days				
Priority Uses:				
Fishing	2,119	2,119	1,018	556
Big game hunting	8	8	8	8
Waterfowl hunting	321	321	185	257
Other migratory bird hunting (mourning dove)	4	4	2	2
Upland game hunting	47	47	22	16
Non-Consumptive: wildlife watching & photography, environmental education, and Interpretation	3,503	4,709	4,616	3,894
Non-priority uses:				
Non-wildlife dependent boating	4,475	4,066	1,745	0
Swimming and other beach activities	3,919	3,527	2,646	0
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	1,574	1,510	1,323	561
Total Non-local Visitor Days	15,970	16,310	11,564	5,293

A visitor usually buys a wide range of goods and services while visiting an area. Major expenditure categories include lodging, restaurants, supplies, groceries, and recreational equipment rental. In this analysis we use average daily visitor spending profiles from the Banking on Nature report (Carver and Caudill, 2007) that were derived from the 2006 National Survey of Fishing, Hunting, and Wildlife Associated Recreation (U.S. Fish and Wildlife Service, 2007). The National Survey reports trip related spending of state residents and non-residents for several different wildlife-associated recreational activities. For each recreation activity, spending is reported in the categories of lodging, food and drink, transportation, and other expenses. Carver and Caudill (2007) calculated the average per-person per-day expenditures by recreation activity for each FWS region. We used the spending profiles for nonresidents for FWS Region 1 (Region 1 includes Idaho), and updated the 2006 spending profiles to 2011 dollars using the Consumer Price Index Inflation Calculator. Average daily spending profiles for nonresident visitors to Region 1 for fishing ($65.98 per-day), big game hunting ($94.98 per-day), upland game hunting ($172.41 per-day) and waterfowl hunting ($192.73 per-day) were used to estimate non-local visitor spending for Refuge fishing and hunting related activities. The average daily nonresident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) ($121.59 per-day) was used for all non-consumptive wildlife viewing activities including non-priority swimming and beach activities and land-based non-wildlife dependent activities.

Banking on Nature does not include a spending profile for boating. To account for expenditures by boaters, it was assumed that boaters have similar expenditures to other non-consumptive wildlife recreators, but have additional fuel expenses to power their motor boats. Based on this assumption, the boater spending profile for this analysis was constructed by adding average daily boating fuel expenditure costs to the average daily nonresident spending profile for non-consumptive wildlife recreation from the Banking on Nature report. Average daily boating fuel expenditures per party were estimated by multiplying the average outboard fuel consumption for 2- and 4-stroke boats (3.2 gallons/hour; Nissan Marine, 2012) by the U.S. average conventional retail gasoline prices for the summer of 2011 (May-August) ($3.68; U.S. Energy Information Administration, 2012). Average daily boating fuel expenditures per person were then calculated by dividing average daily boating fuel expenditures per party by the average number of persons in a boating party (4 persons/party; Sexton et. al., 2012). This resulted in an average daily boating fuel expenditure of $23.57 per-day and total nonresident daily boating expenditures of $145.16 per-day.

Total spending by non-local Refuge visitors was determined by multiplying the average non-local visitor daily spending by the number of non-local visitor days at the Refuge. The economic impacts of each alternative were estimated using IMPLAN. Table 8 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 1. Under Alternative 1, non-local Refuge visitors would spend approximately $1.95 million in the local economy annually. This

spending would directly account for 19 jobs, $538.2 thousand in labor income, and $877.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 9 jobs, $309.6 thousand in labor income, and $546.2 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 1 would generate total economic impacts of 28 jobs, $847.8 thousand in labor income, and $1.4 million in value added.

Table 8. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 1.

Alternative 1	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.1*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	1	$27.6	$45.8
Non-Consumptive (wildlife watching & photography, env. education, and interpretation)			
Direct effects	4	$111.4	$182.1
Secondary effects	2	$67.7	$118.9
Total effect	*6*	*$179.1*	*$301.0*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	7	$197.9	$322.6
Secondary effects	3	$105.3	$187.0
Total effect	*10*	*$303.1*	*$509.6*
Swimming and other beach activities			
Direct effects	4	$124.7	$203.8
Secondary effects	2	$75.7	$133.0
Total effect	*6*	*$200.4*	*$336.8*
Land-based non-wildlife dependent (walking, jogging, and other activities, e.g., picnicking)			
Direct effects	2	$50.1	$81.8
Secondary effects	1	$30.4	$53.4
Total effect	*3*	*$80.5*	*$135.2*
Aggregate Non-local visitation			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total effect	*28*	*$847.8*	*$1,423.8*

Table 9 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 2. Under Alternative 2, non-local Refuge visitors would spend approximately $1.99 million in the local economy annually. This spending would directly account for 19 jobs, $543.9 thousand in labor income, and $887.1 thousand in value added in the local economy. The secondary or

multiplier effects would generate an additional 10 jobs, $314.4 thousand in labor income, and $554.6 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 2 would generate total economic impacts of 29 jobs, $858.4 thousand in labor income, and $1.4 million in value added.

Table 9. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 2.

Alternative 2	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$36.4	$58.7
Secondary effects	1	$20.8	$36.6
Total effect	*2*	*$57.1*	*$95.3*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	1	$17.9	$28.6
Secondary effects	0	$9.8	$17.3
Total effect	*1*	*$27.6*	*$45.8*
Non-Consumptive (wildlife watching & photography, env.l education, and interpretation)			
Direct effects	5	$149.8	$244.8
Secondary effects	3	$91.0	$159.8
Total effect	*8*	*$240.7*	*$404.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	6	$179.8	$293.1
Secondary effects	3	$95.6	$169.9
Total effect	*9*	*$275.4*	*$463.0*
Swimming and other beach activities			
Direct effects	4	$112.2	$183.4
Secondary effects	2	$68.1	$119.7
Total effect	*6*	*$180.3*	*$303.1*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	2	$48.0	$78.5
Secondary effects	1	$29.2	$51.3
Total effect	*3*	*$77.2*	*$129.8*
Aggregate Non-local visitation			
Direct effects	19	$543.9	$887.1
Secondary effects	10	$314.4	$554.6
Total effect	*29*	*$858.4*	*$1,441.6*

Table 10 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 3. Under Alternative 3, non-local Refuge visitors would spend approximately $1.4 million in the local economy annually. This spending would directly account for 13 jobs, $377.8

thousand in labor income, and $616.6 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 6 jobs, $222.4 thousand in labor income, and $391.6 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 3 would generate total economic impacts of 19 jobs, $600.1 thousand in labor income, and $1 million in value added.

Table 10. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 3.

Alternative 3	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	1	$17.5	$28.2
Secondary effects	0	$10.0	$17.6
Total effect	*1*	*$27.4*	*$45.8*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$10.1	$16.2
Secondary effects	0	$5.5	$9.8
Total effect	*0*	*$15.6*	*$26.0*
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)			
Direct effects	5	$146.8	$240.0
Secondary effects	3	$89.2	$156.7
Total effect	*8*	*$236.0*	*$396.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	3	$77.2	$125.8
Secondary effects	1	$41.1	$72.9
Total effect	*4*	*$118.2*	*$198.7*
Swimming and other beach activities			
Direct effects	3	$84.1	$137.6
Secondary effects	1	$51.1	$89.8
Total effect	*4*	*$135.3*	*$227.4*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$42.1	$68.8
Secondary effects	1	$25.6	$44.9
Total effect	*2*	*$67.6*	*$113.7*
Aggregate Non-local visitation			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.4	$391.6
Total effect	*19*	*$600.1*	*$1,008.2*

Table 11 summarizes the economic impacts associated with current non-local Refuge visitation by activity for Alternative 4. Under Alternative 4, non-local Refuge visitors would spend approximately

$631 thousand in the local economy annually. This spending would directly account for 5 jobs, $164.5 thousand in labor income, and $268.3 thousand in value added in the local economy. The secondary or multiplier effects would generate an additional 2 jobs, $98.7 thousand in labor income, and $173.5 thousand in value added. Accounting for both the direct and secondary effects, spending by non-local visitors for Alternative 4 would generate total economic impacts of 7 jobs, $263.2 thousand in labor income, and $441.8 thousand in value added.

Table 11. Average Annual Impacts of Non-Local Visitor Spending by Activity for Alternative 4.

Alternative 4	**Employment** (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Priority uses			
Fishing			
Direct effects	0	$9.5	$15.4
Secondary effects	0	$5.5	$9.6
Total effect	*0*	*$15.0*	*$25.0*
Hunting (big game, waterfowl, and other migratory birds)			
Direct effects	0	$13.3	$21.2
Secondary effects	0	$7.1	$12.7
Total effect	*0*	*$20.4*	*$33.9*
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)			
Direct effects	4	$123.9	$202.5
Secondary effects	2	$75.2	$132.2
Total effect	*6*	*$199.1*	*$334.7*
Non-priority uses			
Non-wildlife dependent boating			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Swimming and other beach activities			
Direct effects	0	$0.0	$0.0
Secondary effects	0	$0.0	$0.0
Total effect	*0*	*$0.0*	*$0.0*
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)			
Direct effects	1	$17.8	$29.2
Secondary effects	0	$10.8	$19.0
Total effect	*1*	*$28.7*	*$48.2*
Aggregate Non-local visitation			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.7	$173.5
Total effect	*7*	*$263.2*	*$441.8*

Table 12 summarizes the total economic impacts associated with current non-local Refuge visitation by alternative. As shown in Table 12, the total annual average economic impacts for Alternative 2 would be similar to Alternative 1. The impacts for Alternative 3 would be approximately 30% less than the impacts for Alternative 1. Alternative 4 would have the largest decrease in impacts (approximately 70-75%) compared to Alternative 1.

Table 12. Average Annual Impacts of Non-Local Visitor Spending by Alternative.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total economic impact	28	$847.8	$1,423.8
Alternative 2			
Direct effects	19	$543.9	$887.1
Secondary effects	10	$314.4	$554.6
Total economic impact	29	$858.4	$1,441.6
Alternative 3			
Direct effects	13	$377.8	$616.6
Secondary effects	6	$222.4	$391.6
Total economic impact	19	$600.1	$1,008.2
Alternative 4			
Direct effects	5	$164.5	$268.3
Secondary effects	2	$98.7	$173.5
Total economic impact	7	$263.2	$441.8

Impacts from Refuge Administration

Staff – Personal Purchases

Refuge employees reside and spend their salaries on daily living expenses in the local area, thereby generating impacts within the local economy. Household consumption expenditures consist of payments by individuals/households to industries for goods and services used for personal consumption. The IMPLAN modeling system contains household consumption spending profiles that account for average household spending patterns by income level. These profiles allow for leakage of household spending to outside the region. The IMPLAN household spending pattern for households

earning $35-50 thousand dollars per year was used to reflect the average salary of full-time permanent employees at the Refuge ($46,000 per year). Table 13 illustrates current Refuge staffing and additional positions needed under Alternatives 2, 3, and 4.

Table 13. Current Staffing and Additional Positions Needed to Implement the CCP.

Current Refuge Staff Positions (Alternative 1)
Refuge Manager
Assistant Refuge Manager
Visitor Services Manager
Wildlife Biologist
Maintenance Worker
Administrative Assistant
Office Aid
Youth Conservation Corps Leader (full-time seasonal)
Youth Conservation Corps (4 full-time seasonal positions)
Environmental Education Specialist (Intern)
Volunteer Coordinator (Intern)
Biological Science Technician (Intern)
Additional positions needed to implement the CCP (for Alt 2,3, 4)
*Biological Science Technician
*Environmental Education Specialist
*Volunteer Coordinator
Law Enforcement Officer

*If these positions were funded, the current interns would not be necessary.

Refuge personnel estimate that annual salaries total around $524.6 thousand for Alternative 1 and would increase to $711.1 thousand under Alternatives 2, 3, and 4. Table 14 shows the economic impacts associated with spending of salaries in the local two-county area by Refuge employees under all Alternatives. For Alternative 1, salary spending by Refuge personnel would generate additional secondary effects (i.e. additional non-refuge jobs in the local economy) of 4 jobs, $133.9 thousand in labor income, and $249.3 thousand in value added in the local economy. Alternatives 2,3, and 4 would generate additional secondary effects of 5 jobs, $181.5 thousand in labor income, and $338 thousand in value added in the local economy.

Table 14. Annual Local Impacts of Salary Spending by Deer Flat NWR Personnel for by Alternative.

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			

Direct effects	0	$0.0	$0.0
Secondary effects	4	$141.1	$254.7
Total economic impact	*4*	*$141.1*	*$254.7*
Alternatives 2, 3, and 4			
Direct effects	0	$0.0	$0.0
Secondary effects	6	$191.2	$345.2
Total economic impact	*6*	*$191.2*	*$345.2*

Work-related Purchases

A wide variety of supplies and services are purchased for Refuge operations and maintenance activities. Refuge purchases made in the local two-county area contribute to the local economic impacts associated with the Refuge. Major local expenditures include: supplies and services related to annual maintenance costs for trails, buildings and signage, and small equipment; auto repairs, parts, and fuel; and utilities. Current Refuge non-salary recurring expenditures average approximately $204.7 thousand per year. Average annual costs (including recurring costs and the annual average of one-time project costs over the life of the plan) are anticipated to increase by $83.8 thousand for Alternative 1, $397 thousand for Alternative 2, $832.8 thousand for Alternative 3, and $362.6 thousand for Alternative 4. Total average annual non-salary costs would total $288.5 thousand for Alternative 1, $601.7 thousand for Alternative 2, $1.04 million for Alternative 3, and $567.3 thousand for Alternative 4. The large increase in costs under Alternative 3 are related to the construction of a boardwalk. According to Refuge records, approximately 80% of the annual non-salary budget expenditures are spent on goods and services purchased in the local two-county area. Table 15 shows the economic impacts associated with work-related expenditures in local communities near the Refuge. For Alternative 1, work-related purchases would generate a total economic impact of 3 jobs, $122.9 thousand in labor income, and $179.3 thousand in value added. Work-related purchases under Alternative 3 would generate the largest total economic impact of 15 jobs, $536.6 thousand in labor income, and $734.4 thousand in value added.

Table 15. Local Economic Impacts of Refuge Related Purchases by Alternative

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Alternative 1			
Direct effects	2	$76.5	$100.1
Secondary effects	1	$46.4	$79.2
Total economic impact	3	$122.9	$179.3
Alternative 2			
Direct effects	5	$177.4	$212.9
Secondary effects	3	$103.7	$176.3

Total economic impact	8	$281.1	$389.2
Alternative 3			
Direct effects	9	$326.9	$385.5
Secondary effects	6	$209.7	$348.9
Total economic impact	15	$536.6	$734.4
Alternative 4			
Direct effects	4	$165.4	$199.2
Secondary effects	3	$95.1	$162.3
Total economic impact	7	$260.5	$361.5

Summary of Economic Impacts for Alternative 1 (Status Quo)

Table 16 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 1. Under Alternative 1, management activities directly related to Refuge operations generate an estimated 21 jobs, $616.0 thousand in labor income, and $979.5 thousand in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities generate a total economic impact of 35 jobs, $1.1 million in labor income, and $1.8 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 1 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 16. Summary of all Refuge management activities for Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	2	$77.8	$101.9
Total Effects	7	$265.9	$436.8
Non-local Public Use Activities			
Direct effects	19	$538.2	$877.6
Total Effects	28	$847.8	$1,423.8
Aggregate Impacts			
Direct effects	21	$616.0	$979.5

Total effects	35	$1,113.6	$1,860.7

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 2 (Preferred Alternative)

Table 17 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 2. Under Alternative 2, management activities directly related to Refuge operations would generate an estimated 24 jobs, $722.7 thousand in labor income, and $1.1 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 43 jobs, $1.3 million in labor income, and $2.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 2 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 17. Summary of all Refuge management activities for Alternative 2

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	5	$178.8	$214.7
Total Effects	14	$474.2	$737.3
Non-local Public Use Activities			
Direct effects	19	$543.9	$887.1
Total Effects	29	$858.4	$1,441.6
Aggregate Impacts			
Direct effects	24	$722.7	$1,101.8
Total effects	43	$1,332.6	$2,178.9

[a.] Staff salary spending and work related purchases

Table 18 summarizes the change in economic effects associated with Refuge operations under Alternative 2 as compared to Alternative 1. Due to increases in visitation and administration, Alternative 2 would generate 8 more jobs, $219.0 thousand more in labor income, and $318.3 thousand more in value added as compared to Alternative 1.

Table 18. Change in economic impacts under Alternative 2 compared to Alternative 1

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 3	(+) $100.9	(+) $112.8
Total Effects	(+) 7	(+) $208.4	(+) $300.5
Non-local Public Use Activities			
Direct effects	no change	(+) $5.7	(+) $9.5
Total Effects	(+) 1	(+) $10.6	(+) $17.8
Aggregate Impacts			
Direct effects	(+) 3	(+) $106.7	(+) $122.3
Total effects	(+) 8	(+) $219.0	(+) $318.3

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 3

Table 19 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 3. Under Alternative 3, Refuge management activities directly related to Refuge operations would generate an estimated 22 jobs, $706.0 thousand in labor income, and $1.0 million in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 40 jobs, $1.3 million in labor income, and $2.1 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 3 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 19. Summary of all Refuge management activities for Alternative 3

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	9	$328.3	$387.4
Total Effects	21	$729.8	$1,082.5
Non-local Public Use Activities			

Direct effects	13	$377.8	$616.6
Total Effects	19	$600.1	$1,008.2
Aggregate Impacts			
Direct effects	22	$706.0	$1,003.9
Total effects	40	$1,329.9	$2,090.7

[a.] Staff salary spending and work related purchases

Table 20 summarizes the change in economic effects associated with Refuge operations under Alternative 3 as compared to Alternative 1. Due to substantial increases in Refuge administration (including the construction of a boardwalk), Alternative 3 would generate 5 more jobs, $216.3 thousand more in labor income, and $230.0 thousand more in value added as compared to Alternative 1.

Table 20. Change in economic impacts under Alternative 3 compared to Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 7	(+) $250.4	(+) $285.5
Total Effects	(+) 14	(+) $463.9	(+) $645.6
Non-local Public Use Activities			
Direct effects	(-) 6	(-) $160.4	(-) $261.1
Total Effects	(-) 9	(-) $247.6	(-) $415.6
Aggregate Impacts			
Direct effects	(+) 1	(+) $90.0	(+) $24.4
Total effects	(+)5	(+) $216.3	(+) $230.0

[a.] Staff salary spending and work related purchases

Summary of Economic Impacts for Alternative 4

Table 21 summarizes the direct and total economic impacts in the two-county area of Refuge management activities for Alternative 4. Under Alternative 4, Refuge management activities directly related to Refuge operations would generate an estimated 9 jobs, $331.4 thousand in labor income, and $469.3 thousand in value added in the local economy. Including direct, indirect, and induced effects, all Refuge activities would generate a total economic impact of 20 jobs, $716.8 thousand in labor income, and $1.2 million in value added. In 2009, total labor income was estimated at $14.8 billion and total employment was estimated at 367.7 thousand jobs for the local two-county area (IMPLAN 2009 data). Thus, total economic impacts associated with Refuge operations under Alternative 4 represent less than .01 percent of total income and total employment in the overall two county area economy. Total economic effects of Refuge operations play a larger role in the communities in Canyon

County near the Refuge where most of the Refuge-related expenditures and public use related economic activity occurs.

Table 21. Summary of all Refuge management activities for Alternative 4

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	4	$166.8	$201.0
Total Effects	13	$453.6	$709.5
Non-local Public Use Activities			
Direct effects	5	$164.5	$268.3
Total Effects	7	$263.2	$441.8
Aggregate Impacts			
Direct effects	9	$331.4	$469.3
Total effects	20	$716.8	$1,151.3

[a.] Staff salary spending and work related purchases

Table 22 summarizes the change in economic effects associated with Refuge operations under Alternative 4 as compared to Alternative 1. Due to substantial decreases in visitation, Alternative 4 would generate 15 less jobs, $396.8 thousand less in labor income, and $709.4 thousand less in value added as compared to Alternative 1.

Table 22. Change in economic impacts under Alternative 4 compared to Alternative 1

	Employment (# full & part time jobs)	Labor income (Thousands, $2011)	Value Added (Thousands, $2011)
Revenue Sharing & Refuge Administration[a]			
Direct effects	(+) 2	(+) $89.0	(+) $99.1
Total Effects	(+) 6	(+) $187.8	(+) $272.7
Non-local Public Use Activities			
Direct effects	(-) 14	(-) $373.7	(-) $609.3
Total Effects	(-) 21	(-) $584.6	(-) $982.1
Aggregate Impacts			
Direct effects	(-) 12	(-) $284.7	(-) $510.2
Total effects	(-) 15	(-) $396.8	(-) $709.4

[a.] Staff salary spending and work related purchases

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Appendix A

As mentioned in the Impacts from Public Use and Access Management section, when determining the economic impacts of visitor spending, only spending by non-locals are included in the analysis. This spending generates new income and employment, and has an economic impact on the region. Evaluating it shows the gain to the region from having the Refuge (Carver and Caudill, 2007). In this Appendix, total spending by both locals and non-locals is evaluated to show the significance of visitation to Deer Flat NWR to the local economy under Alternative 1 (Status Quo). As noted by

Carver and Caudill (2007), significance shows the economic activity in a region that is connected to Refuge activities, but does not reflect income and employment that would be lost if the Refuge were not a part of that economy.

Table A shows local and non-local visitation to Deer Flat NWR under Alternative 1. To capture spending by local visitors, we used the spending profiles in Carver and Caudill (2007) for residents for FWS Region 1 and update the 2006 spending profiles to 2011 dollars using the Consumer Price Index Inflation Calculator. Average daily spending profiles for resident visitors to Region 1 for fishing ($40.82 per-day), big game hunting ($41.15 per-day), upland game hunting ($40.54 per-day) and waterfowl hunting ($55.58 per-day) were used to estimate local visitor spending for Refuge fishing and hunting related activities. The average daily resident spending profile for non-consumptive wildlife recreation (observing, feeding, or photographing fish and wildlife) ($33.35 per-day) was used for all non-consumptive wildlife viewing activities including non-priority swimming and beach activities and land-based non-wildlife dependent activities. As described in the Impacts from Public Use and Access Management section, local boater expenditures were e by adding average daily boating fuel expenditure costs ($23.57 per-day) to the average daily resident spending profile for non-consumptive wildlife recreation ($33.35 per-day) from the Banking on Nature report. Total spending by local refuge visitors was determined by multiplying the average local visitor daily spending by the number of local visitor days at the Refuge.

Table A. Estimated Annual Deer Flat NWR Local and Non-local Visitation by Visitor Activity for Alternative 1

Alternative 1	Total number of visits	Number of local visits	Number of non-local visits	Number local visitor days[a]	Number of non-local visitor days[a]
Priority uses					
Fishing	48,430	45,040	3,390	28,150	2,119
Hunting (big game, waterfowl, and other migratory birds)	6,765	6,224	541	4,371	380
Non-Consumptive (wildlife watching & photography, environmental education, and interpretation)	93,410	84,069	9,341	31,526	3,503
Non-priority uses					
Non-wildlife dependent boating	55,080	47,920	7,160	29,950	4,475
Swimming and other beach activities	60,290	52,452	7,838	26,226	3,919
Land-based non-wildlife dependent (walking, jogging, and other activities (e.g., picnicking)	32,280	28,084	4,196	10,531	1,574
Total Visitation	296,255	263,788	32,467	130,754	15,970

[a] One visitor day = 8 hours

Table B summarizes the total economic significance associated with both local and non-local visitation under the status quo Alternative 1. Under Alternative 1, local and non-local Refuge visitors would spend a combined $7.3 million in the local economy annually. Accounting for both direct and secondary effects, spending by local and non-local visitors for Alternative 1 account for a total economic significance of 88 jobs, $3.3 million in labor income, and $5.5 million in value added in the local two-county area.

Table B. Total Annual Impacts of Local and Non-Local Visitor Spending for Alternative 1

	Employment (# full & part time jobs)	**Labor income** (Thousands, $2011)	**Value Added** (Thousands, $2011)
Local Spending			
Direct effects	55	$1,585.0	$2,566.4
Secondary effects	24	$825.8	$1,470.9
Total economic significance	79	$2,410.8	$4,037.2
Non-local Spending			
Direct effects	19	$538.2	$877.6
Secondary effects	9	$309.6	$546.2
Total economic impact	28	$847.8	$1,423.8
Total economic significance	*88*	*$3,258.5*	*$5,461.0*

Appendix N. Acronyms and Abbreviations

Act	National Wildlife Refuge System Improvement Act of 1997 (also Improvement Act or NWRSIA)
ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
AFA	Acre Feet per Annum
AHM	Adaptive Harvest Management
AMA	Academy of Model Aeronautics
AQI	Air Quality Index
ARPA	Archaeological Resources Protection Act
Audubon	National Audubon Society
AUM	Animal Unit Month
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BIDEH	Biological Diversity, Integrity and Environmental Health
BLM	Bureau of Land Management
BMPs	Best Management Practices
Bti.	*Bacillus thuringiensis israelensis*
C.F.R.	Code of Federal Regulations
CCC	Civilian Conservation Corps
CCP	Comprehensive Conservation Plan
CCPRW	Canyon County Parks, Recreation, and Waterways
CD	Compatibility Determination
CEQ	White House Council on Environmental Quality
CFS	Cubic Feet per Second
CIG	Climate Impacts Group
CMP	Corridor Management Plan
CWA	Clean Water Act
CWCS	Comprehensive Wildlife Conservation Strategy
DDE	Dichlorodiphenyldichloroethylene
DO	Dissolved Oxygen
DPS	Distinct Population Segment
E.O.	Executive Order
EE	Environmental Education
EIS	Environmental Impact Statement
ENSO	El Niño/Southern Oscillation
EPA	U.S. Environmental Protection Agency
EPS–HDT	Economic Profile System-Human Dimensions Toolkit
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FHBC	Fort Hall Business Council
Friends	Friends of Deer Flat Wildlife Refuge
FWS	U.S. Fish and Wildlife Service (also Service, USFWS)
FY	Fiscal Year
GHGs	Green House Gases
GIS	Geographic Information System
GPS	Global Positioning System

GSA	General Services Administration
ha	Hectare
HAER	Historic American Engineering Record
IBA	Important Bird Area
ICT	CCP Interagency Coordinating Team
IDAPA	Idaho Administrative Procedure Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDPR	Idaho Department of Parks and Recreation
IDWR	Idaho Department of Water Resources
IMPLAN	Impact Analysis for Planning
Improvement Act	National Wildlife Refuge System Improvement Act of 1997 (also Act, NWRSIA)
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
ISHS	Idaho State Historical Society
LCC	Landscape Conservation Cooperative
LDRA	Lower Dam Recreation Area
LE	Law Enforcement
LEIS	Legislative Environmental Impact Statement
MBCC	Migratory Bird Conservation Commission
MMS	Maintenance Management System
MOU	Memorandum of Understanding
MRA	Minimum Requirements Analysis
MSL	Mean Sea Level
NAGPRA	Native American Graves Repatriation Act
NAWMPC	North American Waterfowl Management Plan Committee
NCDC	National Climatic Data Center
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSRE	National Survey on Recreation and the Environment
NTU	Nephelometric Turbidity Unit
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
PDO	Pacific Decadal Oscillation
PIF	Partners in Flight
PLO	Public Land Order
PM	Particulate Matter
PMU	Population Management Unit
ppm	Parts Per Million
PUP	Pesticide Use Proposal
Reclamation	Bureau of Reclamation
RM	River Mile

RMP	Resource Management Plan
RONS	Refuge Operating Needs System
RRS	Refuge Revenue Sharing Act
SCORTP	Statewide Comprehensive Outdoor Recreation and Tourism Plan
SDH	Southwest District Health
Service	U.S. Fish and Wildlife Service (also FWS, USFWS)
SGCN	Species of Greatest Conservation Need
SMU	Smoke Management Unit
SUP	Special Use Permit
SWID	Southwest Irrigation District
T and E	Threatened and Endangered
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service (also FWS, Service)
USG	Unhealthy for Sensitive Groups
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USHCN	U.S. Historical Climatology Network
VAOT	Vessels At One Time
VCS	Visitor Contact Station
VRM	Visual Resource Management
WPA	Works Progress Administration
WQS	Water Quality Standard
WRCC	Western Regional Climate Center
WSA	Wilderness Study Area

Document continues on next page.

Appendix O. Glossary

Adaptive Management. The rigorous application of management, research, and monitoring to gain information and experience, necessary to assess and modify management activities. A process that uses feedback from refuge research, monitoring, and evaluation of management actions, to support or modify objectives and strategies at all planning levels. (Service Manual 602 FW 1.4)

Alternative. Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues (Service Manual 602 FW 1.6). The "no action" alternative is current refuge management, while the "action" alternatives are all other alternatives.

Anadromous. Fish that hatch and rear in fresh water, migrate to the ocean (salt water) to grow and mature, and migrate back to fresh water to spawn and reproduce. (www.streamnet.org/glossary.html)

Appropriate Use. A proposed or existing use on a refuge that meets at least one of the following four conditions:

(1) The use is a wildlife-dependent recreational use as identified in the Improvement Act.
(2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
(3) The use involves the take of fish and wildlife under State regulations.
(4) The use has been found to be appropriate as specified in section 1.11 of the USFWS Appropriate Use Policy. (603 FW 1)

Approved Acquisition Boundary. National wildlife refuge boundary approved by the National Fish and Wildlife Service Director for potential acquisition of lands by the Service.

Approved Refuge Boundary. A national wildlife refuge boundary approved by the National or Regional Fish and Wildlife Service Director. Within this boundary, the Service may negotiate with landowners to acquire lands not already owned by the Service. (Modified from Region 1 Landowner Guide, USFWS Division of Refuge Planning)

Archaeology. The scientific study of material evidence remaining from past human life and culture. (www.merriam-webster.com)

Avifaunal. All the birds present in a region, environment, or period of time. (Encarta Dictionary)

Benefiting Resources. Those species, species groups, or resources expected to benefit from actions taken for a **Resource of Concern**.

Big Six. Wildlife-dependent recreational uses under Refuge System Improvement Act include hunting, fishing, wildlife observation, photography, environmental education, and interpretation.

Bioaccumulation. A process where chemicals are retained in fatty body tissue and increase in concentration over time. (U.S. EPA Pesticide Glossary, http://epa.gov/pesticides/glossary/)

Biological Diversity (also Biodiversity). The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which

they occur (Service Manual 601 FW 3). The Refuge System's focus is on indigenous species, biotic communities, and ecological processes.

Biological Integrity. Biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities. (Service Manual 601 FW 3)

Biome. A division of the world's vegetation that corresponds to a defined climate and is characterized by specific types of plants and animals (e.g., tropical rain forest or desert). (Encarta Dictionary)

Birds of Conservation Concern. A category assembled by the U.S. Fish and Wildlife Service Division of Migratory Birds identifying the migratory and nonmigratory species (beyond those already designated as Federally threatened or endangered) that represent the Division's highest conservation priorities. (FWS, Division of Migratory Birds)

Board of Control; the Boise Project. Boise Project Board of Control and the Payette Division irrigation districts coordinate reservoir releases for irrigation, power generation, flood protection, municipal and industrial water use, recreation, water quality, and a healthy fishery. (Reclamation, www.usbr.gov/pn/project/boise_index.html)

Bureau of Reclamation. The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. (Reclamation, www.usbr.gov/library/glossary)

Candidate Species. Plant or animal species for which FWS or NOAA Fisheries has on file sufficient information on biological vulnerability and threats to support a proposal to list as endangered or threatened. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Categorical Exclusion. A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act. (40 C.F.R. 1508.4)

Colonial (Nesting). A group of individuals that nest in the same area at the same time. Grebes, great blue herons, and gulls are examples of colonial nesting species at Deer Flat NWR. (www.fws.gov/birds/documents/whichbirdscolonial.pdf).

Compatibility Determination. A written determination signed and dated by the refuge manager and regional chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The Director makes this delegation through the Regional Director. (Service Manual 603 FW 2)

Compatible Use. A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (Service Manual 603 FW 2.6). A compatibility determination supports the selection of compatible uses and identifies stipulations or limits necessary to ensure compatibility.

Composition (Plant). The inventory of plant species found in any particular area.

Comprehensive Conservation Plan. A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purpose(s) of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the biological integrity, diversity, and environmental health of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System, if appropriate; and meets other mandates. (Service Manual 602 FW 1.4)

Concern. See **Issue.**

Connectivity. The arrangement of habitats that allows organisms and ecological processes to move across the landscape; patches of similar habitats are either close together or linked by corridors of appropriate vegetation. The opposite of **Habitat Fragmentation**.

Conservation Targets (also see **Resources of Concern; Priority Species, Species Groups,** and **Communities).** Term used by land management agencies and conservation organizations to describe the resources (ecological systems, ecological communities, species, species groups, or other natural resources) selected as the focus of conservation actions. (**Consumptive Use.** Recreational activities, such as hunting and fishing that involve harvest or removal of wildlife or fish, generally to be used as food by humans.

Contaminants or **Environmental Contaminants.** Chemicals present at levels greater than those naturally occurring in the environment resulting from anthropogenic or natural processes that potentially result in changes to biota at any ecological level (USGS Open File Report 99-108, Assessing Environmental Contaminant Threats to Lands Managed by the U.S. Fish and Wildlife Service). Pollutants that degrade other resources upon contact or mixing. (Adapted from Webster's II)

Cooperative Agreement. An official agreement between two parties.

Cover. The estimated percentage of an area, projected onto a horizontal surface, occupied by a particular plant species.

Cultural Resource Inventory. A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 C.F.R. 60.4. (Service Manual 614 FW 1.7)

Cultural Resources. The physical remains, objects, historic records, and traditional life ways that connect us to our nation's past. (FWS, Considering Cultural Resources, http://www.fws.gov/nativeamerican/graphics/Cultural_Resources_Overview.pdf)

Department of the Interior. The U.S. Department of the Interior serves as steward and guardian of the nation's natural resources and cultural heritage. It manages federal lands, such as national parks and refuges; honors the nation's trust responsibilities to tribal communities; and promotes conservation and wise use of natural resources. (U.S. Department of the Interior website)

Decadence. Marked by decay or decline. For plants, showing little or no new growth. (Adapted from Merriam-Webster online dictionary, www.merriam-webster.com)

Dichlorodiphenyldichloroethylene (DDE). A chemical compound formed by the loss of hydrogen chloride (dehydrohalogenation) from DDT, of which it is one of the more common breakdown products. DDT is an organochlorine pesticide that was once widely used to control insects on agricultural crops. Consuming large amounts of DDT over a short time would most likely affect the nervous system. (Public Health Statement of the Agency for Toxic Substances and Disease Registry, Centers for Disease Control)

Direct Loss. Loss of food or loss of habitat as nonnative species out-compete native species.

Distinct Population Segment (DPS). A subdivision of a vertebrate species that is treated as a species for purposes of listing under the Endangered Species Act. To be so recognized, a potential distinct population segment must satisfy standards specified in a FWS or NOAA Fisheries policy statement (See the February 7, 1996, Federal Register, pages 4722-4725). The standards require it to be separable from the remainder of and significant to the species to which it belongs. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Disturbance. Significant alteration of habitat structure or composition, or of the behavior or wildlife. May be natural (e.g., fire) or human-caused events. (e.g., aircraft overflight).

East Pool. That part of Lake Lowell that is east of the Narrows (see CCP Map 3).

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment.

Ecosystem Management. Management of natural resources using system-wide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.

Elevation. The elevation above sea level of the surface water at Lake Lowell.

Endangered Species (Federal). An animal or plant species in danger of extinction throughout all or a significant portion of its range. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Endangered Species (State). A plant or animal species in danger of becoming extinct or extirpated in a state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a significant degree.

Enhance. To improve the condition of an area or habitat, usually for the benefit of certain native species.

Environmental Assessment (EA). A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact. (40 C.F.R. 1508.9)

Environmental Education Study Sites. Outdoor locations where groups of students engage in hands-on activities within an environmental education curriculum.

Environmental Health. Composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment. (Service Manual 601 FW 3)

Environmental Impact Statement (EIS). A detailed written statement required by Section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impact of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short term uses of the environment versus the maintenance and enhancement of long-term productivity and any irreversible and irretrievable commitment of resources. (Adapted from 40 C.F.R. 1508.11 and 42 U.S.C. 4332)

Ethnography. The study and systematic recording of human cultures; also: a descriptive work produced from such research.

Executive Order. A President's or Governor's declaration which has the force of law, usually based on existing statutory powers, and requiring no action by the Congress or state legislature.

Experimental Population. A population (including its offspring) of a listed species designated by rule published in the Federal Register that is wholly separate geographically from other populations of the same species. An experimental population may be subject to less stringent prohibitions than are applied to the remainder of the species to which it belongs. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Finding of No Significant Impact (FONSI). A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared. (40 C.F.R. 1508.13)

Fluviatile. Belonging to, existing in or about, or produced by the action of streams or rivers. (Webster's Third New International Dictionary Unabridged online)

Focal Conservation Target. A suite of conservation targets that for purposes of planning are sorted and condensed to represent threats to biological integrity diversity and environmental health at the refuge level.

Goal. Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units. (Service Manual 602 FW 1.6)

Habitat. Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Habitat Fragmentation. The division of continuous patches into smaller pieces which are partly or fully disconnected from one another by infrastructure, agricultural fields, or human settlements (www.biology-online.org). The opposite of **Connectivity.**

Habitat Management Plan. A plan that provides refuge managers a decision-making process; guidance for the management of refuge habitat; and long-term vision, continuity, and consistency for habitat management on refuge lands. (Service Manual 620 FW 1.4)

Habitat Restoration. Management emphasis designed to move ecosystems to desired conditions and processes and/or to healthy ecosystems.

Herptiles. A general term for amphibians and reptiles.

Historic Conditions. Composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human-related changes to the landscape. (Service Manual 601 FW 3)

Hydrology. study of the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment within each phase of the water cycle (USGS website http://ga.water.usgs.gov/edu/hydrology.html).

Hydrophytic. Hydrophytic vegetation is the community of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (U.S. Army Corps of Engineers Wetland Delineation Manual).

Hypolimnion. The lower zone of a thermally stratified lake, below the thermocline, and usually depleted in oxygen during summer stagnation. (www.streamnet.org/glossary.html)

Important Bird Area. A site that provides essential habitat for one or more species of bird and that is recognized as being important on a global, continental, or state level.

Indicator. A measurable characteristic of a key ecological attribute that strongly correlates with the status of the key ecological attribute, something that serves as a sign or symptom.

Inholding. Refers to lands within an **Approved Refuge Boundary** that are not owned by the U.S. Fish and Wildlife Service. These can be private lands or lands owned by City, County, State, or other Federal agencies.

Integrated Pest Management (IPM). The use of pest and environmental information in conjunction with available pest control technologies to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to persons, property, and the environment. (U.S. EPA Pesticide Glossary, http://epa.gov/pesticides/glossary/f-l.html#i)

Interpretation. A teaching technique that combines factual information with stimulating explanation, frequently used to help people understand natural and cultural resources. (www.yourdictionary.com)

Invasive. Nonnative species disrupting and replacing native species. (www.thebiotechdictionary.com)

Inventory. A survey of the plants or animals inhabiting an area.

Inviolate Sanctuary. Management purpose for migratory birds under the Migratory Bird Conservation Act (16 U.S.C. 715d).

Issue. Any unsettled matter that requires a management decision (e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition). (Service Manual 602 FW 1.6)

Key Ecological Attributes. Those aspects of the environment, such as ecological processes or patterns of biological structure and composition that are critical to sustain the long-term viability of the target. These key ecological attributes are further divided into measurable indicators.

Lacustrine. Pertaining to, produced by, or inhabiting a lake. (U.S. EPA, Terms of Environment)

Macrophyte. A macroscopic plant, commonly used to describe aquatic plants that are large enough to be visible to the naked eye. (www.biology-online.org)

Maintenance. The upkeep of constructed facilities, structures, and capitalized equipment necessary to realize the originally anticipated useful life of a fixed asset. Maintenance includes preventative maintenance; cyclic maintenance; repairs; replacement of parts, components, or items of equipment, periodic condition assessment; periodic inspections, adjustment, lubrication and cleaning (non-janitorial) of equipment; painting, resurfacing, rehabilitation; special safety inspections; and other actions to assure continuing service and to prevent breakdown.

Maintenance Management System (MMS). A national database of refuge maintenance needs and deficiencies. It serves as a management tool for prioritizing, planning, and budgeting purposes. (RMIS descriptions)

Methylmercury. CH_3Hg+, organic form of mercury and the form of mercury that is most easily bioaccumulated in organisms; a neurotoxin. Methylmercury can accumulate up the food chain in aquatic systems and lead to high concentrations in fish, which, when consumed by humans, can result in an increased risk of adverse effects in highly exposed or sensitive populations. (USGS, Toxic Substances Hydrology Program)

Migration. The seasonal movement from one area to another and back.

Migratory Birds. Those species of birds listed under 50 C.F.R. 10.13. (Service Manual 720 FW 1)

Monitoring. The process of collecting information to track changes of selected parameters over time.

National Environmental Policy Act of 1969 (NEPA). Requires all Federal agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making. (40 C.F.R. 1500)

National Register of Historic Places (NRHP). The nation's master inventory of known historic properties administered by the National Park Service. Includes buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archeological, or cultural significance at the national, state, and local levels. (USFWS, Considering Cultural Resources, http://www.fws.gov/nativeamerican/graphics/Cultural_Resources_Overview.pdf)

National Wildlife Refuge. A designated area of land, water, or an interest in land or water within the Refuge System, excluding coordination areas. (Service Manual 601 FW 1.3)

National Wildlife Refuge System. Various categories of areas administered by the Secretary of the Interior for the conservation of fish and wildlife, including species threatened with extinction; all lands, waters, and interests therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management areas; or waterfowl production areas.

National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57**).** A Federal law that amended and updated the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee, et seq.).

Native. With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem. (Service Manual 601 FW 3)

NephelometricTurbidity Unit (NTU). A unit measuring the lack of clarity of water, used by water and sewage treatment plants, in marine studies, and so on. Water containing 1 milligram of finely divided silica per liter has a turbidity of 1 NTU.

Nonconsumptive Recreation. Recreational activities that do not involve harvest, removal, or consumption of fish, wildlife, or other natural resources.

Noxious Weed. A plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insect or disease; or nonnative, new, or not common to the United States. According to the Federal Noxious Weed Act (Public Law 93-629), a noxious weed is one that causes disease or had adverse effects on humans or their environment and therefore is detrimental to the agriculture and commerce of the United States and to public health.

Objective. A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Objectives should be attainable, time-specific, and measurable. (Service Manual 620 FW 1)

Obligate Species. A plant or animal that occurs only in a narrowly defined habitat such as a tree cavity, rock cave, or wet meadow. (www.streamnet.org/glossary.html)

Operations. Activities related to the normal performance of the functions for which a facility or item of equipment is intended to be used. Costs such as utilities (electricity, water, sewage) fuel, janitorial services, window cleaning, rodent and pest control, upkeep of grounds, vehicle rentals, waste management, and personnel costs for operating staff are generally included within the scope of operations.

Organochlorines. Compounds that contain carbon, chlorine, and hydrogen. Their chlorine-carbon bonds are very strong, which means that they do not break down easily. They are highly insoluble in water, but are attracted to fats. Since they resist metabolism and are readily stored in fatty tissue of any animal ingesting them, they accumulate in animals in higher trophic levels. (USFWS, Pacific

Region Ecological Services, http://www.fws.gov/Pacific/ecoservices/envicon/pim/reports/contaminantinfo/contaminants.html)

Otoliths. A structure of the inner ear of vertebrates. In fish, this structure is used for balance, orientation, and sound detection. The otoliths of fish provide useful information on age, growth rate, life history, recruitment, and taxonomy of individuals (Alaska Department of Fish and Game, http://tagotoweb.adfg.state.ak.us/oto/).

Outreach. The process of providing information to the public on a specific issue through the use of the media, printed materials, and presentations.

Pacific Flyway. One of several major north-south travel corridors for migratory birds. The Pacific Flyway is west of the Rocky Mountains.

Palustrine. Pertaining to a marsh or wetlands; wet or marsh habitats. (U.S. EPA, Terms of Environment)

Passerine. Of or relating to the largest order (Passeriformes) of birds, which includes over half of all living birds; birds having feet that are adapted for perching, including all songbirds. (www.OxfordDictionaries.com)

Permanent Wetland. Characterized by saturated soil and shallow ponding of water (6 inches deep) throughout winter and early spring.

Piscivorous. Habitually feeding on fish; fish-eating.

Planning Team. The primary U.S. Fish and Wildlife staff and others who played a key role in developing and writing a CCP. Planning teams are interdisciplinary in membership and function. Teams generally consist of a Planning Team Leader, Refuge Manager, staff biologists, a state natural resource agency representative, and other appropriate program specialists (e.g., social scientist, ecologist, recreation specialist). Other Federal and Tribal natural resource agencies are asked to provide team members, as appropriate. The planning team prepares the CCP and appropriate NEPA documentation. (Service Manual 602 FW 1.6)

Plant Association. A classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community **Plant Community.** An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on the site such as soils, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community.

Preferred Alternative. This is the alternative determined (by the decision maker) to best achieve a refuge's purpose, vision, and goals; to best contribute to the Refuge System mission; to best address the significant issues; and to be consistent with principles of sound fish and wildlife management.

Preplanning. The first phase of comprehensive conservation planning process. It includes identifying the planning area and data needs; establishing the planning team and planning schedule; reviewing available information; preparing a public involvement plans and conducting internal scoping.

Priority Public Uses. Hunting, fishing, wildlife observation and photography, environmental education and interpretation, where compatible, are identified under the National Wildlife Refuge System Improvement Act of 1997 as the six priority public uses of the National Wildlife Refuge System.

Propagule. A structure (such as a cutting, a seed, or a spore) that propagates a plant.

Public. Individuals, organizations, and groups; officials of Federal, State, and local government agencies; Indian tribes; and foreign nations. It may include anyone outside the **Planning Team**. It includes those who may or may not have indicated an interest in Service issues and those who may be affected by Service decisions.

Public Land Order. Public lands consist of that class of land remaining from the original public domain that was acquired by the United States by treaty, purchase, or cession from a foreign power.

Quality Hunt. Each refuge includes input during development of a CCP that helps define and evaluate wildlife-dependent recreation programs such as hunting and contains the following attributes:

(1) Minimizes conflicts with neighboring landowners;
(2) Promotes accessibility and availability to a broad spectrum of the American people;
(3) Promotes resource stewardship and conservation;
(4) Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
(5) Provides reliable/reasonable opportunities to experience wildlife;
(6) Uses facilities that are accessible to people and blend into the natural setting; and
(7) Uses visitor satisfaction to help define and evaluate programs.

Refuge Operating Needs System (RONS). A national database of unfunded refuge operating needs required to meet and/or implement station goals, objectives, management plans, and legal mandates. It is used as a planning, budgeting, and communication tool describing funding and staffing needs of the Refuge System.

Refuge Purpose(s). The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge. (Service Manual 602 FW 1.6)

Resource of Concern (ROC). All plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, state, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect "migrating waterfowl and shorebirds." Federal or state threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts. (Service Manual 620 FW 1.4)

Restore. To bring back to a former or original condition. (Webster's II)

Salmonid. A bony soft-finned fish of the family Salmonidae, Order Salmoniformes, that includes salmon, trout, whitefish, and char. (Encarta Dictionary)

Scoping. A stage in the development of a CCP in which a refuge uses news releases, and other appropriate media to notify the public of the opportunity to participate in the planning process and to help identify issues, concerns, and opportunities related to the project.

Species of Concern (Federal). An informal term referring to a species that might be in need of conservation action. This may range from a need for periodic monitoring of populations and threats to the species and its habitat, to the necessity for listing as threatened or endangered. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Step-down Management Plan. A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives. (Service Manual 602 FW 1.6)

Strategy. A specific action, tool, technique, or combination of actions, tools, and techniques used to meet unit objectives. (Service Manual 602 FW 1.6)

Stress. The impairment or degradation of a key ecological attribute for a conservation target. (TNC 2000)

Threatened Species (Federal). An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range. (FWS, Endangered Species Glossary, http://www.fws.gov/endangered/glossary.html)

Threatened Species (State). A plant or animal species likely to become endangered in a state within the near future if factors contributing to population decline or habitat degradation or loss continue.

Traditional Cultural Property. A historic property that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. (National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties)

Transmissivity. The rate which groundwater flows horizontally through an aquifer.

Trophic. A position in a food chain occupied by a group of organisms with similar feeding mode. (www.biology-online.org)

Trust Species. A resource such as endangered species or migratory birds and fish that the government holds in trust for the people through law or administrative act. Federal trust species include threatened and endangered species, as well as migratory birds (e.g., waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Upland. Any area that does not meet the definition of a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic

characteristics associated with wetlands. (U.S. Army Corps of Engineers Wetland Delineation Manual)

Vegetation Type (Also Habitat Type, **Forest Cover Type).** A land classification system based upon the concept of distinct plant associations.

Vision Statement. A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. The vision statement for the refuge is tied to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates. (Service Manual 602 FW 1.6)

Waterfowl. Resident and migratory ducks, geese, and swans.

Water Quality. A term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Watershed. The land area that drains water to a particular stream, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge. Large watersheds, like the Mississippi River Basin, contain thousands of smaller watersheds.

West Pool. That part of Lake Lowell that is west of the Narrows (see CCP Map 3).

Wetlands. Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water at some time during the growing season of each year. (Service Manual 660 FW 2; Cowardin et al. 1979)

Wildlife-dependent Recreational Use. A use of a refuge involving hunting, fishing, wildlife observation, photography, environmental education, or interpretation. These are the six priority public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. The Service will also consider these other uses in the preparation of refuge CCPs; however, the six priority public uses always will take precedence. (Service Manual 602 FW 1.6)

Appendix P. References Cited

This appendix contains all references cited in Chapters 1 through 5. References for citations in appendices A-O are part of each individual appendix, and are not duplicated in the following list.

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