Comprehensive Conservation Plan

Occoquan Bay National Wildlife Refuge

Occoquan Bay National Wildlife Refuge

Comprehensive Conservation Plan Approval

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Approve: Ronald E. Lambertson — 12-22-97
Ronald E. Lambertson — Date
Regional Director, Region 5

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Comprehensive Conservation Plan and Environmental Assessment

Occoquan Bay National Wildlife Refuge
December 1997

This Comprehensive Conservation Plan (CCP) and Environmental Assessment has been prepared for the Occoquan Bay National Wildlife Refuge located in Woodbridge, Prince William County, Virginia. It describes and discusses the planning process, public involvement, resource and other issues, and the preferred alternative, which will be used to guide the direction of refuge operations for the next 10 to 15 years. The change of title, from Comprehensive Management Plan to Comprehensive *Conservation* Plan, was mandated by new legislation, the National Wildlife Refuge System Improvement Act of 1997.

The former Woodbridge Research Facility will be rejoined with adjacent Marumsco National Wildlife Refuge to form a larger refuge to be managed as one entity, both biologically and administratively. The purpose of this CCP is to identify what role the newly formed refuge will play in wildlife conservation, in the community, and in supporting the mission of the National Wildlife Refuge System.

The Service greatly appreciates the time and efforts of the many citizens who contributed to the creation of the refuge and the development of its CCP. While the Service recognizes that this plan does not satisfy all concerns expressed during the planning process, nevertheless, public involvement and participation substantially shaped the plan. That involvement also greatly assisted the Service in determining how best to balance the important conservation of the natural resources found on the refuge while ensuring that environmental education and visitor use needs are met, as mandated by legislation.

This is a dynamic plan. While it will serve as the guide for overall refuge direction, it will be adjusted to consider new and better information, ensuring that refuge activities best serve the intended purpose for which this refuge was established and the mission of the National Wildlife Refuge System. In-depth reviews will occur every five years, while station evaluations, accomplishments reporting, and evaluation of collected data will provide ongoing reviews. The refuge invites, and looks forward to, continued public interest and involvement in assisting the refuge to meet its goals and objectives in the future.

Finding of No Significant Impact and Decision Notice
Occoquan Bay National Wildlife Refuge
Final Comprehensive Conservation Plan and Environmental Assessment

It is my decision to adopt the Comprehensive Conservation Plan for Occoquan Bay National Wildlife Refuge attached to this Decision Notice and Finding of No Significant Impact. The plan expands upon the Proposed Action in the draft comprehensive plan dated August 1997.

Four management alternatives for Occoquan Bay National Wildlife Refuge were assessed to determine the most effective alternative for achieving refuge purposes as well as the anticipated impacts on the human environment. Based on the analysis in the Environmental Assessment and comments received, I have selected Alternative D (Proposed Action) as the preferred alternative to be implemented on the refuge.

This alternative was selected because it best meets the primary purposes of the refuge to manage for migratory birds, provide environmental education opportunities related to fish and wildlife resources, and provide appropriate public access compatible with resource protection. The preferred alternative differs from the proposed alternative in that a specific site for a headquarters/education/interpretation facility has been chosen. An alternative site is feasible, however, if during detailed planning, new information indicates there would be adverse impacts to cultural or historic resources, threatened or endangered species, wetlands or other trust resources on the preferred site. Additionally, it is explicit in the plan that management of all resources will be adjusted to consider new and better information, ensuring that refuge activities best serve the intended purposes of the refuge.

Visitation will be monitored for its impacts on the flora and fauna of the refuge. Development of refuge facilities will cause minimal disturbance to refuge lands. The preferred alternative will allow for the eventual restoration of up to ten acres of early successional habitat for high priority grassland birds in the existing compound. It will not adversely impact endangered or threatened species or adversely impact wetlands or the floodplain, nor will it harm or cause the loss or destruction of archeological or historical resources. This alternative will have a positive effect on visitor use and recreation, environmental education, conservation of natural resources, and the local communities.

For these reasons, I find that the preferred alternative will not have a significant impact on the human environment in accordance with Section 102 of the National Environmental Policy Act and in accordance with the Service's Administrative Manual {30AMs.9B(2)(d)} and conclude that an environmental impact statement is not necessary.

Ronald E. Lambertson — 12-19-97

Regional Director, Region 5
Fish and Wildlife Service
Hadley, Massachusetts

Date

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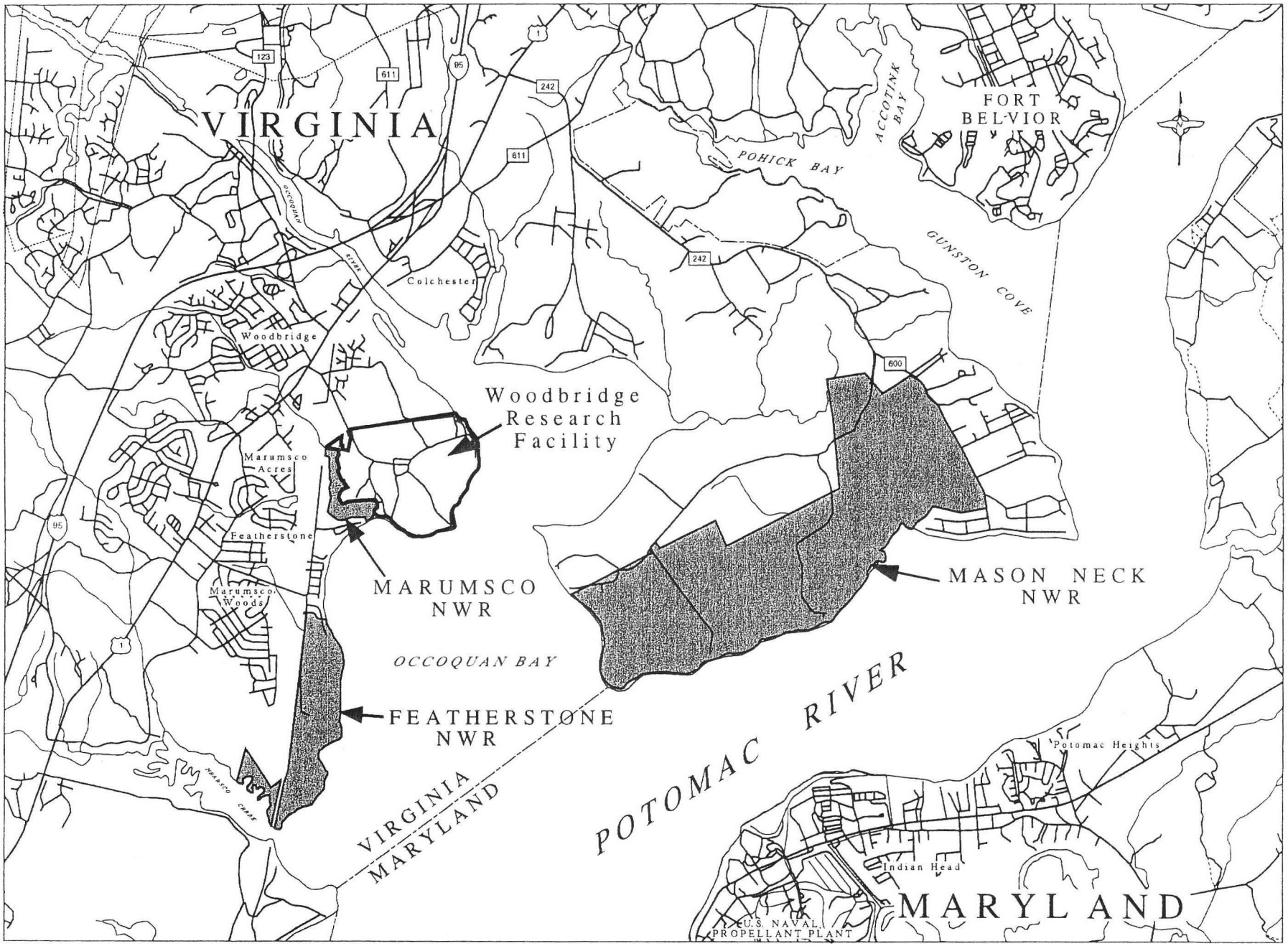

LOCATION MAP
POTOMAC NWR COMPLEX

Fig. 1

I. INTRODUCTION AND BACKGROUND

Purpose of and Need for Action

This Comprehensive Conservation Plan has been prepared for the Occoquan Bay National Wildlife Refuge in Woodbridge, Prince William County, Virginia. Its purpose is to identify what role the refuge, with its biological resources, existing facilities, and educational opportunities, will play in support of the mission of the National Wildlife Refuge System, and how it will address community expectations for public use. The plan outlines intended management direction and expectations to guide operations of the site following transfer from the U.S. Army to the U.S. Fish and Wildlife Service, and for up to 15 years thereafter.

The 654-acre parcel of land formerly known as the Woodbridge Research Facility and the Marumsco National Wildlife Refuge is located near the confluence of the Occoquan and Potomac Rivers, tributaries to Chesapeake Bay. The research facility, which served as an Army communications and research center for several decades, closed its operations in September 1994 under the Base Realignment and Closure Act (BRAC). Local initiative and support led to the signing of legislation by President Clinton in September 1994, authorizing transfer of the entire facility to the U.S. Fish and Wildlife Service. As a prerequisite to accepting transfer of the Woodbridge Research Facility, the Service required that an "EPA-approved cleanup plan" be prepared by the Army. To that end, the Army prepared the document entitled "BRAC Cleanup Plan, Revised Version III". That document describes the current environmental condition of the property, and presents the Army's plan and schedule for taking appropriate environmental clean up and restoration actions.

The refuge will be managed as one of three refuges comprising the Potomac River National Wildlife Refuge Complex, located in Prince William and Fairfax Counties, Virginia. Mason Neck NWR, established in 1969 under the authority of the Endangered Species Act, was the Nation's first national wildlife refuge for bald eagles. Featherstone NWR, established in 1970, is located along the western shoreline of Occoquan Bay, south of Occoquan Bay NWR. Marumsco NWR, the freshwater marsh on Marumsco Creek, was carved from the Woodbridge Research site, and established by transfer from the Department of Defense to the Service in 1972 for its "particular value in carrying out the national migratory bird management program". The Occoquan Bay NWR will rejoin the former Woodbridge Research Facility land with that of Marumsco NWR.

As a classified Army site, the Woodbridge Research Facility has long been closed to the public. Mowed and cleared for electronics testing, the now open land contains a diversity of grassland and wetland plant species unusual in the heavily developed Potomac region. Its diverse habitats support a correspondingly high number of wildlife species, particularly migrant land and waterbirds. The Service will manage the land to provide early successional habitats and appropriate wildlife-dependent recreational opportunities, to educate visitors on the results and benefits of habitat management for wildlife, and for the enjoyment and benefit

of people. Within the 10-acre, fenced compound in the center of the refuge are four buildings formerly used as research and testing facilities. Interest in these buildings is for their reuse as environmental education facilities.

The Service prepared this plan for Occoquan Bay NWR to:

- Provide a clear statement of the desired future conditions for habitat, wildlife, facilities, and people;
- Ensure that management of the refuge reflects the policies and goals of the National Wildlife Refuge System;
- Ensure the compatibility of current and future uses of the refuge;
- Provide long-term continuity and direction for Refuge management; and,
- Provide a basis for operation, maintenance, and development of budget requests.

Mission of the U.S. Fish and Wildlife Service

"...provide Federal leadership to conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of the American people."

The Service has primary responsibility for migratory birds, endangered species, anadromous and interjurisdictional fish, and certain marine mammals. The Service also manages the National Wildlife Refuge System, the world's largest collection of lands set aside specifically for the protection of fish and wildlife populations and habitats. Over 510 national wildlife refuges provide important habitat for native plants and many species of mammals, birds, fish, invertebrates, amphibians, and reptiles. They also play a vital role in preserving endangered and threatened species. Refuges offer a wide variety of recreational opportunities, and many have visitor centers, wildlife trails, and environmental education programs. Nation-wide, over 29.5 million visitors annually hunt, fish, observe and photograph wildlife, or participate in interpretive activities on national wildlife refuges.

Mission of the National Wildlife Refuge System

"...to administer a national network of lands and waters for the conservation, management, andwhere 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."

On October 9, 1997, President Clinton signed organic legislation for the development and operation of the National Wildlife Refuge System. With respect to the System, it is the policy of THE UNITED STATES OF AMERICA that:

(A) each refuge shall be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established;

(B) compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System, directly related to the mission of the System and the purposes of many refuges, and which generally fosters refuge management and through which the American public can develop an appreciation for fish and wildlife;

(C) compatible wildlife-dependent recreational uses are the priority general public uses of the System and shall receive priority consideration in refuge planning and management;

(D) when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable and appropriate.

Chesapeake Bay/Susquehanna River Ecosystem Priorities

The Occoquan and Potomac Rivers significantly contribute to the Chesapeake Bay. The Chesapeake Bay watershed covers a basin of 64,000 square miles, encompassing portions of Delaware, Maryland, Pennsylvania, New York, Virginia, and West Virginia. Waters from this expansive landscape flow into the largest estuary in the United States. The watershed contains an array of habitat types that support thousands of different species of fish and wildlife. The challenge to all stewards of such a diverse watershed is finding a way to ensure that all of its parts are considered in making decisions that affect the natural and human resources of the area. The following priorities are the framework for Service efforts and management in the Chesapeake/Susquehanna watershed.

Endangered Species Resource Priority – Protect, monitor and restore threatened and endangered species, and candidate species facing immediate or serious decline.

Wetlands Resource Priority – Protect and restore vegetated palustrine and riverine wetlands with emphasis on the seven areas identified in *Recent Wetlands Status and Trends in the Chesapeake Watershed* (Tiner 1994): Southeastern Virginia, Virginia Piedmont, Maryland Eastern Shore, Western Delaware, Virginia Upper Coastal Plain, Virginia Blue Ridge/Appalachians, Northeastern Pennsylvania.

Interjurisdictional Fish Resource Priority – Restore and maintain self-sustaining populations of interjurisdictional/anadromous species (American shad, hickory shad, river herring, striped bass, and Atlantic sturgeon), coastal migratory fishes identified in the Atlantic Coastal

Fisheries Cooperative Management Act of 1993, and those species for which the Fisheries Management Workgroup of the Chesapeake Bay Program has developed fishery management plans.

Non-Game Birds Resource Priority – Reverse the decline of migratory bird populations identified in *Migratory Nongame Birds of Management Concern in the Northeast* (Schneider and Pence 1992) including grassland species and other migrant Neotropical birds.

Waterfowl and other Migratory Game Birds Resource Priority – Restore waterfowl populations to 1970's levels by the year 2000 as identified in the North American Waterfowl Management Plan and the Chesapeake Bay Waterfowl Policy & Management Plan.

Legal Mandates

Administration of National Wildlife Refuges is governed by various Federal laws, Executive Orders, and regulations affecting land and water use as well as the conservation and management of fish and wildlife resources. Policies of the Service guiding all aspects of refuge administration are stated in its primary management documents and in the Service Manual.

The National Wildlife Refuge System Improvement Act of 1997 mandates the development of a comprehensive conservation plan for all units of the National Wildlife Refuge System, compliant with the National Environmental Policy Act and its implementing regulations. It recognizes wildlife-dependent recreation as priority public uses of refuge land.

Management is further guided by the Fish and Wildlife Act of 1956 and the National Wildlife Refuge System Administration Act that authorizes the Secretary of the Interior to permit any uses of a refuge "...whenever it is determined that such uses are compatible with the major purposes for which such areas were established."

The Refuge Recreation Act of 1962 requires that any recreational use of refuge lands be compatible with the primary purposes for which a refuge was established and not inconsistent with other previously authorized operations.

The National Historic Preservation Act of 1966 provides for the management of historic and archaeological resources that occur on any refuge. Other legislation, such as the Endangered Species Act, the North American Wetlands Conservation Act, and particularly the National Environmental Policy Act (NEPA) all provide guidance for the conservation of fish and wildlife and their habitats.

II. PUBLIC INVOLVEMENT

Planning Process

Much legwork and great patience on the part of the public has characterized the transfer of the Woodbridge Research Facility from the Department of Defense to the Department of the Interior, U.S. Fish and Wildlife Service. From the July 1991 BRAC recommendation to close the facility, to the first public scoping meetings for the comprehensive plan in April 1997, a strong core of dedicated citizens has been instrumental in making the transfer happen. Early planning meetings were held with members of the Woodbridge Reuse Committee, the Re-constituted Reuse Committee, the Woodbridge Refuge Committee, the Woodbridge Economic Development Group, and the Friends of Woodbridge Refuge, among others, with a three-fold interest in the environment, education, and economics. Broad goals for the management of the site were discussed.

Awaiting the Army's Contamination Remedial Plan, the Service, the Woodbridge Reuse Committee, and the Woodbridge Foundation, Inc., researched opportunities to rehabilitate the buildings in the 10-acre compound on the site. Late in 1996, the Service was presented with options for providing environmental education off-site that were previously unavailable for consideration. There was a concern that perhaps not all public opinions had been heard concerning the future uses of the facility and refuge. It was decided that the development of a comprehensive plan would expedite the process and offer a public forum in which all interested citizens and organizations could participate.

Summary of Public Involvement

In compliance with the National Environmental Policy Act (NEPA), and the Fish and Wildlife Service's comprehensive conservation planning process, the Service initiated the public scoping of issues for the comprehensive conservation plan and environmental assessment to address. Issues, concerns, and opportunities were identified in two open houses and public meetings in April, 1997. Questionnaires regarding issues for the refuge were made available to people at the scoping meetings; 56 questionnaires were returned with very thoughtful and insightful comments and suggestions. A weekend workshop in May with 27 representatives of the community, various interest groups, conservation organizations, and educational institutions provided information on programming, access, key elements and important management considerations.

Workshop input and the verbal and written comments received were incorporated into rough draft alternatives, which were presented for public discussion on May 28, 1997. Additional verbal and written comments were received during and following that meeting. Comments received in this manner were considered for incorporation and became the components of the four alternatives described in the draft plan. Draft alternatives were publicly reviewed and discussed on May 28, 1997.

The draft Comprehensive Management Plan was released for public review the last week of August 1997. Approximately 350 copies of the draft were made available at Mason Neck NWR headquarters, the Chinn Library in Woodbridge, and through direct distribution. The draft plan without graphics was available on the internet, via the Fish and Wildlife Service homepage. Reading copies were available in the Prince William County libraries. Copies were sent to the appropriate departments of the Commonwealth of Virginia. A 30-day public review comment period was provided. On September 16, a public meeting was held in Woodbridge to review the alternatives, to receive comments, and to answer questions. All public comments (written and verbal) received during initial scoping, review meetings, and the 30-day review period were considered in this final Comprehensive Conservation Plan. Additionally, the information received by the Service throughout this process helped form the basis for the goals and objectives of the refuge. Comments received are addressed in this Comprehensive Conservation Plan.

Summary of the Draft Plan and Environmental Assessment

This section summarizes each alternative considered in the draft plan. It incorporates from the draft plan the environmental consequences of implementing each alternative – impacts on plants, animals, air and water quality, historic and archaeological resources, and local economy.

The draft comprehensive plan, issued in August 1997, developed and compared four alternatives and their associated impacts to the biological and cultural resources, and the human environment. The alternatives were based on important issues raised at the public scoping meetings, issues relevant to the mission and objectives of the National Wildlife Refuge System, and the legislation directing transfer of the Woodbridge Research Facility to the Service. The alternatives were evaluated for their environmental consequences and their ability to support the proposed Refuge goals. The issues included environmental education, resource management, visitor use and access, use of existing buildings, and construction of new Service facilities. The four alternatives from the Draft Comprehensive Management Plan studied by the Service are summarized below in Table 1.

The basic components of Alternative D comprise the *Preferred Alternative*, developed here as the basis for the Comprehensive Conservation Plan. These components, with the phasing and implementation of the programs modified by public comment, best meets the vision and goals of the refuge and the Service.

TABLE 1. PROPOSED OCCOQUAN BAY NWR - DRAFT ALTERNATIVES

ALTERNATIVES	FWS FACILITIES LOCATION	ENVIRONMENTAL EDUCATION PROGRAMS	TOWER/FENCE	RESOURCE MANAGEMENT	VISITOR USE	ACCESS ROUTES AND PARKING
A NO ACTION	FWS not on site;continue to lease off site office	On-site activities with no facilities	Tower abandoned or continued government use only; fence not maintained	Minimal maintenance of grasslands Manage deer population	Individuals or groups by permit only (minimal issuance of permits)	Minimal maintenance of roads Parking at compound off Dawson Beach Rd. and in NE quadrant
B MINIMAL ADDITIONAL FWS DEVELOPMENT	FWS in guard shack for on site presence but off site office maintained for most functions	On-site activities with use of building 211 for FWS EE Long-term lease of compound buildings for environmental education	Long-term lease of tower Refuge perimeter fence maintained	Maintain current grasslands Manage deer population Refuge volunteers for resource inventory and monitoring	Limited open access in northeast and northwest quadrants of refuge on current roads; no fishing access through refuge EE. research and activities in other areas by permit only	Walking access in designated areas on existing roads; motor vehicles for permitted groups Parking in compound for EE use only, other visitor parking off Dawson Beach Rd. and in NE quadrant
C MAJOR ON SITE FWS DEVELOPMENT WITH FIVE YEAR COMPOUND LEASE FOR EE USE	FWS construction HQ/EE center in northeast quadrant; Caruther's Foundation;250k FWS temporary use of guard shack for on site presence Maintenance building in northeast quadrant or Dawson Beach Rd. entrance	On-site activities with temporary use of building 211 for FWS EE Five year lease of building 211 for environmental education Demonstration projects with EE cooperators	Five year lease of tower then removal Refuge perimeter fence maintained	Maintain current grasslands Restore compound to grasslands after five year lease Manage for diversity and education Manage deer population Refuge staff and volunteers for resource inventory and monitoring	Access in designated higher use areas on roads and new trails; existing roads only in lower use areas Fishing access through NE quad EE. research and activities in other areas by permit only Scheduled refuge tours and activities	Walking access to all open areas (handicapped accessible) Motor vehicle access for permitted group activities Parking in compound for EE use only, other visitor parking off Dawson Beach Rd. and in NE quadrant at FWS facility
D MAJOR ON SITE FWS DEVELOPMENT WITH NO OTHER ON SITE STRUCTURES	FWS construction HQ/EE center in northeast quadrant; Caruther;s Foundation; 250k FWS temporary use of guard shack for on site presence Maintenance building in northeast quadrant or Dawson Beach Rd. entrance	Permitted on site EE activities by outside groups On site FWS EE activities EE facilities adjacent to refuge and /or at FWS EE center Demonstration projects with EE cooperators	Remove tower Refuge perimeter fence maintained	Enhance current grasslands Restore compound to grasslands Manage for diversity and education Manage deer population Refuge staff and volunteers for resource inventory and monitoring	Access in designated higher use areas on roads and new trails; existing roads only in lower use areas EE. research and activities in other areas by permit only Scheduled refuge tours and activities	Parking off Dawson Beach Rd. and in NE quadrant at FWS facility Walking access to all open areas (handicapped accessible) Motor vehicle access for permitted group activities

8-4-97

Alternative A - No Action.

Program Elements of Alternative A

The Federal Government must consider a "No Action" alternative as a baseline of comparison for all other alternatives. The "No Action" alternative provides no Service presence on-site, minor habitat management, and minimal public access. Little or no environmental education is conducted and no facilities are used. An area closed to the public does not support the purposes for which the refuge was established and the refuge goals, particularly the fostering of partnerships and opportunities to educate people on the value of wildlife and wildlife management. Alternative A is not a viable alternative.

Environmental Consequences of Alternative A

Impacts on Animal and Plant Populations

Under the no action alternative, minimal mowing would be used in an effort to maintain the present extent of grassland habitat and other early successional habitats. In this alternative, the refuge would not have the manpower to carry out mowing or burning regimes at frequent enough cycles to prevent some grassland habitat from reverting to shrub and forest habitat. Consequently, while wildlife and plant populations would remain within the range of normal fluctuations, and not significantly differ from present conditions there could be a reduction of populations of species dependent on grassland habitat and an increase of those populations of species associated with early successional forests. The 10-acre compound area and buildings would be abandoned but no efforts would be made to restore the area to grassland habitat. A deer management plan will be developed and implemented to keep deer populations within the carrying capacity of the habitat. Consequently, the deer population would remain at about its current size of about 75 over the long term. A separate environmental assessment will address the alternatives and impacts for this plan. Overall, plant and animal biodiversity would remain about the same or shift slightly towards species favoring old fields or forests. There would be little disturbance to wildlife under this alternative since visitor use would be minimal.

Impacts on Air and Water Quality

Since the Refuge would be open to very little visitor use under this alternative, there would be no impacts on air or water quality.

Impacts on Archeological and Historical Resources

There would be no development on the Refuge, and consequently no possibilities for impacts on archeological or historic sites. There would also be no interpretation of archaeological or historical sites.

Socioeconomic Impacts

This alternative would not draw tourists, and would provide opportunities only for limited use by local or regional residents. Consequently, it would not generate the expenditure or infusion of additional dollars into the local economy.

The costs of implementing this alternative are minimal, since unit management would be accomplished within existing staff and dollar resources of the Potomac River NWR Complex.

Alternative B - Minimal Service Development, use by others of the compound buildings

Program Elements of Alternative B

Alternative B evaluates a minimal Service presence on-site and limited shared use of rehabilitated compound buildings. Compound buildings are rehabilitated and leased through the Army by a non-profit organization, such as the Potomac Nature and History Trust (the Trust), for environmental education purposes and for occasional Service use. The Trust is a consortium of groups interested in promoting and carrying out environmental education programs on the Refuge. EE and research conducted by the Trust and others occurs in the compound buildings. Buildings not used within 5 years are removed. Property management responsibility such as rehabilitation, operation, and maintenance is borne by the organization.

Visitor use is allowed by foot in designated areas in the west quadrant of the Refuge. Group environmental education activities and research are permitted on a case-by-case and site-by-site basis. Access to visitor use areas is by foot, or by vehicle for permitted group activities. Routine mowing occurs on cycles of about three years.

The idea of reusing existing buildings is appealing to many people. The actual day-to-day operations of these structures require up-front money and long-term rental commitments. A significant difference exists between rent that can be charged for less than first class office space and the cost of rehabilitation and maintenance.

The underwriter of the buildings' maintenance and operations is the Service. Failure by the non-profit to keep the rehabilitated buildings filled with renters and unexpected expenses of building maintenance falls to the Service. The Service is not comfortable accepting that responsibility. Rental of the buildings hinges on the interest of large educational institutions, such as the Prince William County school system, George Mason University, and Northern Virginia Community College. Space is currently being offered in the Belmont Development for rent by these institutions without the added costs of building rehabilitation or involvement by the Service. There is not the interest at this time by these potential tenants to spend time and money to rehabilitate existing buildings.

Environmental Consequences of Alternative B

Impacts on Animal and Plant Populations

Under the Minimal Service Development alternative, efforts would be made to mow grasslands to maintain the present extent of grassland habitat and other early successional habitats. In this alternative, the refuge would carry out mowing regimes to minimally prevent grassland habitat from reverting to shrub and forest habitat. Wildlife and plant populations would remain within the range of normal fluctuations, and not significantly differ from present conditions. The 10-acre compound area and buildings would be used by partners for environmental education programs. Those buildings not used within 5 years would be removed, pending funding. No efforts would be made to restore those sites to grassland habitat. A deer management plan will be developed and implemented to keep deer populations within the carrying capacity of the habitat. Consequently, the deer population would remain at about its current size of approximately 50-75 over the long term. A separate environmental document will address the alternatives and impacts for this plan.

Overall, plant and animal biodiversity would remain about the same or could shift slightly towards species favoring old fields or forests. Disturbance to wildlife would increase under this since visitor use would increase but since most visitor use would be confined to existing roads and firebreaks on about one-third of the refuge, disturbance is not expected to deter wildlife from using the refuge.

Impacts on Air and Water Quality

Since the Refuge would be open to limited visitor use under this alternative, there would be no impacts on air or water quality.

Impacts on Archeological and Historical Resources

There would be no development on the Refuge outside the main compound, and consequently, no possibilities for impacts on archeological or historic sites. There would also be no interpretation of archaeological or historical sites.

Socioeconomic Impacts

This alternative would draw low numbers of tourists, and would provide limited opportunities for local or regional residents. Consequently, it would not generate the expenditure or infusion of additional dollars into the local economy.

Alternative C - Major Service development on-site, temporary use of Building #211, and EE space provided off-site by others.

Program Elements of Alternative C

Under this alternative, the Service constructs a new headquarters/ environmental education/ interpretive center within the northeast quadrant of the site. The Trust, working with Belmont Development, offers 50,000 square feet of Environmental Education (EE) and research facilities on the Belmont property. The Service uses the guard shack as a temporary visitor contact station. Building #211 is used for five years, as temporary Service office space and temporary EE use, after which existing buildings are removed. The refuge perimeter fence is maintained, except at the existing barge bulkhead, for fishing purposes. The Service maintains the major roads to ensure safe and reasonable access to areas open to the public.

Visitor use is allowed in designated areas for compatible wildlife-dependent activities, such as wildlife photography or observation, and nature interpretation. Fishing is allowed seasonally at the barge bulkhead. Facilities to improve interpretation of refuge management and the habitats are constructed. The Service establishes a refuge entrance fee.

Environmental education or research activities are allowed by permit. Demonstration projects related to refuge management practices are developed, with cooperators. These areas are accessible and interpreted for visitor and EE group viewing. The environmental education sites on the refuge are generally improved. Visitor use is monitored, to evaluate impacts to the refuge plant and animal resources.

The Service conducts environmental education activities at the refuge EE center and on refuge lands, focusing on refuge management practices. On-refuge visitor parking is available adjacent to the refuge Headquarters and EE center and on Dawson Beach Road. Access to open areas on the refuge is by foot on existing roads, firebreaks and new trails, or by motor vehicle in the case of permitted group activities. Bicycles remain with cars at parking areas. Refuge tours and activities are scheduled on an irregular, but frequent, basis.

Resource management focuses on improvement to and restoration of grassland areas and diversity of plants and animals native to the region. Burning and mowing regimes are employed to enhance habitat structure and favor warm season grasses to attract and increase breeding populations of grassland-dependent birds. The compound area is eventually restored as grasslands. A deer management plan is implemented to maintain the deer population within the carrying capacity of the refuge. This will be addressed in a separate environmental document. Refuge staff and qualified refuge volunteers continue developing an inventory of the plants and animals. Water quality monitoring, and population monitoring of deer, raptors, waterfowl, breeding birds, breeding amphibians, interjurisdictional fishes, and rare plants is initiated. Wetland habitat is restored in the

northwest quadrant, and wetlands throughout the refuge are managed to enhance use by waterfowl, waterbirds, and other wetland-dependent wildlife.

The Service recognizes the desire to use the existing buildings for temporary use by educational groups. As in Alternative B, the costs still fall to the Service to underwrite. However, Belmont Development, working with the Trust, provides temporary facilities on adjoining property. There is no longer a need to use the compound buildings, with their associated maintenance and operation. The intention is to construct a permanent facility on the Belmont property for research and education.

Making the compound the hub for all traffic - EE, refuge staff, and visitors - creates a high level of activity that affects all areas surrounding it. Although in the center of the refuge, concentrations of habitat diversity, that are not under consideration for contamination cleanup, are not within easy walking distance. The compound is not within walking distance of public transportation, which makes the compound location less preferable than the bunker site.

Environmental Consequences of Alternative C

Impacts on Animal and Plant Populations

Under this alternative, mowing and prescribed burning would be used to enhance the quality of the current grasslands for grassland dependent species. After 5 years, the 10-acre, former compound area would be restored to grassland habitat, pending funding for building removal and restoration. Wildlife and plant populations of grassland species, particularly declining species like Grasshopper sparrows, Henslow's sparrows and Eastern meadowlarks, would likely increase. A deer management plan will be developed and implemented to keep deer populations within the carrying capacity of the habitat. Consequently, the deer population would remain at about its current size of about 75 over the long term. A separate environmental assessment will address the alternatives and impacts for this plan.

Plant and animal biodiversity would remain about the same, since the relative composition of habitat types would remain about the same as current conditions. Populations of grassland birds, however, are expected to increase with the qualitative and quantitative improvement of grassland habitat on the refuge. Waterfowl and waterbird use are also expected to increase with the restoration and management of wetlands on the refuge. Increases in visitation under this alternative would cause some disturbance to wildlife. Visitors would be confined to roads, trails, and firebreaks, however, which would minimize disturbance to wildlife and the trampling of plants. Visitor use would be monitored and areas closed at times if seasonal wildlife concentrations or use are unduly disturbed or threatened.

Impacts on Air and Water Quality

The Refuge would be open to greater visitor use under this alternative. Consequently, exhaust emissions from a greater number of vehicles would probably contribute to minor, localized increases in air pollution. Refuge management activities and visitor use would not affect water quality. Habitat management involving prescribed burning may occur and only under ideal conditions of weather, moisture, wind speed and wind direction, in compliance with air quality and health standards.

Impacts on Archeological and Historical Resources

Review of proposed locations for construction of refuge buildings, parking areas, or trails would be conducted as prescribed in Section 106 of the National Historic Preservation Act. Archaeological surveys would be undertaken as needed to ensure avoidance of archaeological resources eligible for inclusion in the National Register of Historic Places. Interpretation of the historical use of the unit would be part of the overall interpretation of the Refuge, particularly how historic land use changes have influenced wildlife.

Socioeconomic Impacts

The environmental education center and interpretive programs at the Refuge would draw large numbers of visitors to the Refuge to enjoy wildlife-dependent opportunities for wildlife observation, photography, fishing, and environmental education. While birding concentrations, rare or unusual species, or diversity may not be extraordinary attractions compared to other refuges, the fact that the Refuge lies at the doorstep of the Nation's capitol would offer large numbers of tourists an experience that interprets the local Refuge flora, fauna, and management programs. It would showcase interpretation for the entire National Wildlife Refuge System. Revenues generated by entrance fees are expected to exceed $15,000 the first year for the benefit of the Refuge management and programs.

Alternative D - (Preferred Alternative) Major Service development on-site with EE space provided off-site by others.

The modified Alternative D is the preferred alternative developed as the Comprehensive Conservation Plan, supported by the goals and objectives in Chapter IV - Refuge Management. The Service proceeds with management in the direction of Alternative D, as modified:

Program Elements of Alternative D - Preferred Alternative

The Service constructs a new headquarters/environmental education/interpretive center on the existing bunker site. Working with Belmont Development, the Trust manages 50,000 sq.ft. of EE and research facilities specifically constructed for these purposes on the Belmont property. As an interim measure, the Service minimally upgrades and uses

the former guard shack at the entrance gate as an on-site office and visitor contact station. The compound facilities and tower are abandoned and removed as funds become available. Decisions on whether to maintain or remove the perimeter fence are made on a section-by-section basis, as maintenance needs arise. Fencing is modified at the existing barge bulkhead or at a point where access to the narrow beach provides fishing opportunities. Also considered is the removal of the fence along Marumsco Creek, to rejoin the two properties. The Service maintains the gravel roads to ensure safe and reasonable access to areas open to the public.

Visitor use is allowed in designated areas. Visitor access is for specific wildlife-dependent activities, such as wildlife photography or observation, and nature interpretation that are compatible with refuge purposes. Fishing is allowed seasonally at the better of the two sites, the barge bulkhead or the beach, with disabled access provided. Facilities to improve interpretation of refuge management and the habitats are constructed. The Service establishes a refuge entrance fee, of which at least 80% remains with the refuge to support visitor use facilities and programs. Entrance fees are expected to exceed $15,000 the first year.

Environmental education and research activities are allowed by permit throughout most of the refuge. Wildlife or plant demonstration projects related to refuge management practices are developed, with EE cooperators. These areas are accessible and interpreted for visitor and EE group viewing. The environmental education sites on the refuge are improved by mowing and leveling the sites for greater ease of access and safety. The need or use for simple, roofed structures is evaluated for EE use. Visitor use is monitored to evaluate its impact on refuge plant and animal resources. Seasonal, temporary, and rotational road and trail closures are to be considered for minimizing impacts to wildlife and habitat due to visitation.

The Service conducts environmental education activities at the refuge EE center and on refuge lands. Service EE activities and interpretation focus on refuge management practices on this unit or other units within the National Wildlife Refuge System. On-refuge visitor parking is available adjacent to the refuge Headquarters and EE center and north of Dawson Beach Road at the intersection of Lake Drive. Access to open areas on the refuge is by foot on existing roads, firebreaks and trails, or by motor vehicle in the case of permitted group activities. Access to fishing at the existing barge bulkhead is from the refuge EE Center along designated trails, or from nearby parking for disabled anglers. Bicycles remain with cars at the Service EE Center parking area. Refuge tours and activities are scheduled on an irregular, but frequent, basis.

Resource management emphasizes improvement to and restoration of grassland areas for the diversity of plants and animals. Burning and mowing regimes of grasslands are employed to enhance habitat structure and favor native grasses to attract and increase breeding populations of grassland-dependent migratory bird species. The compound area is restored as grassland habitat. A deer management plan is developed which would identify the most effective strategy to maintain the deer population within the carrying

capacity of the refuge. This will be addressed in a separate environmental document. Refuge staff and qualified refuge volunteers pursue the collection of data regarding water quality and quantity, native plant, fish, and wildlife population monitoring such as the monitoring of wildlife and plant responses to management public visitation. Impacts from visitor use will be monitored on a continual basis. Activities will be adjusted as necessary to reduce impacts. Wetland habitats throughout the refuge are managed to enhance use by waterfowl, waterbirds, and other wetland-dependent wildlife.

Environmental Consequences of Alternative D (Preferred Alternative)

Impacts on Animal and Plant Populations

Under this alternative, mowing and prescribed burning would be used to enhance the quality of the current grasslands for grassland dependent species. The 10-acre, former compound area would eventually be restored to grassland habitat. Wildlife and plant populations of grassland species, particularly declining species like grasshopper sparrows, Henslow's sparrows and Eastern meadowlarks, would likely increase. Disturbed wetlands will be restored where possible. A deer management plan will be developed and implemented to keep deer populations within the carrying capacity of the habitat. Consequently, the deer population would remain at about its current size of about 50-75 over the long term. A separate environmental assessment will address the alternatives and impacts for this plan.

Plant and animal biodiversity would increase, given the selective, research-based, habitat management occurring. Populations of grassland birds are expected to increase with the qualitative and quantitative improvement of grassland habitat on the refuge. Waterfowl and waterbird use are also expected to increase with the restoration and management of wetlands on the refuge. Increases in visitor use under this alternative would cause some disturbance to wildlife. Visitors would be confined to roads, trails and firebreaks, however, minimizing disturbance to wildlife and trampling of plants. Visitor use would be monitored and areas closed at times if seasonal wildlife concentrations or use are unduly disturbed or threatened.

Impacts on Air and Water Quality

The Refuge would be open to greater visitor use under this alternative. Consequently, exhaust emissions from a greater number of vehicles would probably contribute to minor, localized increases in air pollution. Refuge management activities and visitor use would not affect water quality. Habitat management involving prescribed burning may occur and only under ideal conditions of weather, moisture, wind speed and wind direction, in compliance with air quality and health standards.

Impacts on Archeological and Historical Resources

Review of proposed locations for construction of refuge buildings, parking areas, or trails would be conducted as prescribed in Section 106 of the National Historic Preservation Act. Archaeological surveys would be undertaken as needed to ensure avoidance of archaeological resources eligible for inclusion in the National Register of Historic Places. Interpretation of the historical use of the unit would be part of the overall interpretation of the Refuge, particularly how historic land use changes have influenced wildlife.

Socioeconomic Impacts

The environmental education center and interpretive programs at the Refuge would draw large numbers of visitors to the Refuge, to enjoy wildlife-dependent opportunities for wildlife observation, photography, fishing, and environmental education. Information is not available to make precise calculations on the amount of economic activity that would be generated by birding ecotourism at the Refuge. However, eight other National Wildlife Refuges surveyed were estimated to contribute a range from slightly less than $1 million to about $14 million to the local economy. While birding concentrations, rare or unusual species, or diversity may not be extraordinary attractions here, compared to other refuges, the fact that the Refuge lies at the doorstep of the Nation's capitol would offer large numbers of tourists an environmental education that interprets the local Refuge flora, fauna, and management programs. It would showcase interpretation for the entire National Wildlife Refuge System. Revenues generated by entrance fees are expected to exceed $15,000 the first year for the benefit of the Refuge management and programs.

Issues, Concerns, and Opportunities

Issues, concerns, and opportunities were identified through early planning discussions and through the public scoping process which began with open houses and public meetings in April 1997. The following topics were identified, most of which were evaluated in Alternative A-D. Comments listed are representative of those received by the Service; responses from the Service follow.

1) Reuse of existing compound buildings

Much discussion has focused on the adaptive reuse of the compound buildings to house the research and educational needs of County schools, and nearby colleges and universities. Having a non-profit organization operate and manage the buildings has long been discussed.

Comments:

*Reuse existing facilities to minimize impacts or ecological disruption
*Reuse existing facilities to save taxpayers' money
*Reuse building #211 only
*Reuse all buildings and evaluate after a period of time

Response:
Reuse and reutilization of existing compound buildings do not appear to have the benefits to the public, the Service, and the educational community they once seemed. While the cost of rehabilitating the compound buildings is less than the cost of constructing a new Service facility, the up-front cost of rehabilitating the existing buildings is still substantial. If the Service were to rehabilitate building #211 for its own use, including EE facilities and an interpretive center, similar to that in a new facility, the cost would be approximately $3.3 million. New construction is around $5-6 million. For other users, no one organization has the money to complete rehabilitation and turn over finished buildings to the educational institutions. Rehabilitation costs would thus be charged to building users in addition to the rent; this would be the most costly alternative for any building user. Rent generated does not even cover operations and maintenance costs. The Service cannot underwrite this difference. In any case, the Belmont development has committed to providing 50,000 sq.ft. of EE and Research facilities off-site. Eventual removal of existing buildings will allow the Service to restore 10 acres of early successional habitat for grassland-dependent species.

2) U.S. Fish and Wildlife Service Facility Location

General responses indicated that there should be Service presence on the site. Specific recommendations for facility location varied among off-site, at the existing entrance to the site, in the existing buildings, at the old homestead site, and at the bunker (Building #306). A "Science Center" built to meet the administrative, and environmental education and interpretation needs of the refuge and serve as an educational gateway to the refuge was identified.

Comments:
*Reuse existing facilities to minimize impacts or ecological disruption
*Site-specific environmental studies are needed prior to siting any facilities
*Locate facility on land already disturbed - example, Bunker #306
*Limit further development
*Locate facility near Dawson Beach Road gate - less sensitive area
*Locate facility near old Homestead site

Response:
The location of the Service facility plays a key role in addressing visitor use and Service management of the refuge. It is to be a welcoming facility, where all visitors can receive information about the value of land protection for wildlife, the benefits of active habitat management, and contributions people can make for wildlife. The facility needs to be near the entrance to the site where people's questions about wildlife can be answered, whether or not they walk out on the site. The preferred access route to the refuge will be through the Belmont property. It is there that research, educational, and transportation facilities will be provided.

The Service compared the attributes of several possible locations for its facility location -- the existing compound, the west gate on Dawson Beach Road, the former homestead site at the highest point on the site, and the bunker area in the northeast corner of the refuge. Selection considered access to public transportation, utilities, biological impacts, construction impacts, visual intrusion on the refuge landscape, and access to habitat variety for interpretation.

Occoquan Bay NWR is a small piece of land. For that reason, special emphasis will be placed on experiencing the refuge by foot (disabled access will be accommodated), with minimal vehicular access or the potential use of trams. An important consideration for a facility, therefore, is to locate it near areas that can provide a diversity of habitats and management techniques to interpret to visitors.

The west gate is over a mile from the proposed research facility; it is at the back door of the public eye; it is not likely to be accessible by public transportation; and, there would be the normal impact due to construction. The location doesn't lend itself to easy access to demonstratable habitats.

The homestead site is a desirable location, but is the farthest away from utilities, and is not within easy walking distance from the research and education facility in Belmont. A facility placed on the hill at the homestead site disturbs the same amount of ground as the west gate option. It intrudes visually on much of the northern portion of the refuge. The people activity associated with parking and walking to interpreted trails subdivides the large block of grasslands along the north refuge boundary. Pedestrian use conflicts with vehicles traveling to other parts of the refuge.

Use of the already disturbed compound area for a facility reduces construction impacts. Its sphere of influence is great, as it becomes a congested site in the center of the property through which all foot and vehicular traffic must pass. Its location does not serve the majority of the walking public; its central location on the refuge is out of range of walking distance from the research and education facility and public transportation. High activity levels at the compound and high activity levels on the golf course and residential area on the Belmont property effectively sandwich the northern grasslands and make them less useable to raptors. As a contributor to activity in the compound, visitors will need vehicles to access most of the outlying, diversity of habitat types. There is a variety of habitat types surrounding the compound, but four of the five types are in areas identified as either requiring contamination clean up, or as being downstream from contaminated areas. Part of the compound area itself may have contamination problems resulting from underground storage tanks.

The use of the existing, disturbed bunker site in the northeast corner of the site is preferred. The Army excavated a large area to construct the bunker, its entry drive, the road to the south, and the east end of the hill (with the construction of a parking lot and billfold). Placement of a new building can occur within the footprint of the existing bunker and its associated excavation, thus limiting new disturbance to the construction of

a parking area. Access to the facility is via the existing roadways. A new road is not be necessary. Utility and road connection is made from the Belmont property.

There is minimal visual or physical intrusion into the site and into the northern grasslands. All of the facility, including parking and driveway, is located "behind" the grassy knoll, on the north side of the hill, and is on the very periphery of the grassland. People activity is screened from the rest of the refuge because of the hillside, the traffic in and out of the building is contained in the very smallest area and is not noticeable from the walking trails or the rest of the refuge to the south. Built into the hill, the building provides the panorama view of the refuge from its top floor. The top floor serves as an indoor observation blind. Lower floors face north toward the woods. From the building, people can walk designated trails through a variety of habitat types and management techniques, seeing a variety of wildlife species. Visitors utilizing local bus transportation will be able to walk to the Service facility from the proposed Belmont hotel or research facility. No construction is to occur in the small wooded area (Fig. 2, Area 4).

The Service recognizes concerns expressed for the habitats in the northeast quadrant and their sensitivity for Bald eagle use. This area was the Army public use area and much manipulation of the site has already occurred to improve it for recreational use. Upon closure of the lab, requests by the Service to minimize visitation to this area because of possible eagle use allowed an eagle monitoring program to occur. The low use by eagles of the shoreline adjacent to the former ball field was determined to be due in part to the intensive boat traffic in the boating channel just offshore. Visitor activities will be diverted in response to eagle use and need.

Facility placement will receive continuing scrutiny regarding environmental impacts. Sites will be reviewed again as data from biological studies is collected. Slower, incremental development of public access will be implemented.

3) Visitor Use, Access Routes and Parking

Many early concerns were raised that the Service would limit public use. The desire for public access was clearly heard in both oral and written comments and in the establishing legislation. Many people also stated that unlimited access could so impact the site that the wildlife value could be greatly diminished. Starting slow and building high quality programs was recommended as the best approach. The need to continually monitor and evaluate visitation impacts on habitat and wildlife was seen as a key component of all public use activities. Comments varied about the most appropriate system of access to the site. Recommendations ranged from no vehicular access and parking off-site, to parking at the compound only, to using the entire network of roads and trails for vehicles, bicycles, and walking. An auto tour route was suggested, as was the use of continual trams. School bus accommodation was also expressed as a need.

Comments:

*Support entrance fees
*Continue little or no public use as long as possible
*Maintain recognized quiet areas
*Encourage water and boat access
*Use existing roads, don't create new ones
*Further evaluation needed before locating facilities, parking, trails
*Need public facilities such as boardwalks, observation areas, and accessible trails
*Utilize most refuge roads and trails for public access

Response:
The Service concurs with many of these comments. Facility development on the refuge will occur gradually and carefully. Temporary routes to allow access and introduction to the refuge will be put in place. Arrangements may shift to avoid contamination clean-up. Public access will not be allowed into areas where clean-up is occurring. Improvements to existing roads will be phased in and monitoring of impacts to wildlife will begin as soon as possible. Seasonal or periodic restrictions will be placed on designated areas, and on certain roads and trails as needed, to protect key species of plants and wildlife.

Selection of sites for any facility development will be based on minimizing impacts to the refuge's wildlife and habitats, such as careful scrutiny of trail layout and design to help minimize intrusion or to avoid sensitive plant communities. (See Chapter IV Refuge Management Goals and Objectives).

4) Resource Management

Loss of habitat in the Potomac basin is seen as an important issue. Maintenance of the existing diversity of habitats was cited as a primary focus of resource management activity. As a tool to increase public awareness of habitat management techniques and their roles in enhancing habitat quality, interpretation of refuge management should be provided and demonstration areas could be developed, managed, and monitored. Opportunity exists for research efforts to provide valuable information for management efforts.

Comments:

*Maintain and enhance grasslands, restore and enhance wetlands.
*Manage deer population
*Implement appropriate habitat and wildlife surveys before permanent changes are made to habitats

Response:
The Service agrees. (See Chapter IV - Refuge Management Goals and Objectives.)

5) Environmental Education Program

Activities proposed include K-12 environmental education focused on the major habitats of the refuge. Interest exists to do research on wildlife populations, habitat and wildlife use, and monitoring wildlife responses to management techniques.

Response:
Habitat management, habitat restoration, and fish and wildlife conservation will be the focus of refuge management activities, and consequently, will be the focus of the Service's EE programs and interpretation. The Service supports the educational opportunities for K-university programs (see Chapter IV Refuge Management Goals and Objectives). Outdoor class activities will occur in designated areas to minimize wildlife and plant disturbance. Research will occur in coordination with Service staff.

6) Perimeter Fencing

Fencing was erected to safeguard the classified nature of the Army Facility. The retention or removal of some or all of the perimeter fence was requested to be discussed in the plan.

Comments:
*Remove all or most of the perimeter fence along the Potomac
*Retain perimeter fence
*Remove fencing to allow fishing

Response:
The fence is unattractive but serves as a trash barrier during times of high water and a as a deterrent to vandalism. The development of a fishing area at the barge bulkhead requires fence removal at that site. Removal of the fence will be considered on a section-by-section basis where impacts due to vandalism, trash dumping, and free-running dogs may be minimal, such as along Marumsco Creek.

7) Tower

Many comments for maintaining the telecommunications tower were listed. Proposed uses supporting educational programs included long-distance learning, communications, and interpretive opportunities such as observation by camera. Use for income generation was identified.

Comments:
*Remove or lower tower
*Keep tower for educational purposes
*Review potential use of tower using entrance fees to maintain it

Response:
Along with the removal of the compound buildings, the tower's removal is in keeping with the desire by the Service to reclaim the center of the site. Estimates of money that could be earned from leasing additional relays on the tower are as high as $15,000. However, no engineering evaluation of the tower's ability to support additional antennae and dishes has ever been done, so it is unknown if additional dishes are feasible. Maintenance and repair costs would come out of that amount. Long-distance learning does not require a tower to transmit information - that can occur via fiber-optics or other mobile or ground-based transmission sites. Although explaining the tower's presence is a tremendous opportunity for interpretation about "man's impact on the land", the tower is an intrusion, visually, from much of the refuge and is an unattractive "attractive nuisance".

Opportunities for Partnerships

There is a tremendous level of support for the protection of the land base formerly known as the Woodbridge Research Facility. For years, people concerned for the future of the natural assets of the site have been assisting with collection of flora and fauna information. Interest in providing educational opportunities has also been very high. Opportunities exist in many arenas for partnerships. The following are examples:

Data collection and Monitoring

Educational institutions from elementary to post-graduate level are interested in collecting both baseline data and monitoring of longer-term trends of plants, wildlife, fishes, and environmental conditions on the site. An initial list of potential inventories that partners might help conduct are found in Chapter IV - Refuge Management, under the "Wildlife and Habitat Management" section.

Habitat Management

*Cooperative fire management training
*Restoration
*Demonstration habitats

Educational Programs

Opportunities exist to develop and run educational programs that convey the refuge message to visitors. Programs and curricula can be developed - from elementary school levels through adult education. Course work and programs associated with Occoquan Bay NWR can include:

*Teacher education certification credits for environmental education components
*Earth Stewards program with local schools
*Adopt-a-Refuge
*Refuge-lead interpretive or EE programs
*Pathways to Fishing

Volunteer Opportunities

As the refuge contributes to the quality of life in the region, so the strong support in the community and the Potomac region can contribute to the success of the refuge. Helping hands are needed for the surveys, program development, and facility operations envisioned in the preferred alternative. Only then can the refuge achieve its goals and objectives, support the mission of the Fish and Wildlife Service, and contribute to the needs of the community.

Opportunities for partnerships encompass a wide array of community organizations and individuals, including but not limited to:

Groups

Potomac Nature and History Trust
Fairfax Audubon Society
National Audubon Society
Sierra Club - Great Falls Chapter
Northern Virginia Bird Club
Virginia Society of Ornithology
Audubon Naturalist Society
Virginia Native Plant Society
Prince William Wildflower Society
Prince William Natural Resources Council
Woodbridge Foundation Incorporated
Boy Scouts of America - Springfield District
Boy Scouts of America - Woodbridge District
Caruthers Foundation
Belmont Development
Friends of Mason Neck
Friends of the Woodbridge Refuge
Woodbridge Refuge Committee
American Fisheries Society
American Sportfishing Association
Izaac Walton League
Fairfax Rod and Gun Club
Garden Clubs

Civic Associations

Mason Neck Citizens Association
Federation of Lorton Communities
Gunston Homeowners Association
Hallowing Point Civic Association
Belmont Civic Association
Fire and Rescue

Government

National Park Service
- Prince William Forest National Park
- Great Falls National Park

U.S. Fish and Wildlife Service
- National Conservation Training Center
- Washington Office, Division of Refuges
- Fisheries Assistance

Virginia Department of Game and Inland Fisheries
Virginia Department of Conservation and Recreation
- Mason Neck State Park
- Leesylvania State Park
- Gunston Hall Plantation

Virginia Department of Historic Resources
Northern Virginia Regional Park Authority
- Pohick Bay Regional Park

Prince William County
- Prince William County Public Schools
- Prince William County Litter Control
- Prince William County Park Authority
  - Veterans Memorial Park
- Department of Public Works
- Fire and Rescue

Fairfax County
- Prince William County Public Schools
- Fire and Rescue

III. REFUGE AND RESOURCE DESCRIPTION

The descriptive information in long quotation format below was excerpted from the *Environmental Assessment for the Disposal of the Woodbridge Research Facility*, prepared by the Baltimore District of the U.S. Army Corps of Engineers in August 1995.

Geographic Setting

Occoquan Bay NWR is a peninsula of approximately 654 acres. It is bordered by the sandy river shoreline of Belmont Bay and Occoquan Bay and the tidal flats of Marumsco Creek. The food supplies produced by its varied habitats and the peninsula configuration attract migrating birds.

Geology and Soils

> "The Occoquan Bay NWR lies approximately 4 miles east of the fall line separating the Coastal Plain from the Piedmont Uplands Province. Coastal plain sediments began accumulating over the irregular surface of Piedmont rocks during the Cretaceous Period. Alluvial terrace deposits in this segment of the Coastal Plain Province are generally less than 200 feet deep, and are underlain by the sand, silt, clay, and gravel deposits of the Patapsco and Patuxent formations of the Potomac Group. The Potomac Formation is a massive eastward-thickening wedge of sediments exhibiting a variety of grain sizes. The Patapsco Formation is comprised of variegated clay, buff sandy clay, and sand. Interbedded Archeozoic sand, gravel and clay comprise the Patuxent Formation."[1]

Socioeconomic Setting

Prince William County is one of the fastest growing counties in the Commonwealth of Virginia, with more than 241,000 residents. The county consists of 222,305 acres of land and 5,120 acres of water. It comprises single-family residential, multi-family residential, agriculture, parks and open space, and government, commercial, and industrial facilities. Employment is high, predominately in government and government-associated services or activities.

History of Area and Site

"Occoquan" is derived from a Dogue Indian word meaning "at the end of the water". The river and the location made this area a natural site for Native American and colonial settlement.

> "English colonial settlement of the Potomac Valley on the Virginia side began in the mid-17th Century. The first land grant in present-day Prince William County went to Thomas Burbage in 1653 for an area between Neabsco Creek and the Occoquan River. In 1657, Martin Scarlet, a tobacco planter prominent in the colonial history of the area, purchased 700 acres of land on Burbage's Neck, including what is now the Woodbridge Research Facility, and established the Deep Hole Estate there. Upon his death, Scarlet was

[1] *Environmental Assessment for the Disposal of the Woodbridge Research Facility*, prepared by the Baltimore District of the U.S. Army Corps of Engineers in August 1995.

buried in a cemetery on the Estate. All that remains of the cemetery are two headstones, which were removed from the cemetery location, and used as boundary markers. The Taylor family bought Deep Hole Estate in 1765, and the property remained in that family until the mid-1800's.

"During the Civil War, Confederate batteries were built in the vicinity, south of the Woodbridge Research Facility at Freestone Point at the mouth of Neabsco Creek, at Cockpit Point, and at the mouth of Powell's Creek. In 1869, the Deep Hole Estate was bought by the Metzger family, who built a large Pennsylvania-style barn. The Dawson family acquired the property, with the Metzger house intact, in 1908. The Dawsons and their tenant workers raised cattle and wheat and operated a small fishery on the property. Structures known to have existed during this period included the house, two barns, stables, a carriage house, and the ice house in which fish were packed. Of these structures, only some foundations are evident above the ground. The property remained in the Dawson family until 1949.

"The government acquired the land in 1950. The U.S. Army Transmitting Station, which became one of the largest such facilities in the world, was established there in 1952. The property was transferred to AMC in 1971 (except for a 7-acre tract that was transferred to Fort Belvoir as the Fort Belvoir Woodbridge Housing Site) and was used to conduct research of EMPs effects on Army systems. In 1972, approximately 63 acres were transferred to DOI as the Marumsco Wildlife Refuge (Astore, 1991)."[2]

Cultural Resources

"In April 1995, a report entitled "Cultural Resource Survey of the Woodbridge Research Facility, U.S. Army Research Laboratory, Prince William County, Virginia", was prepared by KFS. The purpose of the report was to summarize results from a cultural resource survey conducted to verify potential sites identified in the 1991 CRMP and to conduct archaeological fieldwork.

"The 1995 cultural resource survey included all known sites and potential sites identified in the 1991 CRMP. The 1995 survey work identifies six archaeological sites, two of which are historic sites that include a late 17th Century plantation and mid-19th Century farmstead. Both sites were subject to demolition activities and surface grading. Due to the high level of disturbance, these sites were not recommended as eligible for listing on the National Register of Historic Places (NRHP). The remaining four sites are all small prehistoric sites. These sites have been deteriorated from the process of erosion, have been disturbed to some extent by grading, and produced a small number of artifacts. Based on these factors, none of these four sites were recommended as eligible for listing on the NRHP.

"Field and background archival research revealed the shoreline of the Woodbridge Research Facility as highly eroded. Many well-drained interior areas of the installation have been extensively disturbed through development, such as roads, buildings, and underground facilities. Extensive regrading occurred throughout the installation to accommodate the facility's mission. Many interior areas are too poorly drained to be the location of archaeological sites. Due to the wetland areas and documented disturbance, the report concludes additional archaeological studies are not required."[3]

Although additional archaeological studies were not required in closing the facility, this study was an overview based on a sample of the facility's land. Construction of new facilities on the property will require archaeological review under Section 106 of the National Historic Preservation Act, and may require archaeological surveys of any proposed construction areas.

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[2]*Environmental Assessment for the Disposal of the Woodbridge Research Facility*, prepared by the Baltimore District of the U.S. Army Corps of Engineers in August 1995.

[3]Ibid.

Vegetation

Wetland habitats cover about 50 percent of the site, and include wet meadows, bottomland hardwoods, open freshwater marsh, and tidally influenced marshes and streams. About 20 percent of the unit is upland meadows, with the remaining vegetated areas consisting of mature or second growth forest. A more detailed description of vegetation communities follows, based on information in the *Environmental Assessment for the Woodbridge Research Facility Disposal*, August 1995 (See Figure 2). A current plant list (Appendix K) has been provided by the Virginia Native Plant Society. Since the Service did not hold title to the land prior to the time of transfer, confirmation of the species and composition of habitats has not yet occurred. Acreage of each vegetative community is approximate, based on GIS work and plant identification done by Todd Waltemeyer, Elaine Haug, and Nicky Staunton.

"Information collected during the 1991-1992 BATES survey, wetland delineation, and from color aerial photographs was used to designate 20 vegetative communities. These communities are differentiated by their vegetative composition. Figure 2 illustrates the locations of the designated areas. The largest community, Area 8, covers most of the south and east sections of the WRF and is subject to strong tidal influences. Two other large communities, Area 3 and Area 13, are maintained primarily by annual mowing. Steeply sloping upland wooded areas, Area 15 and Area 20, are found along Marumsco Creek. Description of all the designated vegetative communities are included below.

"Transitions between vegetative communities on the installation are largely the result of differing hydrologic regimes. Tidal influences are significant because most of the Woodbridge Research Facility lies below the 100-year flood plain elevation. Areas receiving the greatest tidal influences are typically characterized by floating, emergent, or scrub/shrub vegetation, whereas higher elevations support open grasslands and trees.

"Area 1 totals 30 acres and is comprised of two intermittent channels draining south from the east side of Dawson Beach Road. Except for the forested band along each channel, this community was traditionally mowed several times during the spring and summer. Commonly observed woody species included black gum (Nyssa sylvatica), northern arrowwood (Viburnum recognitum), sweetgum (Liquidambar styraciflua), and red maple (Acer rubrum). Herbaceous species included soft rush (Juncus effusus), orchard grass (Dactylis glomerata), Virginia creeper (Parthenocissus quinquefolia), tickseed sunflower (Bidens spp.), and umbrella sedge (Cyperus spp).

"Area 2 is a 7-acre grassland between the two stream channels in Area 1. This area was mowed regularly. Herbaceous vegetation included white-top sedge (Dichromena colorata), soft rush, tickseed sunflower, sensitive fern (Onoclea sensibilis), and barnyard grass (Echinocloa crusgalli). Sweetgum now flourish.
"Area 3 is a 103-acre open field covering much of the area adjacent to the northern boundary of the site. This area has been mowed once annually. Elevations in this community are primarily above 15 feet MSL. Dominant species included sweetgum saplings, jointgrass (Manisuris cylindrica), dropseed grass (Muhlenbergia expansa), and bush clover (Lespedeza capitata). Gamma grass (Tripsacum dactyloides) has become a dominant species.

"Area 4 is a 7-acre forested tract in the northeast corner of the installation. It lies between Taylor's Point Road and an intermittent stream channel (ditch). The dominant woody species included persimmon (Diospyros virginiana), sweetgum, and northern arrowwood. Herbaceous species, occurring mostly along the stream channel, included jointgrass, dropseed grass, barnyard grass, and Christmas fern (Polystichum acrostichoides).

"Area 5 is a 7-acre site that previously served as the base Picnic and Recreation Area near Taylor's Point. This heavily used area contained a softball diamond and picnic facilities. Vegetative cover was predominantly mowed turfgrass. The field is seasonally wet and supports Canada geese.

"Area 6 is a 21-acre forest situated south of Charlie Road and west of Deephole Point Road. The dominant tree species was silver maple (Acer saccharinum). Also common were green ash (Fraxinus pennsylvanica) and black gum. Herbaceous understory species included nimble-well (Muhlenbergia schreberi), terrell grass (Elymus virginicus), and ground ivy (Glecoma hederacea).

"Area 7 is an 11-acre mowed area located directly west of Area 6. The western edge of this community is bounded by an intermittent stream channel hydrologically connected to a large tidal marsh community (Area 8). Dominant herbaceous species included jointgrass, dropseed grass, thistle (Cirsium spp.), and soft rush.

"Area 8 is a 120-acre tidally influenced area covering most of the shoreline of Belmont and Occoquan Bays. This area is subject to daily fluctuations in water levels and is dominated by shrubby and emergent growth with occasional interspersions of tree species on islands. Dominant species include marsh mallow (Hibiscus moscheutos), swamp rose (Rosa palustris), button bush (Cephalanthus occidentalis), spatterdock (Nuphar luteum), pickerelweed (Pontederia cordata), silky dogwood (Cornus amomum), and black willow (Salix nigra). Islands were dominated by green ash, sycamore (Platanus occidentalis), black willow, and silver maple.

"Area 9 is a 17-acre transitional area between a tidal community (Area. 8) and an open field community (Area 3). The community is sparsely covered with persimmon, red maple, and sweetgum. Herbaceous cover included jointgrass, raspberry (Rubus spp.), poison ivy, Japanese honeysuckle (Lonicera japonica), soft rush, tickseed sunflower, and nimble-well.

"Area 10 consists of 38 acres between the tidal marsh community (Area 8) and the main compound (Area 12). This transitional community contained a mix of trees, shrub and herbaceous species. The most common species was persimmon. Other common species included sweetgum, silky dogwood, black willow, jointgrass, and yellow foxtail (Seteria glauca).

"Area 11 is a 15-acre forest on the north side of the main tributary and northwest of the intersection of Charlie and Bravo Roads. Tidal influences are minimal at this point, and the vegetation is predominantly woody. Common species include persimmon, black gum, red maple, sweetgum, northern arrowwood, nimble-well, and soft rush.

"Area 12 is the 14-acre main compound and contains expanses of mowed turfgrass and a few ornamental plantings.

"Area 13 is a 153-acre field. This area is upslope of the floodplain and has been mowed annually. Dominant vegetation consists of various herbaceous species, including broomsedge (Andropogon virginicus), yellow foxtail, and bush clover. Linear strips of trees occurred in places and included eastern red cedar (Juniperus virginiana), black cherry (Prunus serotina), and persimmon.

"Area 14 is a 4.5-acre narrow, steep tract extending north and west from the intersection of Fox Road and Deephole Point Road. The area is forested and contains northern red oak (Quercus rubra), pin oak (Quercus palustris), white oak (Quercus alba), sweetgum, willow oak (Quercus phellos), and black locust (Robinia pseudoacacia).

"Area 15 is a 9-acre wet swale that runs southeast from the pond to Marumsco Creek. This area appears to be influenced by tidal regimes near Marumsco Creek and by surface water runoff and pond overflow in its upper segment. Common woody species include green ash, red maple, willow oak, black locust, silky dogwood, smooth alder (Alnus serrulata), northern arrowwood, and black willow. Herbaceous species included clearweed (Pilea pumila), nimble-well, sensitive fern (Onoclea sensibilis), wool grass (Scirpus cyperinus), small-flower agrimony (Agrimonia parviflora), Japanese honeysuckle, and Virginia creeper.

"Area 16 is a 2-acre tidal area downslope from Area 14. Common species included silky dogwood, black haw (Viburnum prunifolium), northern arrowwood, yellow iris (Iris pseudacorus), green ash, and cattail (Typha angustifolia).

"Area 17 is a 4-acre pond. Little vegetation exists within the pond. Above the zone of periodic inundation, however, is a narrow band of woody vegetation dominated by red maple, black locust, black willow, and pin oak.

"Area 18 is a 10-acre forested ridge along Marumsco Creek and just south of the Fort Belvoir Woodbridge Housing Site. The elevation of this community is the highest on the installation and it is dominated by oak trees. Common species include northern red oak, white oak, chestnut oak (Quercus prinus), Virginia pine (Pinus virginiana), mockernut hickory, American beech (Fagus grandifolia), black locust, and eastern red cedar.

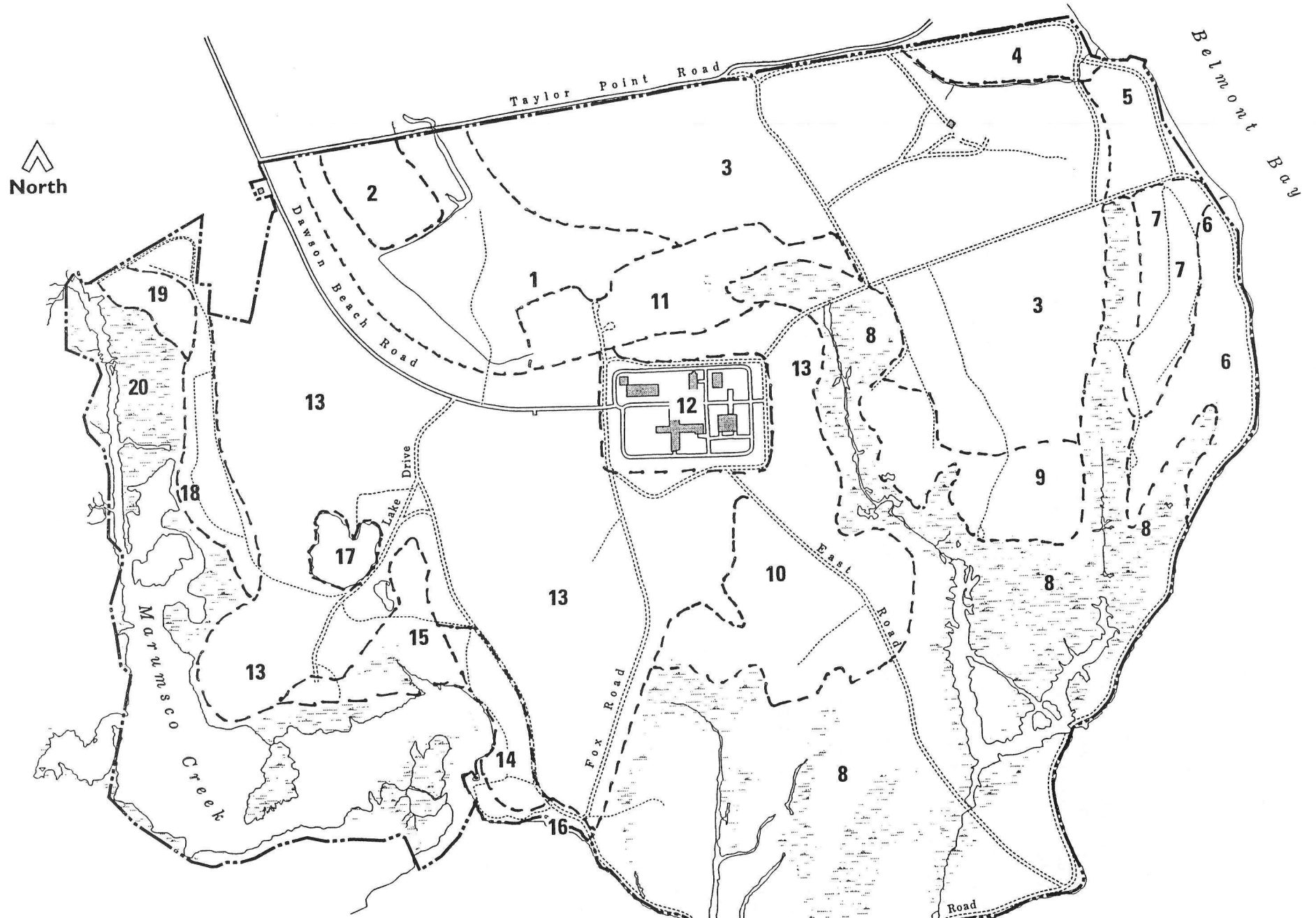
"Area 19 is a 3-acre low area downslope from Area 18 and adjacent to Marumsco Creek. Portions of the area have been disturbed by machinery. The undisturbed portions are dominated by red maple. Other woody species include black cherry and pin oak. Herbaceous cover includes cattail, soft rush, wool grass, barnyard grass, and tickseed sunflower.

"Area 20 is the 74-acre Marumsco Creek tidal marshland containing open marsh plants."[4]

Invasive, non-native plants found on the refuge include Phragmites (Phragmites australis), Japanese knotweed (Polygonum japonica), Japanese clematis (Clematis japonica), Tree of Heaven (Ailanthus altissima), autumn olive (Elaeagnus umbellatus), crown vetch (Coronilla varia), bicolor bush clover (Lespedeza bicolor), and honeysuckle (Lonicera japonica).

Members of The Virginia Native Plant Society have identified over 600 plant species on the refuge since 1993 (Appendix J).

[4]*Environmental Assessment for the Disposal of the Woodbridge Research Facility*, prepared by the Baltimore District of the U.S. Army Corps of Engineers in August 1995.



Vegetative Communities

Marumsco National Wildlife Refuge

Comprehensive Management Plan

Fig. 2

(from Fig. 4-4 Woodbridge Research Facility Disposal - EA, Aug. 1995)

Wetlands

"A comprehensive jurisdictional wetlands delineation of the site was conducted during November and December 1991 (CH2M Hill). Boundaries between wetlands and uplands were determined using the procedure outlined in the 1987 Corps of Engineers Wetlands Delineation Manual. See Figure 3.

"The delineation found that approximately 285 acres of the site are jurisdictional wetlands. Primarily, the wetlands are tidally influenced and contain scrub/shrub and emergent vegetation. Areas of nontidal emergent, scrub/shrub, and forested wetlands were also observed. Less than 5 acres of the identified wetlands were not connected hydrologically to either Belmont Bay or Occoquan Bay.

"A single, large wetland complex, extending southeasterly from the main entrance to the shoreline, accounted for 265 acres of the total. In its upper reaches, this complex is nontidal and borders an unnamed stream. This portion of the complex is vegetated primarily by emergent vegetation, including soft rush (Juncus effusus), sedges (Carex spp.), orchardgrass (Dactylis glomerata), tickseed sunflower (Bidens spp.), white-top sedge (Dichromena colorata), and turfgrass. Along the stream channel, woody vegetation was dominant. Common species included northern arrowwood (Viburnum recognitum), black gum (Nyssa sylvatica), sweet gum (Liquidambar styraciflua), and red maple.

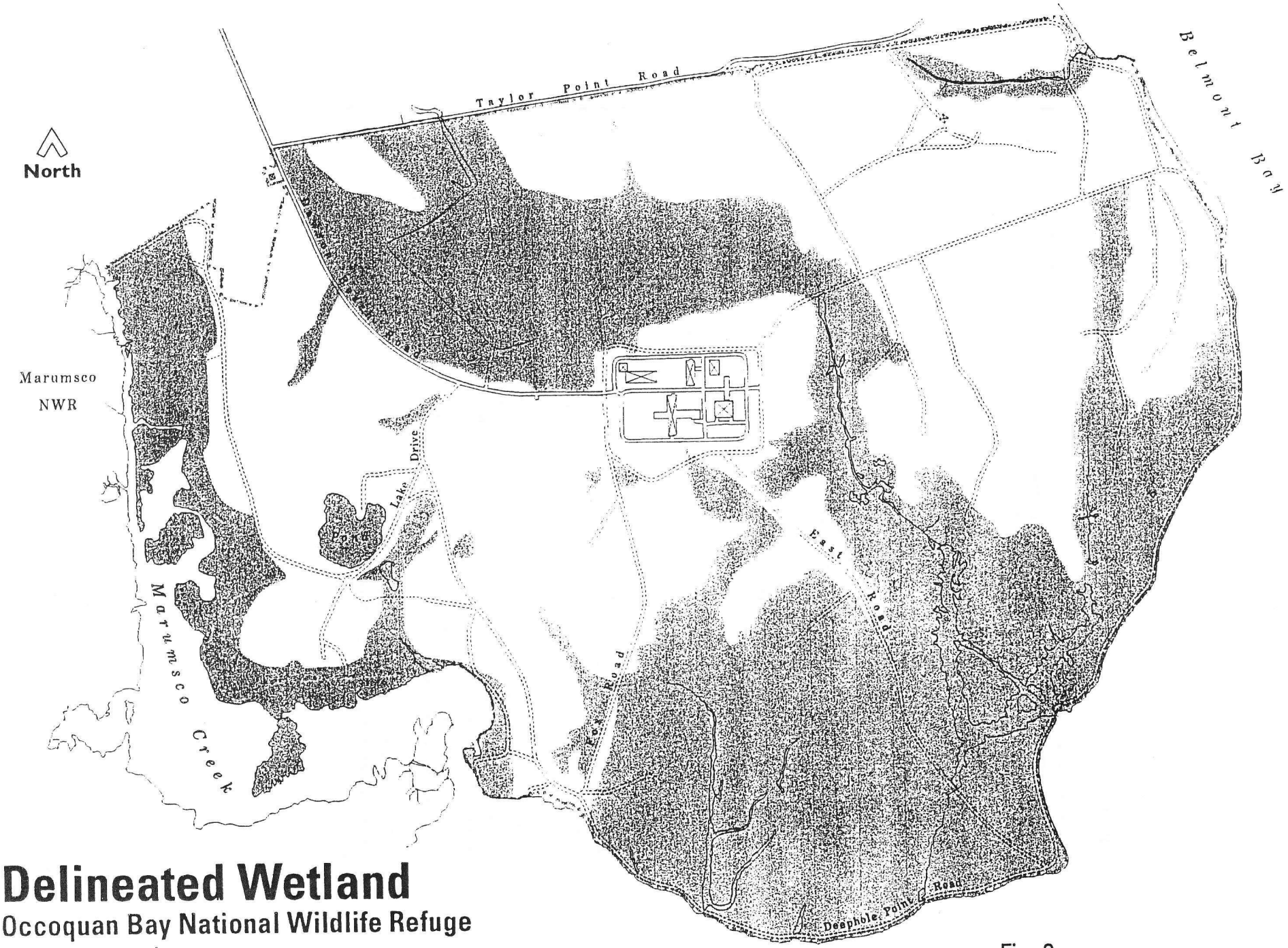
"Just north of the fenced compound, tidal influences begin to dominate the hydrology of the complex. Within this zone, vegetation is primarily shrubby with emergent inclusions. Common species included marsh mallow (Hibiscus moscheutos), swamp rose (Rosa palustris), silky dogwood (Cornus amomum), buttonbush (Cephalanthus occidentalis), spatterdock (Nuphar luteum), soft rush, and pickerel weed (Pontederia cordata). On the upland edges of the wetland, tree species such as green ash (Fraxinus pennsylvanica), sycamore (Platanus occidentalis), and black willow (Salix nigra) were observed.

"South of the main compound, the complex broadens and covers much of the shoreline from the mouth of Marumsco Creek up to the intersection of Charlie Road and Deephole Point Road. The hydrology in this section of the complex is controlled by tidal fluxes. Vegetative species composition is essentially the same as that observed in the tidal section to the north. Islands of arboreal species are interspersed throughout this section of the wetland.

"A 15-acre wetland, associated with Marumsco Creek, lies along the western boundary of the Woodbridge Research Facility. This includes a large swale extending from a point northeast of the installation pond southward to Marumsco Creek. Hydrology in the swale is nontidal. This area was a composite of open areas, dominated by soft rush and sedges, and shrub-forest areas dominated by pin oak (Quercus palustris), northern arrowwood (Viburnum recognitum), smooth alder (Alnus serrulata), and black locust.

"Other isolated areas of wetlands were identified. Vegetation typically included soft rush, wool grass (Scirpus cyperinus), gamma grass (Tripsacum dactyloides), dropseed grass, and nimble-well (Muhlenbergia shreberi)."[5]

[5]Ibid.



Delineated Wetland

Occoquan Bay National Wildlife Refuge (Woodbridge)

Draft Comprehensive Management Plan

Fig. 3

(from Fig. 4-5 Woodbridge Regional Facility Disposal - EA, Aug. 1995)

Fish and Wildlife

The threatened Bald Eagle (*Haliaeetus leucocephalus*) is the only federally-listed species known to occur on the refuge. Bald Eagles are primarily observed perching along the treelines of the eastern portion of the refuge during March and April. Peregrine falcon were thought to be sighted in late fall, 1997. The Loggerhead Shrike (*Lanius ludovicianuus*) is the only state-listed species that has been observed on the refuge.

Members of the Woodbridge Association, Inc. have compiled a butterfly list comprised of over 50 species observed within the property (Appendix F). Little is known about the diversity and abundance of other invertebrate species. Field surveys are needed to document the species of mollusks, arachnids, and other invertebrates occurring on the unit.

The variety of woodland, wetland, and grassland habitats on the refuge provides a high diversity of fish and wildlife species. Over 200 species of birds have been observed on the refuge by members of Prince William Natural Resources Council (Appendix H) . The meadows along the northern boundary of the unit provide particularly high quality foraging habitat for raptor species, such as the Red-tailed Hawk (*Buteo jamaicensis*) and American Kestrel (*Falco sparverius*), while the meadows southwest of the compound area appear to be favored as foraging habitat for the Northern Harrier (*Circus cyaneus*) during winter months.

Refuge grasslands also provide potential nesting habitat for several declining grassland species. Grassland species such as the Grasshopper sparrow (*Ammodramus savannarum*), Vesper sparrow (*Pooecetes gramineus*), and Eastern meadowlark (*Sturnella neglecta*) could be increased by burning and mowing regimes which favor certain habitat structure requirements for the respective species and warm season grasses such as little bluestem (*Andropogon scoparius*), big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*).

The wetlands provide diverse habitats for a number of waterbirds and waterfowl, including the American Bittern (*Botaurus lentiginosus*), Great Blue Heron (*Ardea herodias*), Wood Duck (*Aix sponsa*), and Belted Kingfisher (*Ceryle alcyon*). The mature upland forests along Marumsco Creek, and bottomland forests along a number of the sloughs, provide important habitat for a number of migrant landbirds and resident species, such as the Blue-grey Gnatcatcher (*Polioptila caerulea*), American Redstart (*Setophaga ruticilla*), Golden-crowned Kinglet (*Regulus satrapa*), Cardinal (*Cardinalis cardinalis*), Winter Wren (*Troglodytes troglodytes*), Swamp Sparrow (*Melospiza georgiana*), and Hermit Thrush (*Catharus guttatus*).

Twelve species of salamanders, 13 toads and frogs, 8 turtles, 6 lizards, and 19 snakes are expected to occur on the refuge, per surveys in Prince William County by Dr. Larry Underwood, of Northern Virginia Community College (Appendix H). Spring peeper (*Hyla crucifer*), Green frog (*Rana clamitans*), Pickerel frog (*Rana palustris*), and Spotted salamanders (*Ambystoma maculatum*) are common amphibians associated with the wetland habitats throughout the refuge for either breeding or year-round residence. Painted turtles (*Chrysemys picta*), Mud turtles (*Kinosternon subrubrum*) and Snapping turtles (*Chelydra serpentina*) are abundant aquatic turtles associated with the ponds and sloughs, while

Eastern box turtles (*Terrepene carolina*) are associated with terrestrial habitats. Northern water snakes (*Nerodia sipedon*) are common in the marshes and creeks, while the Black rat snake (*Elaphe obsoleta*) is associated with forested habitats. The Black racer (*Coluber coluber*) and Eastern garter snake (*Thamnophis sirtalis*) are common snakes occurring in fields or edges. The Eastern worm snake (*Carphophis amoenus*), a secretive burrowing snake, and the Mole kingsnake (*Lampropeltis calligaster*), another burrower, have both been documented on the unit.

Forty-eight mammal species are expected to occur on the refuge, according to another study in Prince William County by Dr. Underwood (Appendix I). Many would also be expected to occur on the refuge. River otter (*Lutra canadensis*), White-tailed deer (*Odocoileus virginianus*), Eastern cottontail (*Sylvilagus floridanus*), Red fox (*Vulpes vulpes*), Beaver (*Castor canadensis*), and Meadow voles *(Microtus pennsylvanicus*) are typically found on the refuge. The deer population averages approximately 50-75 animals, and is the only game animal that has been hunted on the unit.

Surveys of the fish fauna conducted at nearby Gunston Cove in 1987 identified species such as the White perch (*Morone americana*), Blueback herring (*Alosa aestivalis*), Bay anchovy (*Anchoa mitchilli*), Spottail shiner (*Notropis hudsonius*) and Pumpkin seed (*Lepomis gibbosus*), which were also likely to occur in the aquatic habitats of the refuge. A survey of the fishery resources on the refuge, done in late summer of 1997 by the Service's Fisheries Assistance Office, confirmed these species and many more. Results from the survey indicate that the tidal marshes are important nursery habitat for freshwater, estuarine, and marine fish species. Additionally, the waters are populated with many species that can contribute to a high quality recreational sport fishery. The shallow water habitat plus the abundance of fishes using this habitat should provide excellent feeding areas for shore birds. An abundance of submerged aquatic vegetation (SAV) throughout the area provides excellent cover attraction for the fishes. Study results are in Appendix K).

Wilderness Consideration

There was no consideration of wilderness designation for the Occoquan Bay NWR. Conditions and setting do not meet any minimum standards for the designation, according to the Wilderness Act of 1964.

IV. REFUGE MANAGEMENT - GOALS AND OBJECTIVES

Refuge Purpose

The purpose of Marumsco NWR, which becomes part of Occoquan Bay National Wildlife Refuge, is for the ***"particular value in carrying out the national migratory bird program."*** (16 U.S.C. §667b: An act authorizing the transfer of certain real property for wildlife, or other purposes).

Woodbridge Legislation (H.R. 4453) applicable to Occoquan Bay NWR states:
"(b) The Secretary of the Interior shall use appropriate parts of this real property for (1) incorporation into the Mason Neck National Wildlife Refuge and (2) work with the local government and the Woodbridge Reuse Committee to plan any additional usage of the property, including an environmental education center: Provided, that the Secretary of the Interior provide appropriate public access to the property."

Considering the above purposes as they relate to the management of Occoquan Bay NWR, they are interpreted and defined as follows:

The Purposes of Occoquan Bay NWR are:
1. As a refuge and breeding area for migratory birds, interjurisdictional fishes, and endangered species;
2. As an outdoor classroom to provide the public with educational opportunities relating to fish and wildlife resources; and
3. For other compatible recreational uses including: fishing, wildlife observation, interpretation, and wildlife photography.

Refuge Vision Statement

Occoquan Bay NWR is envisioned to be a key refuge in the National Wildlife Refuge System. The important grassland and wetland habitats are important to the Nations' wildlife in this highly urbanized area. Furthermore, the variety of habitat types accessible to refuge visitors and the refuge's proximity to the Nation's capitol provide unparalleled opportunities to demonstrate the role of national wildlife refuges, particularly the benefits of habitat management for wildlife.

Natural Resources – The refuge is managed for primary benefit of migratory birds and threatened or endangered species, with an emphasis on early successional habitats and wetland habitats. Habitat management is an active and interactive program which also serves as the focus for the education programs.

Visitor Use – Within an urban setting, Occoquan Bay NWR demonstrates the importance of the natural world to the human quality of life, and the human role in preserving and enhancing wildlife habitat. Local communities enthusiastically identify the area as a destination for wildlife-oriented public use that enhances the quality of life in the Potomac

area. As a result of visiting the refuge, the public gains an appreciation of the co-existence of urban and natural areas. The refuge is a showcase for the Service and other resource partners for environmental education and resource management. A flexible and dynamic learning environment is created in a natural setting. Clean, safe, accessible, wildlife-compatible, and high quality experiences for diverse audiences, within the carrying capacity of the refuge, are provided.

Environmental Education (EE) – In collaboration with many partners, a wide range of innovative, stimulating, general public and environmental education programs and activities is provided. EE is the process of integrating environmental concepts and management with the educational activities of the Service. Activities such as wildlife resource programs, interpretation, outdoor classrooms, and educational assistance are provided as educational activities. When these activities deal with environmental concerns, incorporate basic ecological concepts, or focus on the role of humans in the ecosystem, they become forms of environmental education. Occoquan Bay activities are designed to promote an awareness of the basic ecological foundations for inter-relationships between human activities and the natural system. The primary objectives of the environmental education effort in the Service are to conserve and enhance our fish and wildlife resources, and to motivate citizens to learn the role of management in the maintenance of healthy ecosystems so they can effectively support wildlife conservation.

Facilities – The refuge provides safe, high-quality facilities and visitor opportunities for both Service and non-Service programs, primarily for those activities not available in nearby areas.

Refuge Goals and Objectives

The broad goals of Occoquan Bay NWR support the direction of the Service and the Chesapeake Bay Ecosystem Priorities. These goals step down the stated "Refuge Purposes of Occoquan Bay NWR" into management direction. These goals aided in the selection of the "Preferred Alternative" and the development of this final Comprehensive Conservation Plan. Each goal is supported by measurable, achievable objectives with specific strategies and tasks needed to accomplish them. Objectives are intended to be accomplished in a 10- to 15-year time frame. Actual implementation may vary as a result of available funding.

The following are Occoquan Bay NWR goals and objectives. Accompanying each objective are its strategies, both long term and annual activities, and projects that are means to achieve the refuge objectives. Staffing and funding needed to accomplish the strategies are outlined

Wildlife and Habitat Management

GOAL I: MAINTAIN, RESTORE, AND ENHANCE GRASSLAND AND WETLAND HABITATS TO SUPPORT A DIVERSITY OF PLANTS AND ANIMALS.

Objective 1: The refuge will maintain approximately 290 acres in grassland habitat in a variety of successional stages to maximize the potential habitat for the greatest diversity of breeding and migratory bird species.

Strategies:

- For the first 4 to 5 years, the refuge grassland acreage will be managed at approximately one-third each of 1-year, 2-year, and 3-year growth.

- Design and implement an inventory monitoring program to identify specific use of each phase of growth by breeding and migrating birds.

- To better identify plant and wildlife responses to prescribed fire management, a prescribed burn plan for small (<20-acre) sites will be implemented which will monitor and evaluate changes in plant composition as compared to areas mowed. The State of Virginia and Blackwater NWR have expressed interest in being involved in developing and implementing the plan.

- In year 4 or 5, utilize data collected from the above monitoring programs to develop a management plan that identifies the proportion of habitat in each successional stage, the method of habitat manipulation. The plan will re-evaluate habitat management objectives for each unit. The plan will consider area use by migrating and breeding birds, numbers of species, species of concern, and habitat response to type of manipulation.

Objective 2: The refuge will maintain approximately 180 acres in wetland habitat in the current mix of wetland types for migratory bird species.

Strategies:

- Implement a water quality monitoring program and work with Belmont Development to ensure adequate water quantity flow to the refuge.

- Design and implement a survey of migratory bird use and nesting in the various wetland types.

- Evaluate the benefits of restoring the natural water regime to the NW area of the refuge where natural water flow has been redirected through ditching.

- Utilize data collected to develop a management plan that identifies the proportion of habitat maintained in each wetland type. The plan will reevaluate management

objectives and will consider area use by migrating and breeding birds, numbers of species, species of concern, and methods for controlling water flow.

Objective 3: Encourage research that will provide needed data for improved management of Occoquan Bay and other units of the National Wildlife Refuge System.

Strategies:

- Fill biologist position to coordinate biological research.

- Design and implement the following biological surveys:
  1. Use and response by migratory birds to successional stages of grasslands.
  2. Use by migratory birds of each wetland type.
  3. Responses in plant composition to grassland mowing and burning regimes.
  4. Inventory of invasive species.
  5. Water quality and quantity monitoring
  6. Monitoring of beaver population and effects on vegetation
  7. Monitoring of deer population and effects on vegetation
  8. Bald eagle use of refuge (reinstate monitoring)
  9. Changes in wildlife use along trails relative to visitation numbers
  10. Changes in fish productivity relative to water quality in Marumsco Creek
  11. Water quality effects upon aquatic communities
  12. Monitoring and assessment of interjurisdictional fish species

- Develop a volunteer program for local researchers, students, etc. to collect the biological data required above.

- Confirm and expand existing vegetation cover type maps.

- Obtain adequate computer equipment and training to operate the Potomac River NWR Complex habitat and wildlife data bases.

GOAL II: PREVENT AND CONTROL INVASIVE SPECIES THAT IMPACT NATIVE PLANT AND ANIMAL COMMUNITIES.

Objective 4: The refuge will provide optimum conditions for migratory birds by maintaining the whitetail deer population within the habitat carrying capacity.

Strategy:

- Survey deer populations, work with the State of Virginia game biologist to evaluate effects of deer on vegetation and identify potential methods for managing the population.

- In FY98, begin deer population management on the refuge.

Objective 5: The refuge will maintain desired wetland diversity by evaluating the impact of beaver activity on wetland structure, composition, and water flow through refuge and by identifying and implementing potential methods for managing the population.

Strategy:

- Identify extent, expansion, changes in vegetation, and impacts to migratory birds due to beaver activity.

Objective 6: The refuge will identify and inventory invasive plant species and will begin controls on these species by FY 2000.

Strategy:

- Work with the Virginia Native Plant Society to locate the invasive plants. Methods of control or elimination will be identified by FY 2000.

GOAL III: PROVIDE HABITAT AND PROTECTION FOR FEDERALLY LISTED THREATENED OR ENDANGERED SPECIES.

Objective 7: Ensure that Bald eagles are protected on the refuge.

Strategies:

- Monitor Bald eagle use on the refuge. Minimize disturbance through adjustments in visitor access.

- Enhance eagle perching opportunities in areas of lower boat disturbance.

Objective 8: Provide habitat that supports State-listed rare species, species of Service management concern, and globally rare species.

Strategies:

- Monitor use of the refuge by the above categories of species, working with VA Division of Natural Heritage; review species' use and needs; and determine how management can support these species.

Visitor Use

GOAL IV: A PUBLIC THAT VALUES FISH AND WILDLIFE RESOURCES, UNDERSTANDS EVENTS AND ISSUES RELATED TO THESE RESOURCES, AND ACTS TO PROMOTE FISH AND WILDLIFE CONSERVATION.

Objective 9: Visitors will (a) know that wildlife can benefit from active management, (b) feel it is important to protect land for wildlife, and (c) actively support wildlife conservation.

Strategies:

- Within two years, evaluate and identify space, equipment, programs, and messages needed to achieve visitor use objectives.
- Identify opportunities to increase awareness of the NWRS, such as NWR week activities.
- Provide interpretation of wildlife, habitats, and habitat management techniques and benefits to wildlife.
- Develop a volunteer program for refuge programs and on-site interpretation.

GOAL V: A PUBLIC THAT VALUES AND SUPPORTS THE NATIONAL WILDLIFE REFUGE SYSTEM.

Objective 10: Provide effective wildlife and ecosystem-based education.

Strategies:

- Assist Prince William County and other surrounding counties with refuge-related information for environmental education curricula.
- Design and implement a training course for teachers and educators desiring to utilize the refuge.

Objective 11: Increase awareness of the NWRS and its benefits to wildlife and people.

Strategies:

- Develop volunteer program to help collect data and provide visitor assistance and interpretation.
- Cooperate in development of school curricula based on the habitats and management techniques employed on the refuge.
- Incorporate key refuge messages into teacher training to serve as a prerequisite to use of the refuge as an outdoor classroom for EE programs.
- Within two years identify other tools, space requirements, opportunities, and partnerships to increase awareness of the NWRS through Environmental Education.

Objective 12: Expand Refuge outreach opportunities.

Strategies:

- Support the activities of the Trust or other non-profit organization to function as its cooperating association and/or a "Friends of Potomac River NWR".

- Identify opportunities to increase visibility of the Service including special events, partnership activities, and implementing strategies outlined in the Regional 100 on 100 campaign.

GOAL VI: THE PROVISION OF OPPORTUNITIES FOR HIGH QUALITY, COMPATIBLE WILDLIFE-DEPENDENT RECREATION AND ENVIRONMENTAL EDUCATION RELATED TO HABITAT AND WILDLIFE MANAGEMENT AND THE HISTORICAL/CULTURAL SIGNIFICANCE OF THE OCCOQUAN BAY NWR.

Objective 13: Provide opportunities for visitors to view and photograph wildlife.

Strategies:

- Upon transfer of the site to the FWS, implement Phase 1 of the public access, including auto and walking routes (see Figure 4).

- Develop and implement a monitoring program that measures change in wildlife use relative to visitation numbers in a zone of 50 ft. along trails through various habitat types. Information to be used for trail management, seasonal closures, and habitat management.

- Redirect access away from areas of active contamination clean-up.

- Incorporate responsible wildlife viewing etiquette into public and environmental education.

- Design demonstration habitat manipulations in the vicinity of public trails to inform visitors of the value of habitat management and to increase use of those areas by wildlife for improved viewing opportunities.

- Within five years, provide wildlife viewing and photography opportunities as shown in Figures 5 through 7.

Objective 14: Minimize impacts to sensitive wildlife and plant species on the refuge.

Strategies:

- Use existing roads and trails wherever possible.

- Review final placement of all facilities for impacts to sensitive species.

- Enact seasonal closures of trails or areas of the refuge, or manage visitation numbers, as determined by monitoring program data.

Objective 15: Provide limited opportunities for fishing on or near the refuge.

Strategies:

- Evaluate within two years, two river sites and the pond for disabled accessible fishing opportunities. Work with Belmont Development to explore the potential of fishing opportunities associated with the marina or other shorefront construction.
- Pursue access to Featherstone NWR to develop high quality fishing opportunities.
- Based on evaluations and current fish contamination issues, develop an educational fishing event on or near the refuge.
- Work with State, Federal, County, and concerned citizens to improve the water quality of Marumsco Creek as a fisheries nursery area.

Objective 16: Identify history of human impacts to the site, opportunities created or lost, and future opportunities.

Strategy:

- Interpret human modification of vegetation, alteration of waterways, restoration opportunities to better understand the role of habitat management.

Administration

GOAL VII: EFFICIENT ADMINISTRATION OF FUNCTIONS THAT SUPPORT AND PURSUE THE VISION FOR THE REFUGE.

Objective 17: Develop the operational capability to accomplish the objectives of the comprehensive plan.

Strategies:

- Create a welcoming facility that provides efficient administration and maintenance space, equipment necessary to support the programs identified, and staff to develop the programs and maintain high levels of public and educational involvement in the refuge activities.
- Within 2 years, working with partners, define the requirements of and expectations for the welcoming facility.

Objective 18: Ensure the health and safety of all refuge users, including staff.

Strategies:

- Monitor contamination clean-up from health, safety, and welfare standpoints.
- Adjust public access as required by contaminate clean-up activities.

Objective 19: Implement projects in a manner sensitive to the cultural resources of the site.

Strategies:

- Review construction projects with the Regional Historic Preservation Officer for their sensitivity to cultural resources.

V. IMPLEMENTATION

Management Priorities

The objectives and strategies constitute the refuge's management direction. In support of the objectives, baseline biological data collection, development of limited public access opportunities, and the development of short-term grassland habitat management approaches are the top three management priorities for the first 5 years of refuge management. An initial list of refuge projects, which describe the funding and staffing needs for accomplishing the objectives in this plan, is found in Appendix C. The refuge needs project list will be reviewed, updated and appended as needed annually.

Appropriate staffing is needed to establish and oversee the collection of biological data needed to direct management activities, such as monitoring flora and fauna responses to various management activities. This research is essential to carefully evaluate management approaches to achieve refuge objectives. Adaptive resource management relies on coordination with research and sound data to direct adjustment of management approaches and techniques.

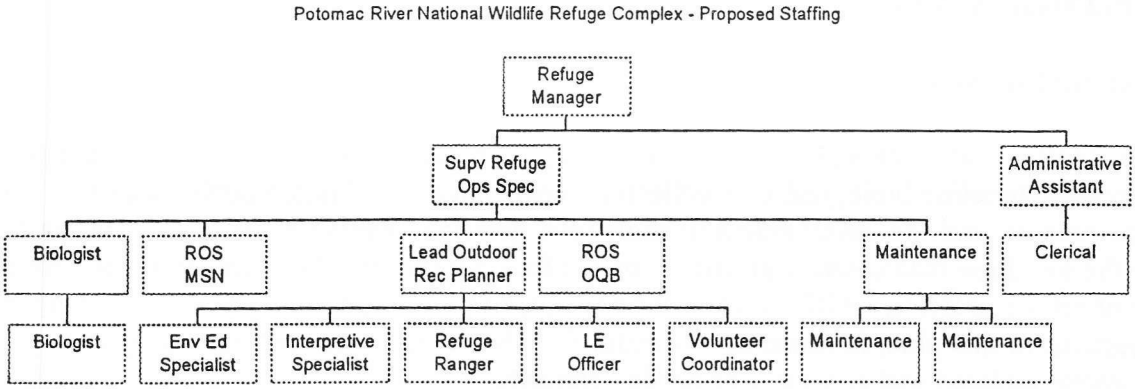
Research will be encouraged that provides needed data for improved management of Occoquan Bay and other units of the National Wildlife Refuge System. Monitoring and evaluation ensures that management can be modified or adapted with new information.

Staffing

To accomplish this research and oversight while providing public use opportunities and developing long-term habitat management strategies, additional staff persons are needed.

Potomac River National Wildlife Refuge Complex proposed staffing:

Project Leader (Refuge Manager) (1)
Deputy Refuge Manager (Refuge Operations Specialist) (1)
Assistant Refuge Manager (Refuge Operations Specialist - MSN) (1)
Assistant Refuge Manager (Refuge Operations Specialist - OQB/FS) (1)
Administrative Assistant (1)
Office Assistant (clerical) (1)
Biologist (1)
Biologist (1)
Maintenance Staff - buildings and habitat manipulation (3)
Outdoor Recreation Planner (1)
Environmental Education Specialist (1)
Interpretive Specialist (1)
Refuge Ranger (1)
Volunteer Coordinator (1)
Refuge Law Enforcement Officer (1)



Project Descriptions

The following project description list identifies those projects necessary to support the goals and objectives approved in this plan. Project costs associated with implementing surveys and monitoring, habitat management, and public access are described below.

Table 1

Alternative D. Major On-Site Service Development with No Other On-site Structures (cost in $ thousands)	Phase	New Staff	Annual Income	One-time Cost	FWS Annual Cost
FWS Facility Location - Headquarters construction	3		50	5,000	150
Maintenance building construction	3			1,000	20
Guard shack upgrade	1		15	150	3 +3ops
Automatic gates, improve Taylor Pt. road	1			90	5
Workshop/EE coordination shelter	1			10	2
Building 211 removal	0			100	
Building 201 removal	0			250	
Utilities demolition	0			500	
Building 202 removal	0			125	
Building 203 removal	0			200	
Tower removal	0			40	

Alternative D. Major On-Site Service Development with No Other On-site Structures (cost in $ thousands)	Phase	New Staff	Annual Income	One-time Cost	FWS Annual Cost
Fence upgrade	0			20	2
Posting refuge boundary	1			5	2
Environmental Education Programs					
Disabled access trails - 800 lf @ $15/lf	1-3			12	1
Five outdoor classroom sites enhanced - level, seed, mow, signage	1-3			20	5
Two outdoor classroom pavilions	2-3			50	1
Upgrade & repair perimeter road and culverts	2			200	5
Interpretive Signage	1-3			5	2
Resource Management					
Equipment (vehicles, boat, mowers, tractor)	1-2			210	14
Biological Surveys	1-3			20	20
Water quality monitoring program	1			50	5
Development of step-down plans	1-3			10	5
Archaeological research and testing	2-3			10	20
Staff/volunteer equipment (computers, radios, field equip)	1			30	10
Staff/volunteer training	1			10	10
Deer management EA and control implementation	1			20	10
Demonstration areas for habitat management	3			15	5
Visitor Use					
Interpretation/EE/Headquarters (see FWS facility) Refuge Operations Specialist (2)					
Design and printing brochures, birds lists, etc.	1-3			20	5
Boardwalks - 875 lf @ $40/lf	1,3			35	2
Three W/L observation platforms	1-3			75	4
Accessible toilets (3)	1-3			45	3
Disabled access trails - 1700 lf @ $15/lf	2-3			25	5

Alternative D. Major On-Site Service Development with No Other On-site Structures (cost in $ thousands)	Phase	New Staff	Annual Income	One-time Cost	FWS Annual Cost
Programmable gate access system	2			120	2
Auto loop road - repair and culvert replacement	1			10	3
Disabled access fishing - bulkhead and beach access	3			50	4
Directional signage/interpretation	1-3			35	1
Information kiosks at HQ/EE, parking lots	1-3			25	.1
Access Routes and Parking Disabled access parking/Road improvement/grading	1-3			22	6
Staffing					
Maintenance Worker , Biologist (2), EE Specialist, Refuge Ranger	1	5		400	325sal +50ops
Operations Specialist, LE Officer, Maintenance Worker, Admin Assistant	2	4		320	260sal +40ops
EE/Interp construction - EE Specialist, Volunteer Coordinator, Operations Specialist (2)	3	4		320	260sal +40ops

Fees

To help plan and construct the projects identified in Table 1, an entrance fee of $2.00/car or $1.00/person has been approved at Occoquan Bay National Wildlife Refuge as part of the National Recreation Fee Demonstration Program. Under this program, 80 percent of the fees collected will be returned to the refuge to support the development of visitor services facilities and programs. The remaining 20 percent of fees will be placed in an account in the Regional Office for distribution to support visitor facilities and programs on refuges located from Maine to Virginia.

In early phases, fees will be collected at the entrance gate used by the military on Dawson Beach Road. Entrance fees may be collected by refuge personnel, volunteers, or through a self-service fee station. One option for frequent visitors may include the use of a pre-paid electronic card which will activate the entrance gate.

Compatibility Determinations

All National Wildlife Refuges except for those in Alaska, are closed to public uses until they are designated as open. Under the National Wildlife Refuge System Improvement Act of 1997, refuges cannot be opened to a public use unless the use being considered is compatible with the mission of the National Wildlife Refuge System and the purposes of the individual

refuge. This law establishes a standard by which the Secretary of the Interior shall determine whether such uses are compatible. The act also establishes the policy of the United States that wildlife-dependent recreational uses, when they are compatible, should be the priority public uses of the Refuge System. These wildlife-dependent uses are hunting, fishing, environmental education, interpretation, wildlife observation, and photography.

The following definitions appear in the National Wildlife Refuge System Improvement Act of 1997.

Compatible Use - a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgement of the Director, will not materially interfere with or detract from the fulfillment of the mission of the National Wildlife Refuge System or the purposes of the refuge. Compatible uses must not be inconsistent with public safety requirements.

Sound professional judgement - 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 the requirements of the Act and other applicable laws. Implicit within this definition is that financial resources, personnel and infrastructure be available to manage permitted activities. No Recreation Act Funding Analyses will be required for compatible wildlife-dependent uses.

Step-down Management Plans

Step-down management plans describe management strategies and implementation schedules for specific management subjects, giving tasks and activities. They are a series of plans dealing with a specific management subject (e.g., fire, public use, habitat management). The list of step-down plans for Occoquan Bay NWR include:

Plan Required	Date
Habitat Management (Includes all Habitats)	FY01
Fire Management Plan	FY98
Refuge Visitor Services/Interpretive Plan	FY99
Fishing Plan (NEPA documentation needed)	FY00
Deer Management Plan (NEPA documentation needed)	FY98

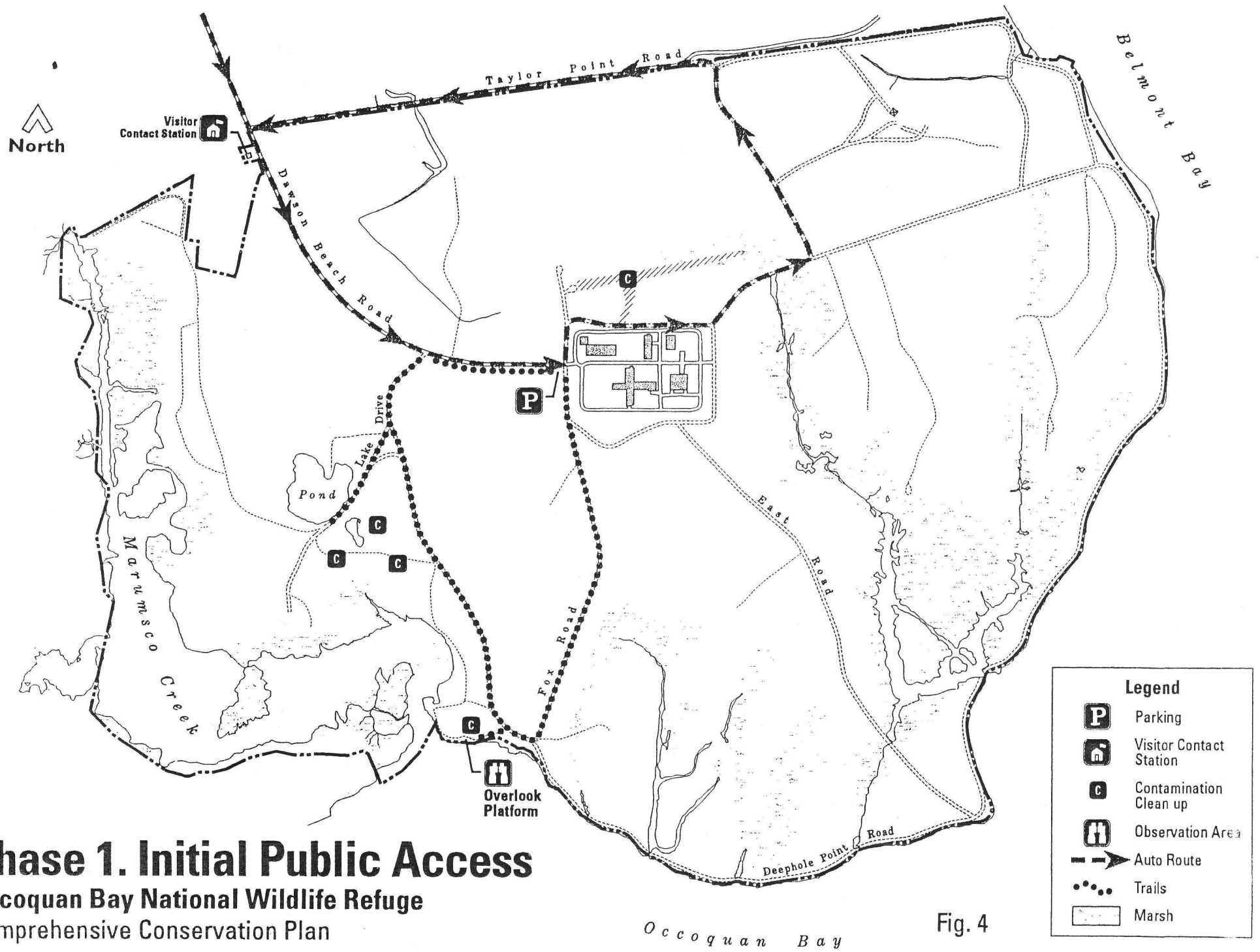
Revisions and Review

The objectives identified in this Comprehensive Conservation Plan are expected to be accomplished in approximately 15 years, with reviews every 5 years to make adjustments due to new information.

Monitoring and Evaluation

Data collected will be used to continually evaluate and adjust management activities.

See Figures 5 through 7 for phasing of public access and creation of Environmental Education sites and observation facilities. This phasing and schedule is contingent upon and subject to the timing of contaminants cleanup work.

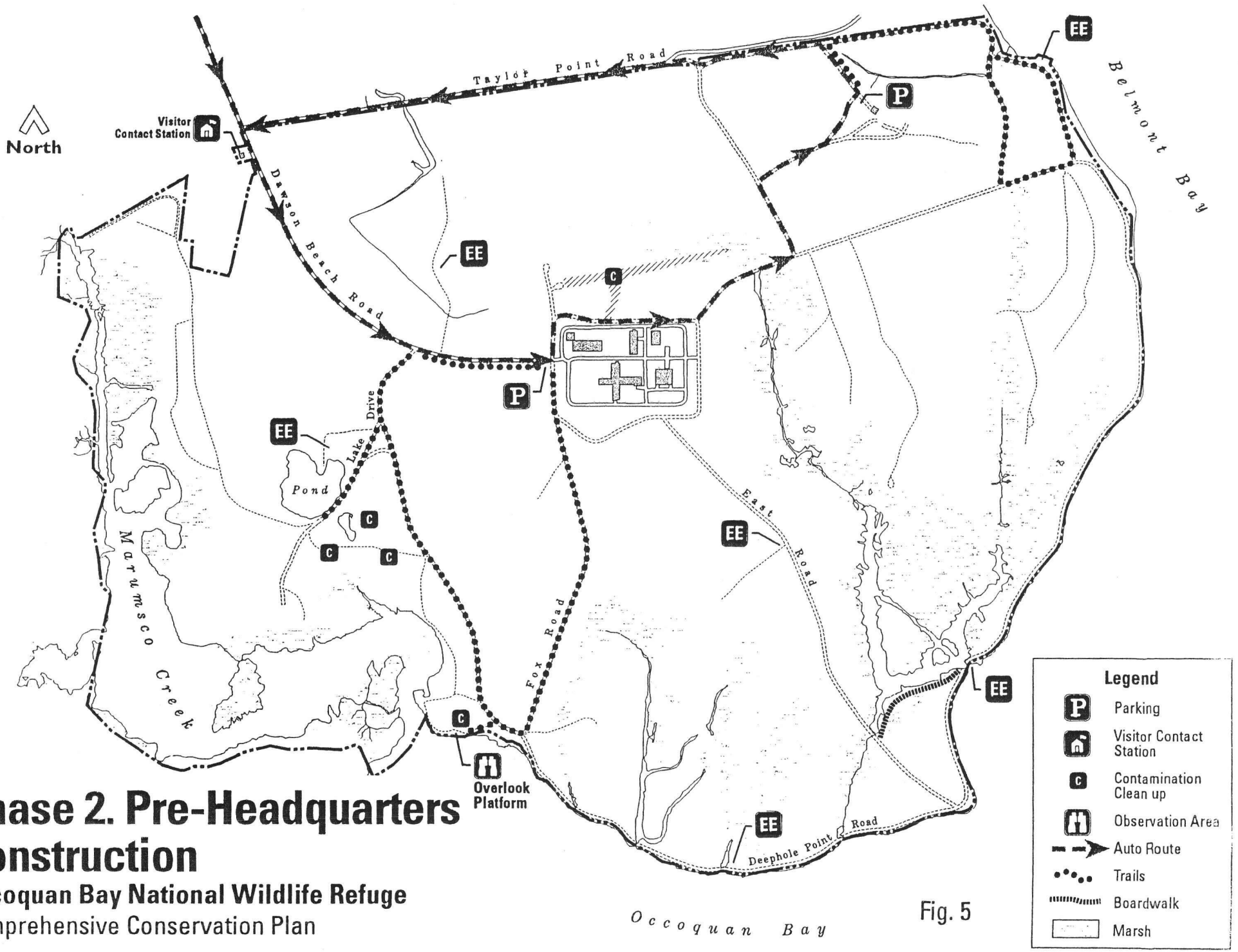


Phase 1. Initial Public Access

Occoquan Bay National Wildlife Refuge

Comprehensive Conservation Plan

Fig. 4

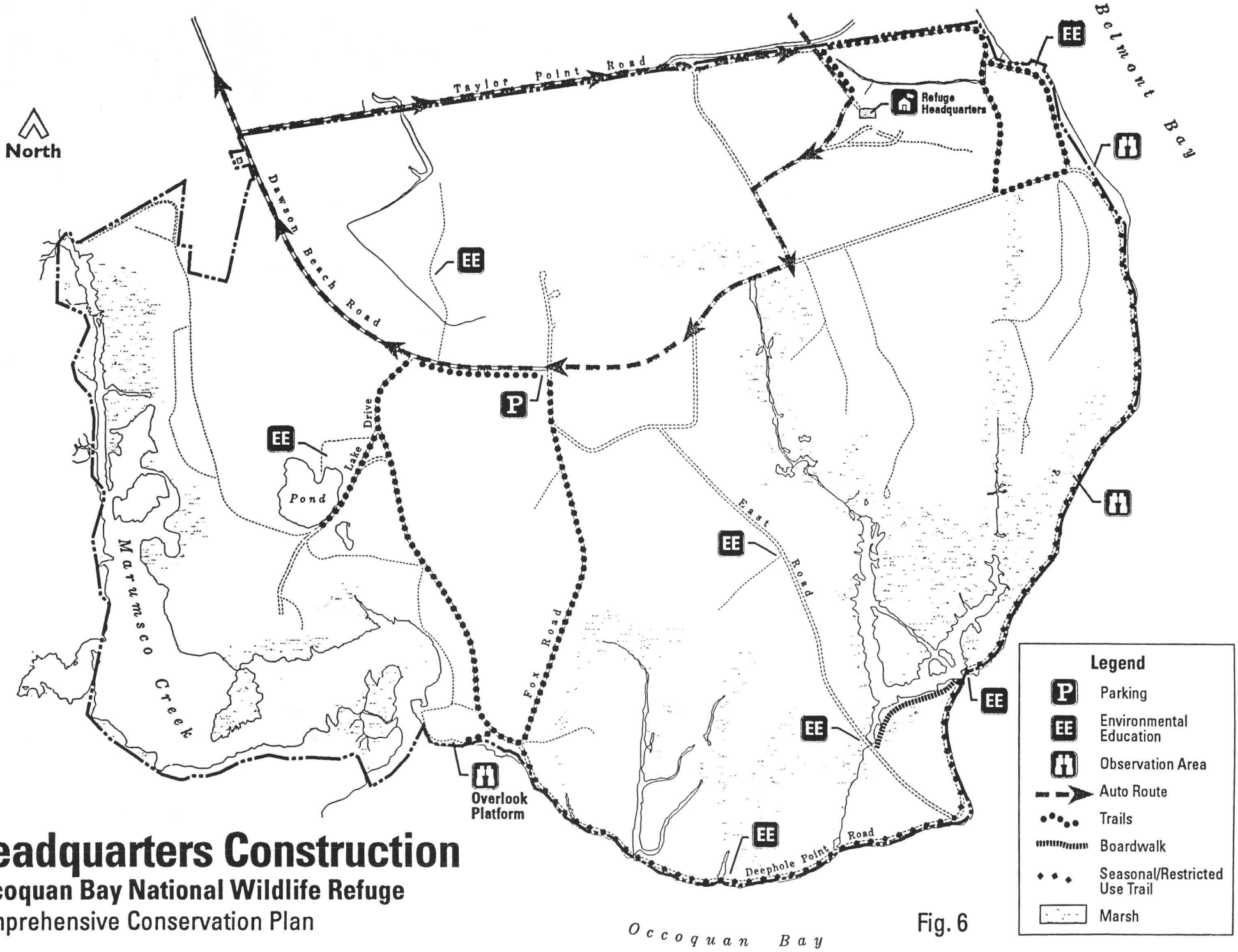


Phase 2. Pre-Headquarters Construction

Occoquan Bay National Wildlife Refuge

Comprehensive Conservation Plan

Fig. 5

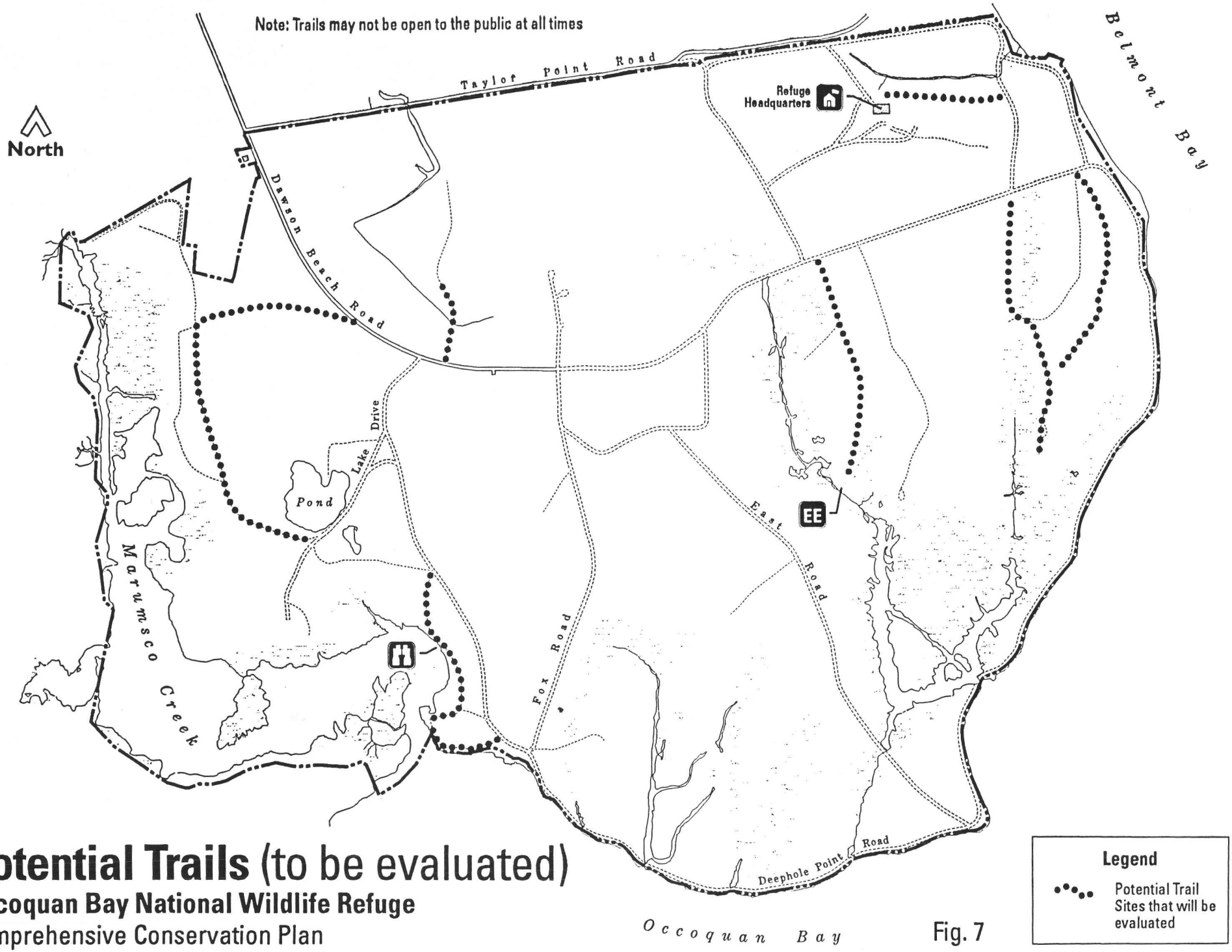


Headquarters Construction

Occoquan Bay National Wildlife Refuge

Comprehensive Conservation Plan

Fig. 6



Potential Trails (to be evaluated)

Occoquan Bay National Wildlife Refuge

Comprehensive Conservation Plan

Fig. 7

Appendix A Compatibility Determination

Station Name: Occoquan Bay National Wildlife Refuge

Date Established: July 15, 1994

Establishing Authority: Military Construction Appropriations Act of 1995 - H.R. 4453 (32) Sec. 127: Land Transfer Woodbridge Research Facility, Virginia

Purpose for Which Established:

"(b) USE OF TRANSFERRED PROPERTY. The Secretary of the Interior shall use appropriate parts of this real property for (1) incorporation into the Mason Neck Wildlife Refuge and (2) work with the local government and the Woodbridge Reuse Committee to plan any additional usage of the property, including an environmental education center provided: That the Secretary of the Interior provide appropriate public access to the property."

The Purposes of Occoquan Bay NWR are:

1. As a refuge and breeding area for migratory birds, interjurisdictional fishes, and endangered species;
2. As an outdoor classroom to provide the public with educational opportunities relating to fish and wildlife resources; and
3. For other compatible recreational uses including fishing, wildlife observation, interpretation, and wildlife photography.

Description of Proposed Use:

The activities considered for this determination are described in the preferred alternative (Proposed Alternative D) within the Final Comprehensive Conservation Plan and include environmental education programs and nature interpretation, construction of associated facilities, research, fishing, wildlife observation and photography, and habitat management. The following is a summary of the Preferred Alternative:

The Service will construct a new headquarters/interpretive center. The guard shack will be upgraded and used as a visitor contact station in the interim. Existing compound buildings will be removed and the area restored to grasslands. The perimeter fence will be maintained or removed on a section-by-section basis as maintenance needs arise. Visitor use will be allowed for wildlife-dependent activities (wildlife photography, observation, environmental education, interpretation, and fishing) in designated areas. Access will be by foot, or in the case of permitted group activities, by motor vehicle. Bicycles will remain with cars at designated parking areas. Environmental education and research activities will be allowed by

permit throughout most of the refuge. Resource management will emphasize grasslands to maximize the potential habitat for the greatest diversity of breeding and migratory bird species. Wetlands will be managed to enhance use by waterfowl, waterbirds, and other wetland-dependent species.

Anticipated Impacts on Refuge Purposes:

Impacts of the proposed action have been addressed in the draft Environmental Assessment and Comprehensive Management Plan. Construction activities related to needs for environmental education and nature interpretation and visitor use will have short term and minor adverse impacts. Ongoing environmental education and interpretive program activities are directly supportive of refuge purposes and provide opportunities to inform visitors about wildlife and plant conservation and management and the National Wildlife Refuge System. Visitor use for fishing, and wildlife observation and photography will be maintained at a level entirely compatible with overall refuge purposes as defined in the Final Comprehensive Conservation plan.

Determination:

This use **IS** compatible __X__. This use **IS NOT** compatible _____.

The following stipulations are required to ensure compatibility:

Monitoring of wildlife programs as stipulated in the Comprehensive Conservation Plan will be used to evaluate impacts of the preferred alternative on plants, animals, and habitat. Management actions will be reviewed, and adjusted if necessary, as new and better data is collected. The Comprehensive Conservation Plan will be reviewed every five years to ensure its compatibility with the original purposes for which the refuge was established.

Justification:

The preferred alternative meets legislative requirements to ensure public access and provide an environmental education center and ensures a balance of visitor use activities with the overall refuge purposes to conserve trust resources.

Refuge Manager: Gregory J. Weiler Date: 12/15/97

Reviewed By: Jeffry L. Underwood Date: 12/23/97

Appendix B Section 7 Consultation -Endangered Species

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: J. Frederick Milton

Telephone Number: 1-703-690-1297

Date: 15 August 1997

I. Service Activity(Program) and Proposed Activity:

Construction of Headquarters, Visitor Center and Enviromental Education Building on the Occoquan Bay National Wildlife Refuge. The construction of trails, overlooks, parking lots, boardwalks and outdoor classrooms accomodates the proposed visitor use of the refuge.

II. Pertinent Species and Habitat Within Action Area:

Bald Eagle *Haliaeetus leucocephalus* -- Perching and feeding habitat along the Occoquan River and adjacent Occoquan Bay. See attached maps for locations.

III. Geographic area or station name and action:

Occoquan Bay National Wildlife Refuge: Construction and visitor use.

IV. Location (attach map) - County and State; section, township, and range (or latitude and longitude); distance (miles) and direction to nearest town:

See attached location map (Figure 1)

V. Determination of effects:

A. Explanation of effects of the action on species and critical habitats in item II. (attach additional pages as needed):

Perching and feeding occurs in and from the wooded shoreline of Belmont and Occoquan Bay. Existing pleasure boating occurs within 100 meters of Belmont Bay shoreline due to the location of the charted travel channel. Visitor access is proposed along the Belmont Bay shoreline, on an existing roadway within the wooded area.

B. Explanation of actions to be implemented to reduce adverse effects:

The canopy of the woods through which the shoreline road passes is 75-100% closed, reducing the accidental disturbance of perching eagles. Seasonal closures of the shoreline road will be made immediately when eagles are reported to be using the area. Similarly, intensive habitat management in the fields behind the wooded shoreline, using tractors or equally loud equipment, would be curtailled.

VI. Effect determination and response requested:

A. Listed species/critical habitat:

Determination	Response requested
no effect	
(species: *Haliaeetus leucocephalus*)	X Concurrence
is not likely to adversely affect	
(species:_____)	____ Concurrence or ____ Formal Consultation
is likely to adversely affect	
(species:_____)	____ Formal Consultation

VII. Reviewing ESFO Evaluation:

A. Concurrence X Nonconcurrence_____

B. Formal consultation required_____

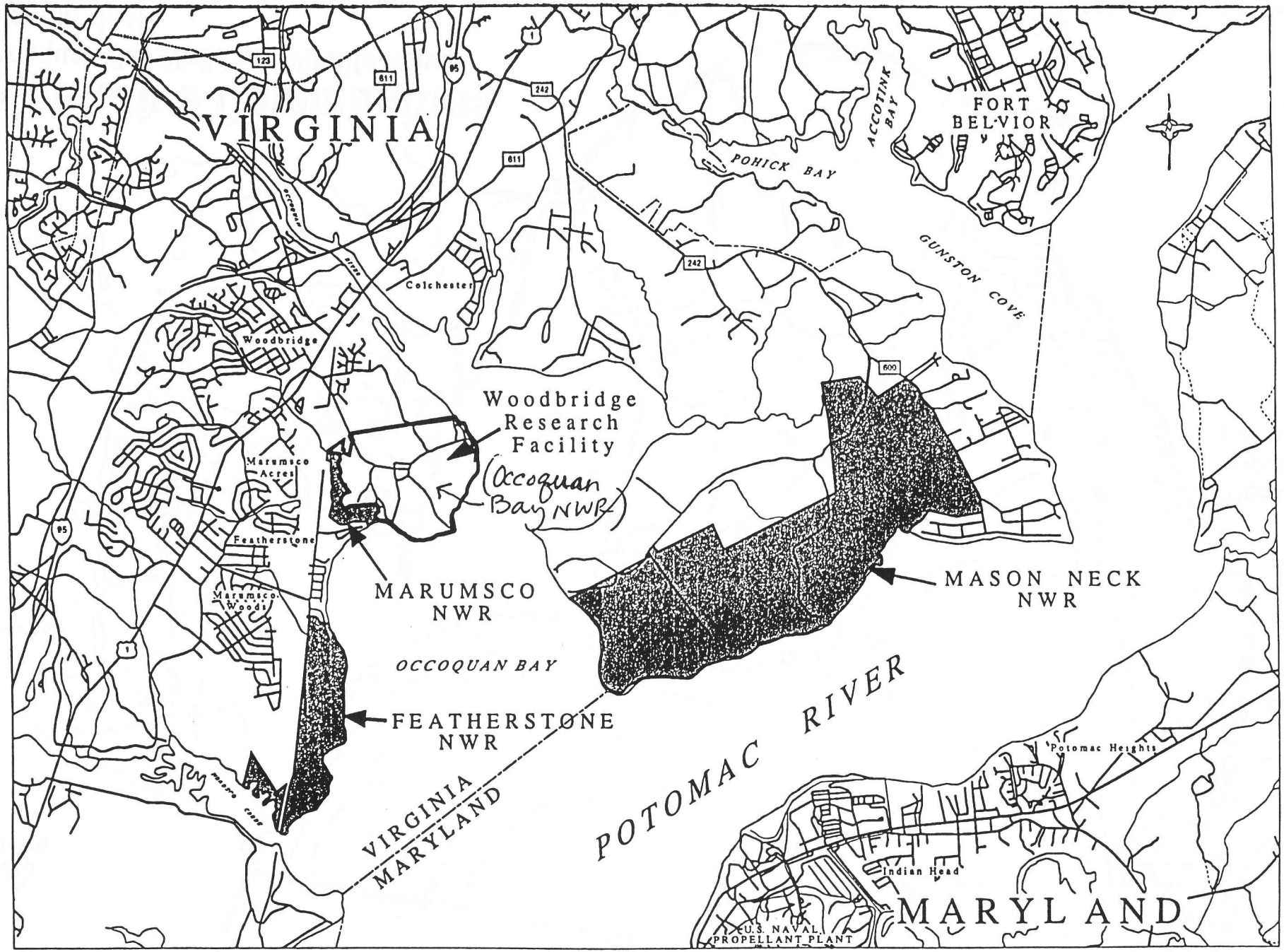
C. Conference required_____

D. Remarks (attach additional pages as needed):

/Kenneth. Mayne Supervisor, VA Field Office 9/19/97

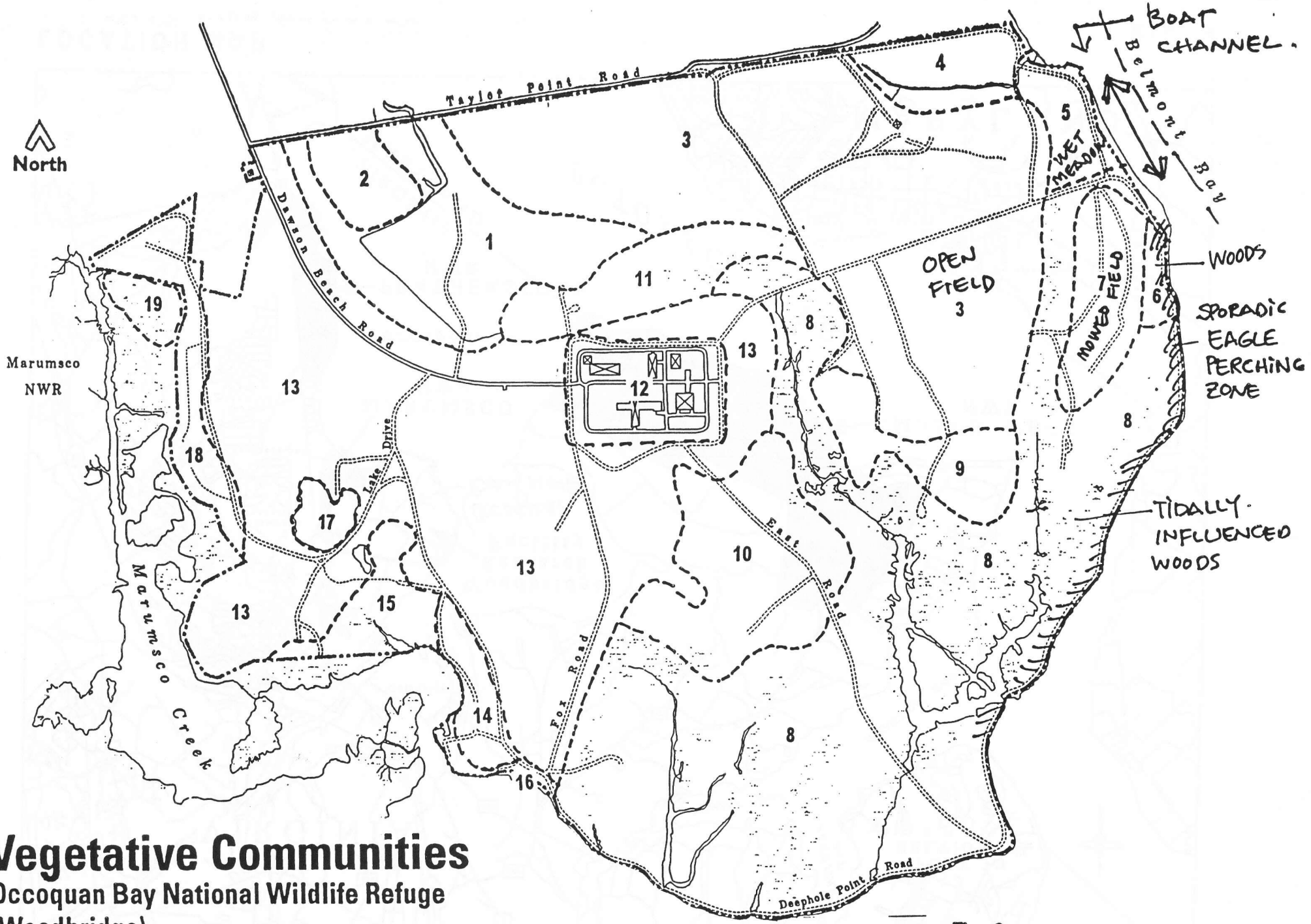
Signature Date

[Title/ESFO Supervisor]



LOCATION MAP

Fig. 1



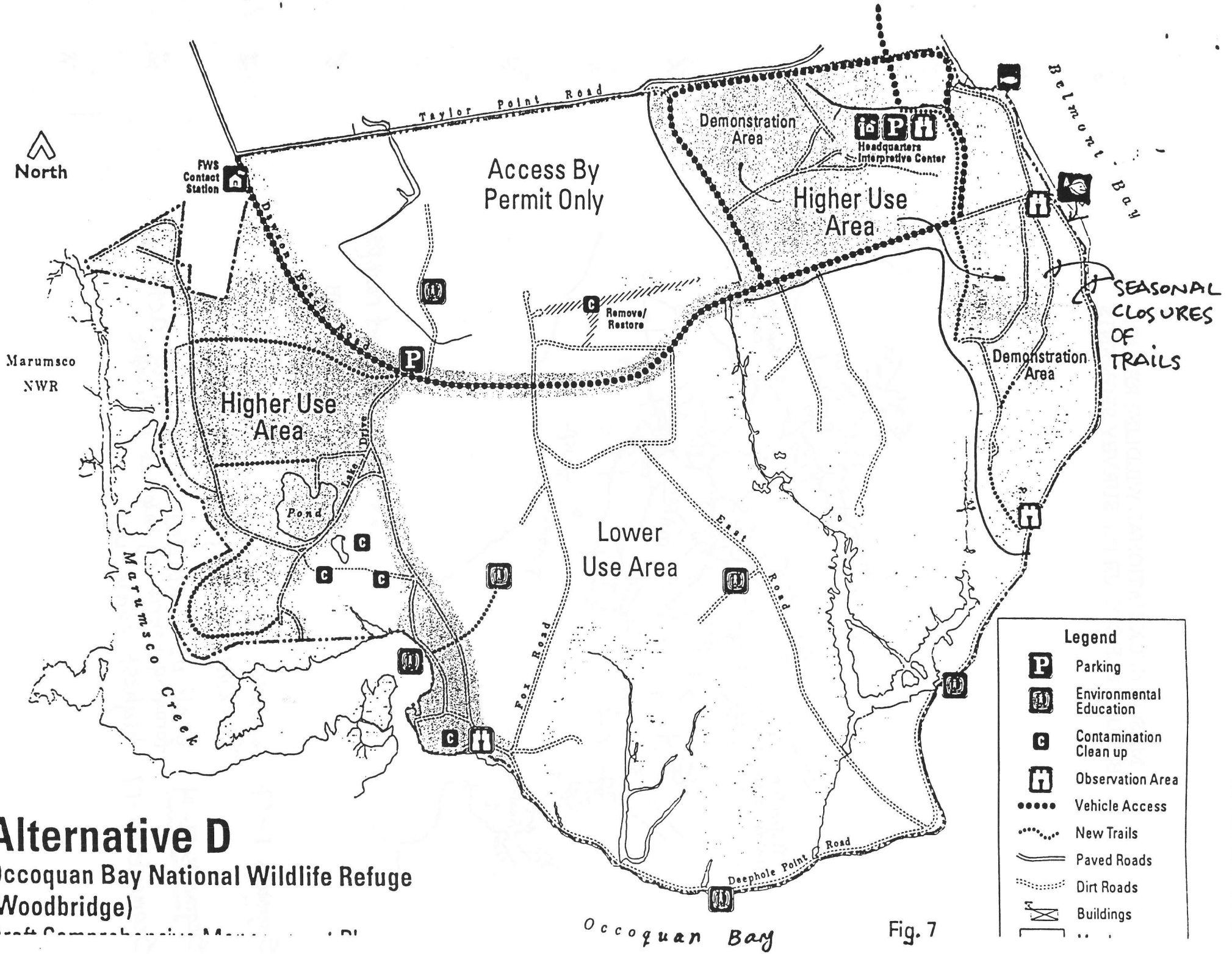
Vegetative Communities

Occoquan Bay National Wildlife Refuge (Woodbridge)

Draft Comprehensive Management Plan

Fig. 2

(from Fig. 4-4 Woodbridge Research Facility Disposal - EA, Aug. 1995)



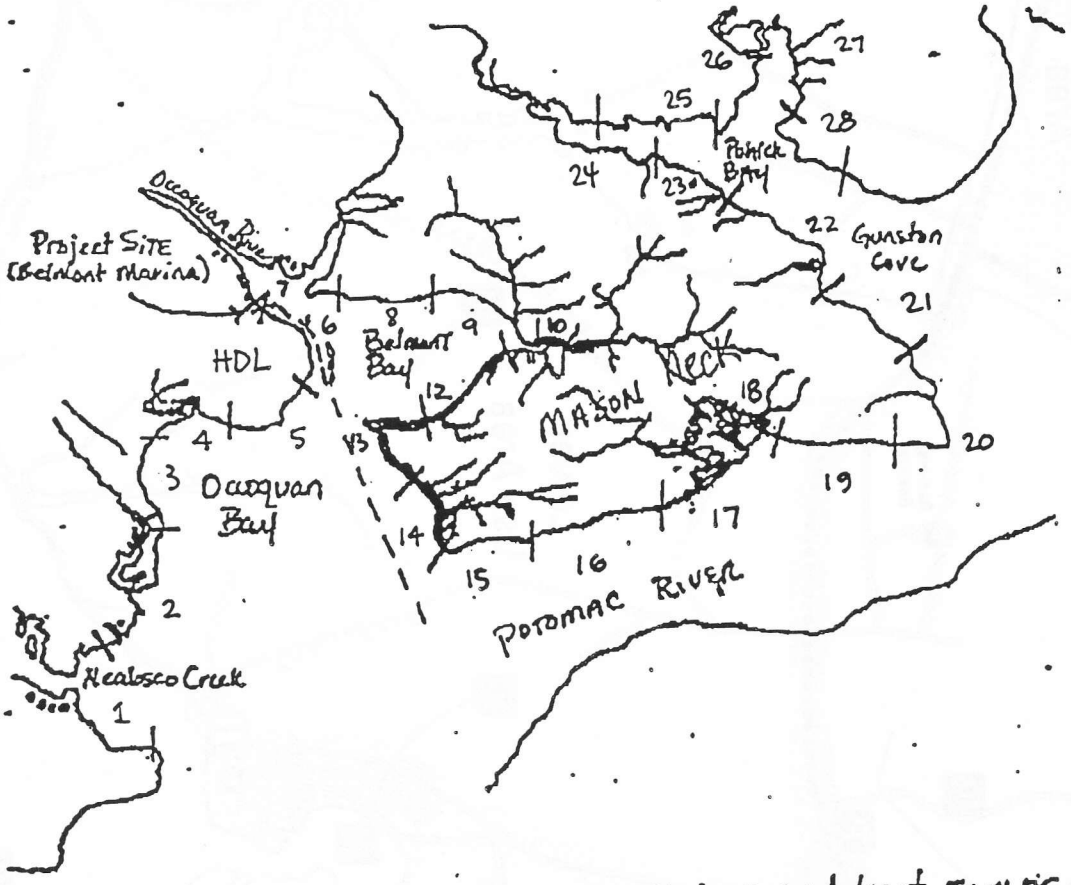
Alternative D

Occoquan Bay National Wildlife Refuge (Woodbridge)

Draft Comprehensive Management Plan

Fig. 7

MASON NECK NATIONAL WILDLIFE REFUGE
BALD EAGLE SHORELINE SURVEY SEGMENTS



• • marinas and boat ramps

= 1/2 MILE SHORELINE INTERVALS

Segments 1-7 sporadic eagle use (water depths, shoreline habitat, disturbance)

Segments 12-14 eagle use impacted by boating activity foraging + perching habitat available

Segments 15-17 highest eagle use

MASON NECK ADULT BALD EAGLES
SHORELINE SURVEY DATA, APRIL 1992 TO OCTOBER 1995
NUMBER OF BIRDS OBSERVED/SURVEY BY SEGMENT

	5	6	7	8	12	13	14	15	16
JAN					1	1.5		3	1.5
FEB*									
MAR				.3		.7		1	1.7
APR.						.3		.5	2
MAY				.2	.2		.6		1.2
JUN	.2			.2	.2			1	1.2
JUL			.3	.3	.3.	.8	.6	.6	1.3
AUG	.3				.6	.1	.4	1.1	1.3
SEP	.1	.1	.3	.3	.1	.6	.4	.5	1.9
OCT		.2				.3	.2	.3	1.8
NOV		.6		.2	.2	.6	.2	1	1.2
DEC		1.				.5		1.5	

*No surveys conducted in February.

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MASON NECK IMMATURE BALD EAGLES
SHORELINE SURVEY DATA, APRIL 1992 TO OCTOBER 1995
NUMBER OF BIRDS OBSERVED/SURVEY BY SEGMENT

	5	6	7	8	12	13	14	15	16
JAN	.5				.5	2		2	.5
FEB*									
MAR		.3						2	.7
APR.								.3	
MAY					.2		.2	.4	.4
JUN		.3	.3	.2	.5	.3	.5	.3	2
JUL	.3	.3		.5	.9	.8	.4	1	1
AUG			.1		.9	.3	.9	1.7	4.4
SEP	.1	.1		.1	.4	1.4	.9	3.1	1.1
OCT				.3	1	.8	.2	1.8	2.5
NOV	.4	.4			.2	1	.6	2.4	1
DEC							.5	1.5	2.5

*No surveys conducted in February.

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Appendix C Refuge Operating Needs System Work Sheets

Occoquan Bay NWR, VA

MONITORING & STUDIES : Surveys & Censuses

1 new survey(s) will be conducted

0 % of effort will be off-refuge

Critical biological data about the refuge's grasslands and forested areas are required by refuge staff for management purposes. Information will be used to develop management plans, regulate visitor use, and evaluate proposed facility placement. A biologist will be hired to perform surveys to evaluate the use of successional grassland stages by migratory birds, bald eagle use of the refuge, raptor use of the refuge, and to gather deer population data. Funds also provide equipment and structures, such as exclosures, needed to gather data.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$150	1.0
Subsequent Years:		$55	1.0

PLANNING LINK: Station CMP; Station Goal/Objective

OUTCOMES*: 10% Endangered Species, 75% Other Migratory Birds, 15% Resident Fish and Wildlife,

1 new study(ies) will be conducted

30 % of effort will be off-refuge

Implement a water quality and quantity monitoring program. Water flow onto the refuge is restricted to one primary source which flows through a major development and golf course. Water flow is restricted at points both on and off the refuge. Study would monitor the flow and quality of water entering the development, entering the refuge, and before and after an area of major beaver activity. The project will be designed in conjunction with the developer of the adjacent property. Funding includes water monitoring equipment, lab testing fees, training and data analysis.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$50	0.0
Subsequent Years:		$10	0.0

PLANNING LINK: Station CMP; Station Goal/Objective

OUTCOMES*: 5% Waterfowl, 25% Other Migratory Birds, 10% Healty Ecosystems, 25% Resident Fish and Wildlife, 25% Public Education, 10% Public Recreation

6 new study(ies) will be conducted

0 % of effort will be off-refuge

A biologist is needed by the refuge to develop and implement biological and public use management plans needed to restore optimum diversity of plants and animals native to the area. Studies will evaluate grassland vegetation response to mowing and burning programs and would evaluate the impact of visitor use of trails and roads on wildlife, especially breeding migratory birds. Additional studies will assess the use of wetland types by migratory birds; determine beaver population status and the beaver's impact on vegetation and water flow; and provide an inventory of invasive species on the refuge.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$100	1.0
Subsequent Years:		$65	1.0

PLANNING LINK: Station CMP; Station Goal/Objective

OUTCOMES*: 50% Other Migratory Birds, 25% Public Education, 25% Public Recreation

HABITAT RESTORATION : Wetland Restoration: On-Refuge

..... acres will be restored

.....1 site(s) will be restored

Project will reinstitute natural drainage to the wet meadow area near the west gate to enhance wildlife habitat, increase wildlife observation opportunities and improve water flow through the refuge. Funding will provide a design contract and annual maintenance supplies needed to maintain the restored drainage.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$20	0.0
Subsequent Years:		$2	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 15% Waterfowl, 35% Other Migratory Birds, 50% Public Education,

HABITAT MANAGEMENT : Graze/Mow/Hay

.....150 additional acres will be managed

..... additional AUMs will be supported

Woodbridge Unit of the refuge has several fields in early successional stages, such as grasslands and wet meadows. Burning and mowing regimes enhance the habitat structure and encourage growth of warm season grasses needed by breeding populations of Grasshopper sparrows, Henslow's sparrows and other grassland birds. A maintenance worker will keep these fields in early successional stages of grassland habitat, as well as provide general support for biological and public use programs.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$75	1.0
Subsequent Years:		$55	1.0

PLANNING LINK: Station Step-down Mgmt Plan; Station Goal/Objective

OUTCOMES*: 5% Waterfowl, 25% Other Migratory Birds, 30% Healty Ecosystems, 15% Resident Fish and Wildlife, 15% Public Education, 10% Public Recreation

Manage Cultural Resources : Archeological research and testing

.....1 new investigation needed

.....unknown new sites will be documented

One of the refuge goals is to relate the historical and cultural significance of the Occoquan Bay NWR to the public. Cultural and historical resources documentation by scientific surveys or field testing is needed. This full-station overview will enable refuge staff to proceed with habitat management and restoration while avoiding damage to cultural or historical resources. The project will also fund the accessioning, cataloging, and protection of any artifacts found during the survey.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$20	0.0
Subsequent Years:		$2	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 100% Public Education,

PUBLIC EDUCATION & RECREATION : Provide Visitor Services

15,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Increases protection of refuge resources and improves visitor services by reconfiguring and staffing Building 101 to serve as a visitor contact station for the Occoquan Bay NWR. An outdoor recreation planner will be hired, facilities will be modified to permit disabled access and educational exhibits will be installed. Office space will be provided for volunteers, who are significant contributors in all areas of refuge management. The project allows the refuge to initiate efforts to meet the public use goals detailed in the station's recent Comprehensive Conservation Plan.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$132	1.0
Subsequent Years:		$55	1.0

PLANNING LINK: Station Goal/Objective; Station Step-down Mgmt Plan; Legal Mandate

OUTCOMES*: 15% Other Migratory Birds, 25% Healty Ecosystems, 15% Resident Fish and Wildlife, 45% Public Education,

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Educational materials are needed to allow visitors to participate in wildlife-dependent recreational activities as outlined in the Occoquan Bay NWR Comprehensive Conservation Plan. Included are refuge brochures, leaflets, maps, orientation video programs and materials used for environmental education purposes. Educational curricula will be developed in cooperation with refuge support groups and local educators.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$75	0.0
Subsequent Years:		$40	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 20% Other Migratory Birds, 5% Healty Ecosystems, 5% Interjurisdictional and Anadromous Fish, 5% Resident Fish and Wildlife, 35% Public Education, 30% Public Recreation

30,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Initial directional signs are needed to allow visitors to locate the refuge and to find specific locations on the refuge where they may participate in wildlife-dependent recreational activities. The project includes the installation of an AM radio transmitter which will inform visitors about wildlife viewing opportunities, facility hours, and educational programming. Funding includes hiring a temporary maintenance worker to assist with sign installation and trail development.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$50	0.5
Subsequent Years:		$2	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 50% Public Education, 50% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

The refuge will be opened to the public during 1998. This project will fund the installation of three universally-accessible toilet facilities to be placed at key locations on the refuge. These facilities will provide support to the students and teachers participating in the refuge environmental education program and to visitors who are walking in more remote portions of the refuge.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$48	0.0
Subsequent Years:		$3	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 50% Public Education, 50% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

With the development of basic visitor facilities, up to 30,000 additional visitors are expected to visit the refuge, contributing up to $600,000 to the local economy. To meet visitor needs, a permanent restroom facility will be installed at the main visitor parking lot. This facility will also provide support to school groups participating in the refuge environmental education program.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$100	0.0
Subsequent Years:		$5	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 50% Public Education, 50% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Installation of a programmable entrance gate which will open at sunrise and close at sunset will increase protection of refuge resources and facilitate visitor access during open hours. Additional features will permit entry to authorized persons who hold a keycard access pass. This gate will provide daytime visitor access to the refuge without the need for the posting of refuge staff at the entrance.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$120	0.0
Subsequent Years:		$2	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 5% Healty Ecosystems, 5% Interjurisdictional and Anadromous Fish, 25% Resident Fish and Wildlife, 30% Public Education, 35% Public Recreation

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

A maintenance worker is needed to assist with the development of trails and trail segments needed to support environmental education activities on the refuge. Trails will be universally-accessible, and will be located in the portions of the refuge designated as environmental study areas. Refuge education programs are expected to attract up to 15,000 visitors per year, providing up to a $150,000 boost to the local economy. Funding also provides materials needed for annual trail maintenance.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:		$80	1.0
Subsequent Years:		$60	1.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 15% Healty Ecosystems, 5% Interjurisdictional and Anadromous Fish, 10% Resident Fish and Wildlife, 50% Public Education, 20% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Trails are needed at the refuge to permit all visitors to observe, photograph, and learn about refuge wildlife and wildlife management. A universally-accessible trail system on the refuge will allow all visitors to receive a comparable trail experience. These trails will supplement the proposed trail system in the environmental study area, allowing the general public to observe wildlife and view habitat management activities on the refuge.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$90	0.0
Subsequent Years:		$5	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 10% Other Migratory Birds, 10% Healty Ecosystems, 5% Resident Fish and Wildlife, 35% Public Education, 40% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Access roads, parking, and the installation of road culverts are needed to allow visitors to safely tour a portion of the refuge in their private vehicles and to park at a central location. The refuge Comprehensive Conservation plan outlines a variety of wildlife-dependent recreation activities at this new refuge, including auto tour capability. Improved refuge visitor facilities are expected to attract up to 30,000 visitors in the first year at this refuge near metropolitan Washington D.C.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$35	0.0
Subsequent Years:		$10	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 40% Public Education, 60% Public Recreation

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Develop visitor informational kiosks at the central parking area and at the future refuge headquarters site. The kiosks will include maps and basic information which will direct visitors to appropriate refuge locations for walking, photographing, and observing wildlife. Kiosks will also include exhibits designed to educate visitors about refuge wildlife and management.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$35	0.0
Subsequent Years:		$1	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 5% Waterfowl, 10% Other Migratory Birds, 10% Healty Ecosystems, 5% Resident Fish and Wildlife, 35% Public Education, 35% Public Recreation

80,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Occoquan Bay Refuge will be opened to the general public in FY 1998. This project will fund the construction of an on site refuge headquarters and visitor center to provide space for visitor services staff and volunteers, exhibits, and a sales area to provide books, videos and other educational items desired by refuge visitors. Exhibits and educational curricula will be developed in cooperation with refuge support groups and local educators. Increased visitation may provide up to a $2.3 million boost to the local economy.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$5,000	$75	1.0
Subsequent Years:		$325	3.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 5% Waterfowl, 10% Other Migratory Birds, 10% Healty Ecosystems, 5% Resident Fish and Wildlife, 45% Public Education, 25% Public Recreation

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Fishing opportunities identified during the Comprehensive Conservation Planning process by the State of Virginia and the public can be provided by developing fishing facilities at two refuge locations on Belmont Bay of the Potomac River. The development of two fishing sites on the refuge will provide universal-access fishing opportunities as well as increased wildlife observation, photography opportunities and up to $130,000 in eco-tourism revenues to the local area.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$60	0.0
Subsequent Years:		$4	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 20% Interjurisdictional and Anadromous Fish, 20% Resident Fish and Wildlife, 60% Public Recreation

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Five outdoor classroom sites and a shelter to be used as a workshop site and coordination area are needed to enhance the environmental education opportunities that can be provided on the refuge. Outdoor classroom sites and educational curricula will be developed in partnership with local school districts and educators. This project will increase the already great interest in using the refuge for outdoor classroom purposes and is likely to be used by at least 5,000 students the first year.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$55	0.0
Subsequent Years:		$35	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 5% Waterfowl, 10% Other Migratory Birds, 20% Healty Ecosystems, 5% Interjurisdictional and Anadromous Fish, 5% Resident Fish and Wildlife, 55% Public Education,

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Located in the metropolitan Washington D.C. area, Occoquan Bay Refuge has the potential to provide high quality, compatible wildlife dependent recreation and environmental education to a significant number of visitors. To improve wildlife viewing and photography opportunities, three observation platforms will be built. These facilities will be built to National Watchable Wildlife program standards and will be submitted for inclusion in the next edition of the Virginia Watchable Wildlife Viewing Guide.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$75	0.0
Subsequent Years:		$4	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 10% Waterfowl, 20% Other Migratory Birds, 10% Healty Ecosystems, 10% Resident Fish and Wildlife, 25% Public Education, 25% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Improvements to Taylor Point Road to allow safe visitor access and egress from the refuge are needed. The road is currently narrow, contains pot-holes and requires paving. The Comprehensive Conservation Plan for the refuge has targeted this road to become the primary visitor entrance. Funding is also requested for the installation of automatic entrance and exit gates to the refuge which will open at sunrise and close at sunset.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$90	0.0
Subsequent Years:		$5	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 50% Public Education, 50% Public Recreation

5,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Demonstration areas are needed to show visitors how wildlife habitat can be managed and improved. Interpretive signs and exhibits will help school children and other visitors understand why habitat manipulation is needed to provide the greatest wildlife benefit from a refuge.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$30	0.0
Subsequent Years:		$10	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 10% Waterfowl, 20% Other Migratory Birds, 20% Healty Ecosystems, 10% Resident Fish and Wildlife, 30% Public Education, 10% Public Recreation

2,000 additional visitors will visit the station

176 existing visitors will have new opportunities

Environmental education opportunities that can be provided on the refuge will be greatly enhanced by building two covered pavilions with tables to be used by school groups during their visit to the refuge. This project will increase the high interest in using the refuge for outdoor classroom purposes and is likely to draw at least 5,000 students to the refuge the first year.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$50	0.0
Subsequent Years:		$1	0.0

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 90% Public Education, 10% Public Recreation

10,000 additional visitors will visit the station

176 existing visitors will have new opportunities

A seasonal refuge law enforcement officer is needed to adequately protect refuge resources and provide for the safety of visitors. Funding includes training, a vehicle and equipment to ensure that refuge lands and visitors are protected from unauthorized uses or criminal activity. Increased visitation the first year may provide up to a $600,000 increase in tourism-related revenue to the local economy.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$78	0.5
Subsequent Years:		$40	0.5

PLANNING LINK: Station Goal/Objective; Station CMP

OUTCOMES*: 10% Endangered Species, 10% Waterfowl, 10% Other Migratory Birds, 10% Healty Ecosystems, 5% Interjurisdictional and Anadromous Fish, 10% Resident Fish and Wildlife, 20% Public Education, 25% Public Recreation

PLANNING & ADMINISTRATION : General Administration

..... (no first measure)

..... (no second measure)

Occoquan Bay is a new refuge without any established programs or previous related use which would allow the Service to accurately predict impacts or the level of program activity needed for management. Many of the programs will be fully developed only after adequate biological data is collected. These programs will require the development of step-down plans. Two refuge operations specialists would be hired to initiate management plans for: fire, grassland, wetland, deer, and public use interpretation.

FUNDS($000) & STAFF NEEDED:	Construction	Operations	FTEs
First Year:	$0	$150	2.0
Subsequent Years:		$120	2.0

PLANNING LINK: Station CMP

OUTCOMES*: 10% Endangered Species, 20% Other Migratory Birds, 10% Healty Ecosystems, 20% Resident Fish and Wildlife, 20% Public Education, 20% Public Recreation

STATION FUNDING & STAFFING NEED TOTALS:

	Construction	Operations	FTEs
First Year:	$5,000	$1,843	9.0
Subsequent Years:		$916	10.5

Appendix D Public Comments on the Draft Plan

Ms. Lois M. Battistoni

- Strongly objects to Alternatives C and D.
- Need more in-depth environmental studies of site.
- Opposes northeast site selection for Interpretive Center, requires more study (Ref. Potomac Nature and History Trust Working Group recommendations).
- Retain and reuse Building 211 intact (correct minor problems).
- Further evaluation of ecological disruption before any new construction.

Mr. Raymond A. Battistoni

- Prefers Alternative B. Initiate immediately for education over 5 to 6 years, using Building 211.
- Following 5- to 6-year period above, USFWS to reevaluate with other groups and interested parties before proceeding to next phase.
- Place Caruthers Foundation proposed $250,000 construction donation in escrow prior to USFWS consideration.
- Locate Interpretive Center near or across road from Refuge entrance building on Dawson Beach Road.

Charles and Barbara Chambers

- Approve proposed names.
- Support entrance fees.
- Prefer Alternative D, with the following revisions:
  - Remove portion of perimeter fence bounding the Bay, from proposed fishing barge bulkheads around and including west side of Marumsco Creek separating NWR from Diamond Lab.
  - Provide satisfactory details on access to fishing areas.
  - What is the *quid pro quo* for Caruthers Foundation's donation?
  - Will there be mid-week birding in lower-use areas?
  - Where is Area 20, mentioned p.12, but not shown Fig.2, p.13?
  - What damage to trees by development in Area 4's 9-acre forested tract?

Mr. Stewart Christiano
Prince William County Park Authority

- Supports Alternative D mix of habitat protection and public access.
- Encourages trail access and water access.
- Encourages small boat and canoe launching area.
- Eliminate fence surrounding waterfront portion of Refuge.
- Provide native species garden in higher use area.
- Encourages partnership with Counties, Northern Virginia Planning District Commission, and Northern Virginia Regional Park Authority to develop recreational opportunities, visitor education.

Commonwealth of Virginia - See Mr. Michael P. Murphy

Mr. Robert Craig
U.S. Army Research Laboratory

- Locate Headquarters/Interpretive Center adjacent to Dawson Beach Road, either within or adjacent to Main Compound, not in northeast quadrant, as currently proposed under Alternatives C and D.
- Reuse existing buildings instead of new construction.
- Reuse existing gravel roadways instead of constructing new road.
- Suggests additional **Alternative E: Major Service development on-site with indefinite use of Compound buildings.** ***Under this scenario, the Service develops the site as described in Alternatives C and D, and the private consortium described in Alternative B is afforded the opportunity to reutilize the buildings and structures within the Main Compound as described in Alternative B. Any buildings that are not beneficially reutilized within 5 years are demolished by the Service as funds allow.***
- Permit bicycle access.

Mr. Charlie Creighton

- Friends of Mason Neck visitor fee? Individual? Vehicle? Request serious thought on tower. Would pay for itself in 2 years. $15k coming in. Look into EA for deer hunt ASAP! Great damage at Mason Neck NWR. Stay ahead of this. Bldg. 211 - FWS offices should be there. It's good to be close to where work is going on. #211 upgrade vs. new construction cost. What you could do there! Great EE facilities. Not fiscally responsible to get rid of this bldg.

Mr. Roger Diedrich
Mount Vernon Sierra Club

- Prefers variation of Alternative B to Alternative D. Alternative D too focused on simultaneous new construction and destruction of functional structures.
- Supports 10-year reuse of existing structures as having lower ecological impact, lower cost.
- Reuse Building 211, rehabilitated and managed by a trust of interest groups; scale back guard shack improvements to minimum upgrade.
- Minimize road maintenance and grading and mowing.
- Modify perimeter fence to permit fishing.
- Add no additional parking–visitor movement on foot or by USFWS-operated low emission buses from Main Compound
- Pavilion construction intrusive on landscape–use bench clearings.
- Supports entrance fee, but do not vigorously promote tourism: habitat too fragile to accommodate large numbers of people.

Mr. David H. Dutton
Department of Historic Resources

- Present document correctly reflects opinion that future identification or evaluation under National Historic Preservation Act §106 may be required. Offers assistance.

Douglas A. Eagles, Ph.D.

- Supports continued volunteer efforts (e.g., Reuse Committee and Woodbridge Refuge Committee).
- Favors either Alternative C, or D.
- Supports educational use: natural beauty; various habitats and succession levels; rigorous professional ecological studies by NoVA, George Mason University, for example.
- Avoid road construction through wet woods.

Ms. Joyce P. Eagles

- Supports Alternative D, also favors combining with Alternative C.
- Supports educational use.
- Supports Caruthers Foundation and Potomac Nature and History Trust partnerships.

Mr. John S. Gottschalk

- Concurs with *Vision Statement* and *Refuge Goals.*
- Locate facilities near present entrance, away from natural habitats in northeast quadrant.
- Supports educational use.
- Remove or lower Tower.
- Reuse existing access roads, minimize visitor use goals.
- Possible removal of perimeter fence along Potomac River.
- Reuse suitable existing buildings; tear down remainder.
- Stagger mowing in 3-year rotating intervals.
- Supports a more general, experiential plan than any of the current Alternatives.

Ms. Elaine Haug

- Supports Alternative C, modified into suggested Alternatives:
- Alternative E
  - Reuse Building 211 immediately for offices and educational interpretation; build combined visitor center/environmental center in Compound area.
  - Limit public vehicles to Compound; establish auto train.
- Alternative F (5-year use)
  - Reuse existing roads and gates, Compound as parking area.
  - Reuse Building 211 as offices and environmental center, site of electric tram system.
  - Locate visitor center at homesite.
  - Suggests archaeological dig at homesite.
  - Preserve northeast, east, and south quadrants for group tours.
  - Limit new road construction, esp. in Charlie culvert area.
  - Preserve perimeter fencing.
- Strongly supports Missions of the Service and National Wildlife Refuge System.

Ms. Daniela K. Horsman, R.N.

- Reuse existing buildings for education and non-invasive environmental science research.
- Limit further development, construction and destruction.

Mr. Billy Isbell

- Supports Alternative D mix of FWS Mission with local access, consensus among groups.

Mr. R. Christian Jones
George Mason University

- Supports Belmont area "...as focus for education and research in ecology and environmental science....current compound can at best serve as a temporary home for limited educational activities." Suggests locating interpretive center on the edge of the Refuge, as well as a research building located close to the Refuge and the marina.

Mr. Donald P. Kelso
George Mason University

- Supports Alternative D.
- "The University has expressed more interest in the development of programs located on land outside the Refuge which would allow the building of up-to-date facilities for research and education. Among these facilities are research and teaching laboratories, large aquarium systems, and boat and docking space....Our goal is to develop an innovative environmental education and research program for schools, the University, and the general public."

Ms. Karen L. Knopes

- Supports Alternative D, with following comments:
  - Northeast quadrant has wonderful habitat as is.
  - Reconsider location of proposed new center.

Mr. Michael P. Murphy
Department of Environmental Quality
Commonwealth of Virginia

- Interpretation of CMP purposes under Woodbridge Legislation:
  - *As a refuge and breeding area for migratory birds and endangered species;*
  - *As an outdoor classroom to provide the public with education opportunities relating to fish and wildlife resources; and*
  - *For other recreational uses including fishing, wildlife observation, interpretation, and wildlife photography.*
- No objection to draft Alternatives, provided that construction of facilities is carried out in accordance with applicable federal, state, and local regulations.
- Environmental Impacts and Mitigation
- *Water Quality*. Minimize adverse impacts of construction in accordance with applicable federal or state regulations or policies.
- *Air Quality*. Minimize adverse impacts through controls on construction equipment, vehicular traffic, fugitive dust. Consider using shuttle or natural gas or electric-powered visitor transport.
- *Natural Heritage Resources*. Division of Natural Heritage documents none in project area.
  - Division of Conservation and Recreation indicates errors on area flora and fauna lists: contact Chris Ludwig, DNH, 804-371-6206.
  - Department of Agriculture and Consumer Services documents no area populations of threatened or endangered plant or insect species.
- *Erosion and Sediment Control*. All erosion control devices must be installed and maintained in accordance with *Virginia Erosion and Sediment Control Handbook*. Barren areas must be revegetated.

- *Historic and Archaeological Resources*. Alternatives A and B: no effect. Alternatives C and D: project site must be evaluated to ensure compliance with National Historic Preservation Act §106.

- *Solid and Hazardous Wastes.* All solid wastes generated during construction should be reduced at the source, reused, or recycled.
- *Chesapeake Bay Preservation Areas.* Site plans must be developed in accordance with Prince William County's ordinance. Contact the County planning department for further information on local CBPA.
- *Pesticides and Herbicides.* Least toxic effective pesticides should be used. Contact DACS, 804-786-3501.
- *Others.*
  - **Recreational Opportunities.** Recommends USFWS include DCR in planning and designing additional passive water access. Contact John Davy, 804-786-2556.
  - **Energy Conservation.** If new construction required should comply with applicable state and federal guidelines, industry standards. Contact Eugene K. Rader, Department of Mines, Minerals, and Energy, 804-293-5121.
- State Regulatory and Coordination Needs. Several state laws may apply, depending upon the Alternative selected.
- *Water Quality and Wetlands.* Possible Virginia Water Protection Permit, as well as USACOE permit, Clean Water Act §404. Contact DEQ-Northern Regional Office and USACOE Hal Wiggins, 703-898-3568.
- *Erosion and Sediment Control and Stormwater Management.* E&SC Plan may be needed if total land disturbance exceeds 10,000 sq.ft. Stormwater Management Plan will be required if land disturbance is 1 acre or more. Contact DSWC, 804-371-7483.
- *Air Quality Regulation.* Following Virginia Administrative Codes may apply: **9 VAC 5-50-60** to **9 VAC 5-50-120, 9 VAC 5-40-5510**, as well as 1990 CAAA §176(c) General Conformity test.
- *Subaqueous Beds and Tidal Wetlands.* Utility crossings or other impacts to submerged lands channelward of mean low water on Belmont Bay, Occoquan Bay, and Marumsco Creek will require Joint Permit Application to VMRC. Contact Heather Wood, 804-247-8028.
- *Natural Heritage Resources.* For updated resource inventory, contact DCR Natural Heritage Program, Leslie D. Trew, 804-786-7951.
- *Solid Waste.* Solid waste, hazardous waste, and hazardous material must be managed in accordance with applicable federal, state, and local regulations, including Virginia Solid Waste Management Regulations, and Virginia Hazardous Waste Regulations. Contact DEQ–Northern Regional Office.
- *Chesapeake Bay Preservation Act.* Prior to development, contact CB Local Assistance Department, Keith White, 804-371-7506.
- *Historic Structures and Archaeological Resources.* If Alternative C or D selected, development must be coordinated with Virginia Department of Historic Resources. Contact Ethel Eaton, 804-786-6329, or David Dutton, 804-786-3143.
- *Asbestos Removal and Disposal.* Prior to renovation or demolition of existing buildings, contact Department of Labor and Industry, Clarence H. Wheeling, 804-786-0574.
- *Waterworks Operation Permit and Sewerage Regulations.* Extensions or modifications to water and sanitary sewage facilities must comply with State Waterworks and Sewerage regulations (Virginia Department of Health administers both federal and state laws governing waterworks operation). Contact Asif Malik, 804-786-5567.
- *Federal Consistency Certification.* Project must be constructed and operated consistent with Virginia Coastal Resources Management Program. Prior to commencing project, USFWS must receive all applicable permits and approvals listed under Enforceable Programs of VCRMP. Encourages following Advisory Policies, as well. Contact DEQ Office of Environmental Impact Review, Ellie Irons, 804-698-4325.

Mr. Michael Nelson
Audubon Naturalist Society

- Supports both the *Vision Statement* and *Refuge Goals.*
- Removal of all buildings not necessary to Refuge or educational purposes.
- Locate visitor center and educational at or near present entrance.
- Remove or cut down tower.
- Remove all or most of perimeter fence along the Potomac.
- No new road construction; ultimately reduce number and kind of roads on property.

Jim and Anne Parker

- Locate interpretive center on land already disturbed by existing buildings (suggests Building 306 site).
- Retain Building 211 for research and education.
- Remove other buildings.
- Use or enlarge existing roads.
- Totally unacceptable to build 10,000-sq.ft. interpretive center for $2 million (too expensive). Much more important to invest in boardwalks, observation decks, mini-buses, teaching and guide staff (to get visitors outside and onto the land).
- Main purpose to minimize impact on wildlife.

Mr. Leslie Platt, ATCC
Potomac Nature and History Trust

Integrating entire system of parks, etc. in the county.
More biological work
Several sites for FWS < env. cost benefit
PNHT ready to work with Service
Support EE/research on Belmont property
Cooperation association

Ms. R. Cynthia Pruett

- Agrees with Alternative selected (D), with following comments:
- Further evaluation required before locating parking, roads, visitor interpretive center, trails, high- and low-use areas, etc.
- Reuse Building 211 (suitable location for many years, small investment, Alternative C costs overstated).
- Reevaluate tower reuse for educational, communications purposes (despite sea-level location) if admittance revenue permits.
- Would like to see clarification in final plan of walking/driving restrictions while birding in high- and low-use areas.
- Recommends further coordination with community in developing highest flexibility plan.

Mr. John Reifenberg

- Aggressive visitor education program may damage future resources.
- Monitor upstream effluent using partnership/friends groups.
- Suggests 2-year mowing plan, to allow biennials opportunity to fruit.
- Incorporate native fruiting plants and shrubs in visitor center and education sites.
- Remove tower, keep fence.
- Concession area could defray trams operating and maintenance costs.
- Remove older buildings in center and plant native grasses.
- What connection between firebreaks in Alternative C and vehicular road in Alternative D?

Ms. Frances M. Rundlett

- Favors Alternative B (building management aspects) and Alternative C (resource management aspects).
- Opposes Alternatives C and D's extensive building development, expanded services, and increased public visitation. Tourism should not be promoted. Refuge should be kept primarily for wildlife. There are sufficient other attractions in Washington area.
- Maintain and restore grasslands; restore and enhance wetlands.
- Monitor plant and animal inventories as proposed in Alternative C.

Ms. Shirlee Seaborne

- Proposes new Alternative E (drawn from Alternatives B and C):
- Retain and utilize existing buildings as long as serviceable, for economic and ecological reasons.
- Alternative E
  - Enhance current grasslands; restore wetlands.
  - Manage deer population, donate meat to food banks, homeless shelters, or sell to local residents, zoos, or wildlife rehabilitation centers.
  - Utilize and retrofit existing buildings for headquarters, interpretive programs, and education.
  - Remove buildings remaining unused after 8 years; construct new buildings only when existing buildings cannot be modified. Include energy efficient design.
  - Maintain perimeter fencing.
  - Long-term use of tower.
  - Use on-site guard shack.
  - Locate Caruthers Foundation research space off-site.
  - Maintenance building on-site at appropriate location.
  - Manage for biodiversity and environmental education.
  - Use existing roads and firebreaks for public use activities.
  - Schedule refuge tours and activities.
  - Walking access in designated open areas on existing roads; motor access for permitted group activities; bicycles on motor vehicle routes only, with parallel paved trails if necessary.
  - Parking in compound for EE use; visitor parking on Dawson Beach Road.
  - Use Taylor Point Road for regional bicycle route, connecting to Veterans Park and beyond?
  - Perform Environmental Impact Study and cost analysis prior to any changes.

Ms. Ella J. Shannon

- Opposes Alternatives C and D as having major intrusive impact on site, by commercializing it.
- Opposes USFWS building, or endorsing building, any new structures, or tearing down existing buildings; restates Woodbridge Foundation proposed lease of buildings.
- Proposes new Alternative, tracking Alternative B, with some less intrusive elements from Alternatives C and D. (Potomac Nature and History Trust Recommendation of September 11, 1997, attached.)

Mr. Stanwyn G. Shetler
National Museum of Natural History
Smithsonian Institution

- "In particular, there seems to be a very clear danger that the USFWS will overdevelop the site and doom or destroy some of the very communities and/or organisms that are the reasons for preserving this parcel."
- Concerned about the amount of development that would take place if Alternative D were adopted, especially taking down fences and opening shoreline for fishing.
- Continue status quo (little or no public use or development) as long as possible.
- Strongly urges selecting the Alternative (perhaps not yet defined) that will minimize further disturbance and development and limit public use, at least for several years.
- Use present facilities as long as possible.
- Carefully managed, guided education should be primary use for the present.
- In time, safely broaden visitation and development where the least ecological harm will be suffered.

Ms. Nicky Staunton
Virginia Native Plant Society

- Requests assignment to planning team of professional habitat preservation representative, to review and assess current drafts for their impact on vegetative communities. I.e., 30,000 to 100,00 visitors to designated high use area of less than one-half of the 136 acres of Area 13 of northwest fields and woods is totally unacceptable.
- Opposes Alternative plans designating further severe habitat reduction by heavy use designations: upland meadows and low wet forest.
- Does not support Alternatives B, C, and D.
  - Upland Meadows (Community #13–131.53 acres): protect. Opposes heavy use by the public of all meadows.
  - Upland Woods (Community #19): protect. Opposes habitat alteration by heavy use.
  - Visitor Interpretive Center: Locate off-site for least negative impact (possible west of guard station in County partnership). On-site location at old Dawson homesite (already disturbed).
  - Compound Buildings: Retain and use the buildings (renovate and landscape).
  - Tower: Retain. Income-producing and needed structure. Maintenance paid by fees, contracted use.
  - Environmental Impact Statement: Produce, before planning to alter existing habitats on the Refuge.
  - Visitor Access: Control. Tours onto Refuge by tram can be scheduled (with fees to offset costs of controlled visits led by volunteers. All vehicles left in parking area.
  - Hydrology: Protect. Water on the north side of the Refuge needs protection. Preserve Catamount Creek.
  - Wetland Forest: The northeast corner of the Refuge should be protected, with no alterations.
- "Education can take place without changing the habitats, and should not change them."

Ms. Marilee Steele

- Opposes any major Service development of the site.
- Supports minimal intrusion on rich abundance of native species of plants, birds, and other wildlife.

Mr. Dennis Stewart

- Speaking for "Community Care" computer rehabilitation. They do computer rehabilitation to give to school children. They would like to continue use of Blg. #211 until the building is needed. Schools will identify students to receive their computers. Army welcomed them onto the site but they have received no support from DOI. They need a stabilized place to do their work, want to continue the work and expand it.

Mr. Robert Studholme

- Fully supports Alternative A.
- Concurs with Occoquan Bay National Wildlife Refuge name.
- Opposes significant impacts of Alternatives C and D. Suggests less intrusive Alternative.

Ms. Tish Tyson
Fairfax And. Society

- Look forward to sharing information. Questions on biology and planning.

Prince William Natural Resources Council

- Council requests more comprehensive ecological analysis and rigorous benefit-cost analysis prior to any decisions on siting and construction of any significant new facilities (buildings, roads, and trails).
- Concurs in Refuge Purpose, FWS and NWRS Mission Statements.
- Concurs in Description of Environment, except as follows:
  - Attribution for observation of bird species (p.19, para.2), should be Prince William Natural Resources Council, vs. Woodbridge Foundation, Inc.
  - Deer population figure (175 avg.) questionable: current pop. numbers c.40 to 50, which may be an appropriate maintenance level, given evident health.
- Section VII: Note absence of Woodbridge Refuge Committee, Prince William Wildflower Society, Friends of Mason Neck; note also misidentification of Prince William Natural Resources Council.
- Appendix VII (Butterflies): Proper attribution would be "Compiled by Prince William Natural Resources Council."
- Appendix VIII (Birds): Proper attribution would be "Compiled by J. Waggener with the support of the Prince William Natural Resources Council."
- Criteria for responsible refuge management:
  - Preserve/enhance open meadow habitat.
  - Maintain recognized sensitive "quiet areas" (interior of northern meadows and southern wetlands, but particularly Refuge's eastern side (between grave stones and break in perimeter road), which interfaces with Bald Eagle recovery sites around Mason Neck.
  - Maintain permanent USFWS on-site presence.
  - Minimize habitat disturbance for new facilities (buildings, roads, trails).
  - Maximize use of existing infrastructure (in furtherance of above).
  - Provide reasonable public access while minimizing wildlife disturbance.
  - Facilitate one-way traffic.
  - Provide permit traffic routes and parking for approved activities (special tours, research, and education).
- Conclusions:
  - Unambiguous merit in adaptive reuse of existing facilities before taking extreme steps of demolition and new construction.
  - Opposes Alternative D as most disruptive to habitat, (with no aesthetic gain in view, access), and most costly.
  - Difficult to defend devoting this level of funding to new facilities, rather than addressing more mainline refuge needs.
- Recommendations:
  - USFWS reexamine assumptions regarding value of property to NWRS. "The comment on page 35 of the Draft CMP ('While birding concentrations, rare or unusual species, or diversity may not be extraordinary attractions here, compared to other refuges...') suggests a fundamental lack of understanding or appreciation of the site."
  - USFWS undertake rigorous analysis of broad range of alternatives before attempting to select sites for significant new facilities.
  - USFWS reevaluate its identification of northeast section for new construction or higher use, given stated grasslands maintenance and improvement goal.
- Attaches June 28, 1996, Prince William Natural Resources Council *Background on the Woodbridge Research Facility*

Mr. Larry Underwood, Ph.D.

- Overall recommendation: move slowly in developing facility.
  - Strongly urges further studies and assessments before siting visitor center, new or expanded roads and trails, and similar infrastructure.
  - Strongly urges moving as quickly as possible with transfer.
  - Offers assistance with information sharing, community and Potomac Nature and Historic Trust.
- Attaches *Habitat Values Associated with the Northeast Corner of Occoquan Bay National Wildlife Refuge*
  - "Increased human activity in the northeast corner or OBR could have deleterious effects on the raptor populations, population dynamics of their prey species, and other habitat and wildlife values. Modifications of or increased

human activities within or adjacent to the wet-forest habitat could diminish its value to white-footed mice....Replacing trees within the wet forest area with new or expanded roadways or trials (sic) would rob raptors of sites on which to roost, loaf, or breed. Placement of buildings, parking lots, or other facilities within the grasslands immediately south of the wet-forest area would destroy critical hunting habitat for raptors. Any construction of facilities or increase in human activities within the area would significantly diminish habitat quality for all components of the ecosystem."

- Strongly urges that, until further studies have been done, these areas be managed and protected as wet-forest and grassland communities, with minimal increases in human activities and no construction of roadways, buildings, or other structures.

Mr. Jim Waggener
Woodbridge Foundation, Inc.

- Endorses PNHT statement. PW Natural Resources Council - similar interests. Council has experience in large # of students (Earth Day, Migratory Bird Day), expect to continue. Council concern: examination of alternative far from comprehensive. Our selection criteria in: pres./enh. meadow , preserving quiet habitat, east shore eagle use.

- Encourage FWS presence on site.
  Reasonable access for public
  One-way vehicular
  Permit parking for special events

- 7 alternatives:
  min. operations w/VCS to expanded to #211, maintenance for extended.
  Expanded opp. @ gate
  (?) old homestead; #306 bunker
  min. disturbance using compound
  max cost/disturbance = Alt. D.
  (?) at homestead
  compound - opp. for (?), maintenance

Mr. Todd A. Waltemyer
Woodbridge Research Facility

- Specific Comments: 17 references to draft text items, corrections, suggestions for improving clarity (q.v.)
- General Comments
  - What are USFWS plans under Alternatives A-D for the current and future tenants of Building 201, America the Beautiful Fund?
  - What about the two tower tenants, DEA and BATF?
  - Suggests including descriptive language about buildings and tower, along with cost summaries at end of draft.

Mr. Edmund B. Welch

- The primary consideration for the USFWS in making its final choice of Alternatives is the protection of wildlife and the habitat on which it is dependent. USFWS must ensure all refuge uses comply with compatibility legislation.
- Basic problem is that Alternatives C and D assume public visitation levels so high that wildlife and habitat may be damaged.
- Concentration of uses under Alternatives C and D falls in unique upland meadows. Suggests retaining them as grasslands unconverted to some other higher use, thus avoiding damage by heavy visitor use.
- Questions projected visitation figures as implying more than a thousand visitors per day.
- Questions advisability of locating new $5 million facility in northeast quadrant. Suggests scaling back plans for facilities so that buildings and visitor concentrations do not jeopardize the upland meadows.

- "FWS has a legal obligation to manage this property as a refuge for wildlife, not as a park."
- "Finally, FWS has done a poor job in the Draft in assessing how likely it is that funding will in fact be available for the increased operating costs of the refuge and the capital expenditures envisioned for new buildings and the demolition or renovation of existing ones."
- "In summary, the Draft is seriously deficient....By offering Alternatives C and D, is FWS putting forth plans that will degrade the very refuge it is legally obligated to protect?"

Ms. Nancy White

- Support of Yvonne, Jim W.? PNHT sustain. EE program for PWCO. Excited about students learning of EE. Units based on 4 habitats. = Water qual./habitats/taking photographs. Can experience 3 field trips in 1.

Mr. John N. Williams

- Totally supports maintenance and enhancement of the meadows (grasslands).
- Opposes from an environmental standpoint destroying a significant portion of the critical upland meadows in the northeast corner to construct a new building when ample space is available in existing buildings in a central location.
  - Cites Nicky Staunton, past President of the Virginia Native Plant Society, and Elaine Haug comments at Fred Lynn School meeting that upland meadows constitute only 20% of total refuge area.
  - "The proposed new visitor center, parking lots, and roadways would destroy a significant portion of this critical habitat, and related "higher use" activities would have a deleterious (sic) effect on a much larger area of the meadows."
  - Questions Alternative D use of northeast corner for demonstration area, two observation areas, and fishing activity along northeast shoreline.
- Supports adaptive reuse of existing buildings as headquarters, visitor center, and education center, as more cost-effective.
- In summary, recommends USFWS refocus efforts toward modifying Alternative B, involving adaptive reuse of existing buildings.

Mr. Paul T. Zeph
Fairfax Audubon Society

- General Comment: "First and foremost, there is a lot of information missing that is required before sound, scientifically-based decisions can be made on building facilities or parking lots, designing vehicle or pedestrian traffic flow, or constructing trails....Please provide a range for or specific permitted activities and intensity of uses that each classification carries."
- Comments on Alternative D:
- Impacts on Wildlife. Wildlife populations need to be mapped and seasonal wildlife uses of vegetative communities need to be identified before permanent changes are made to these communities. Information on habitat-dependent species' disturbance by grassland use not reflected.
- FWS Facilities Location. Pleased with general location chosen for visitor center. However, final siting and design should await more comprehensive analysis of seasonal wildlife use of vegetative communities.
- Visitor Circulation. Prefers Alternative C use of Taylor Road for visitor movement over Alternative D use of Dawson Beach Road. The entire road system needs examination and circulation study to determine least number, best placement. Removal of some roads or road sections should be seriously considered.
- Perimeter Fences. Concurs with USFWS that perimeter fences are necessary for refuge security. Recommends clearing vegetation and constructing viewing platforms along fences in key viewing areas.
- Habitat Restoration. Supports draft *Impacts on Animal and Plant Populations.* However, questions which habitat communities will be expanded and which reduced.
- Marina Boats. Will likely impact Bald Eagle feeding and roosting along creeks in vegetative area 8. Requests USFWS conduct eagle activity inventory and impact analysis.

- Fishing Areas. Not clear why fishing access is being provided, given major changes and potential threats caused by breaching the fence. Requests purpose and need assessment with evaluation of associated access, enforcement, and solid waste costs. Questions justification.
- Special Birding Areas. Identify provision for allowing limited access (and vehicle access) to special birding areas to permit seasonal surveys and population monitoring.
- Management of Refuge Facilities:
  - Opposes turning over any aspect of facility management to an outside organization as premature.
  - References adjacent Belmont property. USFWS should include maps and descriptions of the relationship between the refuge interpretive center with off-site research space, and road access to the facility.
  - "As the preferred Alternative D in the CMP relies on the donation from the Belmont Bay developer, the mechanism for this transfer of funds to the U.S. Government, through a specific foundation (Tax Exempt 501-C(3) Organization), should be explained....Please include the full text of the developer's commitment letter in the appendices of the final CMP."
- Encourages broader public distribution of final copies.

Appendix E Statement of Compliance

U.S. Fish and Wildlife Service, Region 5
Comprehensive Conservation planning

The following Executive Orders and legislative acts have been acted upon as they apply to Occoquan Bay National Wildlife Refuge.

1. National Historic Preservation Act. If the Service proposes any development activities that would affect the archeological or historical sites, the Service will consult with Federal and State Historic Preservation Officers to comply with Section 106 of the National Historic Preservation Act. - August 4, 1997

2. Executive Order No. 11988, Floodplain Management. No structures or other barriers that could either be damaged by or significantly influence the movement of floodwaters are planned for construction by the Service in the project area. The proposal supports the preservation and enhancement of the natural and beneficial values of floodplains. - July 18, 1997

3. Executive Order No. 11990, Protection of Wetlands. The proposed unit will help conserve the natural and beneficial values of the wetland habitat. The Service will undertake no activity that would be detrimental to the continuance of these vital wetlands. - July 18, 1997

4. Executive Order No. 12372, Intergovernmental Review of Federal Programs. By letter of August 29, 1997, the Commonwealth of Virginia and the County of Prince William were sent copies of the draft environmental assessment for distribution to State and County agencies and departments. Coordination and consultation is ongoing with local and State governments, Congressional representatives, and other Federal agencies.

5. Executive Order No. 12996, Management and General Public Use of the National Wildlife Refuge System. Through the development of the Comprehensive Conservation plan, the Service will complete compatibility determinations for existing wildlife-dependent recreational activities that will be allowed to continue, in the Final Comprehensive Conservation plan.

6. Endangered Species Act, Section 7. An internal Section 7 consultation is being conducted. Concurrence is being sought for "no significant effect".

7. Coastal Zone Management Act. Copy of the Draft Comprehensive Conservation Plan was sent to the Commonwealth of Virginia. - August 29, 1997

8. Secretarial Order 3127 (602 DM 2) Contaminants and Hazardous Waste. Significant surveys have been done (see the Remedial Plan, distributed August 1997) containing clean up schedules and remediation requirements.

Gregory J. Weiler
Refuge Manager

12/15/97
Date

Appendix F Butterflies of Woodbridge Research Facility and Marumsco NWR[6]

Pipevine Swallowtail	(*Battus philenor*)
Zebra Swallowtail	(*Eurytides marcellus*)
Black Swallowtail	(*Papilio polyxenes*)
Eastern Tiger Swallowtail	(*Papilio glaucus*)
Spicebush Swallowtail	(*Papilio troilus*)
Cabbage White	(*Pieris rapae*)
Orange Sulphur	(*Colias eurytheme*)
Little Yellow	(*Eurema lisa*)
Sleepy Orange	(*Eurema nicippe*)
Edward's Hairstreak	(*Strymon edwardsii*)
Eastern Tailed Blue	(*Everes comyntas*)
Spring Azure	(*Celastrina ladon*)
Summer Azure	(*Celastrina ladon* form *neglecta*)
Great Spangled Fritillary	(*Speyeria cybele*)
Meadow Fritillary	(*Boloria bellona*)
Silvery Checkerspot	(*Militea nycteis*)
Pearl Crescent	(*Phyciodes tharos*)
Question Mark	(*Polygonia interrogationis*)
Eastern Comma	(*Polygonia comma.*)
Mourning Cloak	(*Nymphalis antiopa*)
Red Admiral	(*Vanessa atalanta*)
Common Buckeye	(*Junonia coenia*)
Red-spotted Purple	(*Limenitis arthemis astyanax*)
Viceroy	(*Limenitis archippus*)
Hackberry Emperor	(*Asterocampa celtis*)
Tawny Emperor	(*Asterocampa clyton*)
Appalachian Brown	(*Satyrodes appalachia*)
Little Wood Satyr	(*Euptychia cymela*)
Common Wood Nymph	(*Cercyonis pegala*)
Monarch	(*Danaus plexippus*)
Silver-spotted Skipper	(*Epargyreus clarus*)
Horace's Dusky Wing	(*Erynnis horatius*)
Least Skipper	(*Ancyloxypha numitor*)
Fiery Skipper	(*Hylephila phyleus*)
Cross Line Skipper	(*Polites manataaqua*)
Little Glassy Wing	(*Pompeius verna*)
Delaware Skipper	(*Atrytone logan*)
Zabulon Skipper	(*Poanes zabulon*)
Dun Skipper	(*Euphyes vestris*)

[6]Compiled by Prince William Natural Resources Council

Appendix G Birds of Woodbridge Research Facility/Marumsco NWR 1989-present[7]

Common Loon (*Gavia immer*)
Pied-Billed Grebe (*Podilymbus podiceps*)
Horned Grebe (*Podiceps auritus*)
Red-Necked Grebe (*Podiceps grisegena*)
White Pelican (*Pelecanus erythrorhynchos*)
Doubled-crested Cormorant (*Phalacrocorax auritus*)
American Bittern (*Botaurus lentiginosus*)
Least Bittern (*Ixobrychus exilis*)
Great Blue Heron (*Ardea herodias*)
Great Egret (*Casmerodius albus*)
Snowy Egret (*Egretta thula*)
Little Blue Heron (*Florida caerulea*)
Cattle Egret (*Bubulcus ibis*)
Green Heron (*Butorides striatus*)
Black-Crowned Night Heron (*Nycticorax nycticorax*)
Yellow-Crowned Night Heron (*Nyctanassa violacea*)
White Ibis (*Eudocimus albus*)
Glossy Ibis (*Plegadis falcinellus*)
Whistling Swan (*Olor columbianus*)
Snow Goose (*Chen caerulescens*)
Canada Goose (*Branta canadensis*)
Wood Duck (*Aix sponsa*)
Green-Winged Teal (*Anas crecca*)
American Black Duck (*Anas rubripes*)
Mallard (*Anas platyrhynchos*)
Northern Pintail (*Anas acuta*)
Blue-Winged Teal (*Anas discors*)
Northern Shoveler (*Anas clypeata*)
Gadwall (*Anas strepera*)
American Wigeon (*Anas americana*)
Canvasback (*Aythya valisineria*)
Redhead (*Aythya americana*)
Ring-Necked Duck (*Aythya collaris*)
Lesser Scaup (*Aythya affinis*)
Common Goldeneye (*Bucephala clangula*)
Bufflehead (*Bucephala albeola*)
Hooded Merganser (*Lophodytes cucullatus*)
Common Merganser (*Mergus merganser*)
Red-Breasted Merganser (*Mergus serrator*)
Ruddy Duck (*Oxyura jamaicensis*)
Black Vulture (*Coragyps atratus*)
Turkey Vulture (*Cathartes aura*)
Osprey (*Pandion haliaetus*)
Mississppi Kite (*Ictinia mississippiensis*)
Bald Eagle (*Haliaeetus leucoephalus*)
Northern Harrier (*Circus cyaneus*)
Sharp-Shinned Hawk (*Accipiter striatus*)
Cooper's Hawk (*Accipiter cooperii*)
Northern Goshawk (*Accipiter gentilis*)
Red-Shouldered Hawk (*Buteo lineatus*)
Broad-Winged Hawk (*Buteo platypterus*)
Red-Tailed Hawk (*Buteo jamaicensis*)
Rough-Legged Hawk (*Buteo lagopus*)
Golden Eagle (*Aquila chrysaetos*)
American Kestrel (*Falco sparverius*)
Merlin (*Falco columbarius*)
Ring-Necked Pheasant (*Phasianus colchicus*)
Wild Turkey (*Meleagris gallopavo*)
Northern Bobwhite (*Colinus virginianus*)
King Rail (*Rallus elegans*)
Virginia Rail (*Rallus limicola*)
Sora (*Porzana carolina*)
American Coot (*Fulica americana*)
Killdeer (*Charadrius vociferus*)
Greater Yellowlegs (*Tringa melanoleuca*)
Lesser Yellowlegs (*Tringa flavipes*)
Solitary Sandpiper (*Tringa solitaria*)
Spotted Sandpiper (*Actitis macularia*)
Semipalmated Sandpiper (*Calidris pusilla*)
Western Sandpiper (*Calidris mauri*)
Least Sandpiper (*Calidris minutilla*)
Pectoral Sandpiper (*Calidris melanotos*)
Dunlin (*Calidris alpina*)
Short-Billed Dowitcher (*Limnodromus griseus*)
Common Snipe (*Capella gallinago*)
American Woodcock (*Philohela minor*)
Laughing Gull (*Larus atricilla*)
Bonaparte's Gull (*Larus philadelphia*)
Ring-Billed Gull (*Larus delawarensis*)
Herring Gull (*Larus argentatus*)
Greater Black-Backed Gull (*Larus marinus*)
Caspian Tern (*Sterna caspia*)

[7]Compiled by J. Waggener with support of Prince William Natural Resources Council

Forster's Tern (*Sterna dougallii*)
Least Tern (*Sterna albifrons*)
Black Tern (*Chlidonias niger*)
Rock Dove (*Columba livia*)
Mourning Dove (*Zenaida macroura*)
Black-Billed Cuckoo (*Coccyzus erythropthalmus*)
Yellow-Billed Cuckoo (*Coccyzus americanus*)
Barn Owl (*Tyto alba*)
Great Horned Owl (*Bubo virginianus*)
Barred Owl (*Strix varia*)
Short-Eared Owl (*Asio flammeus*)
Common Nighthawk (*Chordeiles minor*)
Chimney Swift (*Chætura pelagica*)
Ruby-Throated Hummingbird (*Archilochus colubris*)
Belted Kingfisher (*Megaceryle alcyon*)
Red-Headed Woodpecker (*Melanerpes erythrocephalus*)
Red-Bellied Woodpecker (*Melanerpes carolinus*)
Yellow-Bellied Sapsucker (*Sphyrapicus varius*)
Downy Woodpecker (*Picoides pubescens*)
Hairy Woodpecker (*Picoides villosus*)
Northern Flicker (*Colaptes auratus*)
Pileated Woodpecker (*Dryocopus pileatus*)
Eastern Wood-Pewee (*Contopus virens*)
Yellow-Bellied Flycatcher (*Empidonax flaviventris*)
Acadian Flycatcher (*Empidonax virescens*)
Willow Flycatcher (*Empidonax traillii*)
Eastern Phoebe (*Sayornis phoebe*)
Vermilion Flycatcher (*Pyrocephalus rubinus*)
Great Crested Flycatcher (*Myiarchus crinitus*)
Eastern Kingbird (*Tyrannus tyrannus*)
Horned Lark (*Eremophila alpestris*)
Purple Martin (*Progne subis*)
Tree Swallow (*Iridoprocne bicolor*)
Rough-Winged Swallow (*Stelgidopteryx ruficollis*)
Bank Swallow (*Riparia riparia*)
Barn Swallow (*Hirundo rustica*)
Blue Jay (*Cyanocitta cristata*)
American Crow (*Corvus brachyrhynchos*)
Fish Crow (*Corvus ossifragus*)
Black-Capped Chickadee (*Parus atricapillus*)
Carolina Chickadee (*Parus carolinensis*)
Tufted Titmouse (*Parus bicolor*)
Red-Breasted Nuthatch (*Sitta canadensis*)
White-Breasted Nuthatch (*Sitta carolinensis*)
Brown Creeper (*Certhia familiaris*)
Carolina Wren (*Thryomanes bewickii*)
House Wren (*Troglodytes aedon*)
Winter Wren (*Troglodytes troglodytes*)
Marsh Wren (*Cistothorus palustris*)
Golden-Crowned Kinglet (*Regulus satrapa*)
Ruby-Crowned Kinglet (*Regulus calendula*)
Blue-gray Gnatcatcher (*Polioptila caerulea*)
Eastern Bluebird (*Sialia sialis*)
Veery (*Catharus fuscescens*)
Swainson's Thrush (*Catharus ustulatus*)
Hermit Thrush (*Catharus guttatus*)
Wood Thrush (*Hylocichla mustelina*)
American Robin (*Turdus migratorius*)
Gray Catbird (*Dumetella carolinensis*)
Northern Mockingbird (*Mimus polyglottos*)
Brown Thrasher (*Toxostoma rufum*)
Cedar Waxwing (*Bombycilla cedrorum*)
Loggerhead Strike (*Lanius ludovicianus*)
European Starling (*Sturnus vulagaris*)
White-Eyed Vireo (*Vireo griseus*)
Solitary Vireo (*Vireo solitarius*)
Yellow-Throated Vireo (*Vireo flavifrons*)
Warbling Vireo (*Vireo gilvus*)
Philadelphia Vireo (*Vireo philadelphicus*)
Red-Eyed Vireo (*Vireo olivaceus*)
Blue-Winged Warbler (*Vermivora pinus*)
Tennessee Warbler (*Vermivora peregrina*)
Nashville Warbler (*Vermivora ruficapilla*)
Northern Parula Warbler (*Parula americana*)
Yellow Warbler (*Dendroica petechia*)
Chestnut-Sided Warbler (*Dendroica castanea*)
Magnolia Warbler (*Dendroica magnolia*)
Black-Throated Blue Warbler (*Dendroica caerulescens*)
Yellow-Rumped Warbler (*Dendroica coronata*)
Black-Throated Green Warbler (*Dendroica virens*)
Blackburnian Warbler (*Dendroica fusca*)
Yellow- Throated Warbler (*Dendroica dominica*)
Pine Warbler (*Dendroica pinus*)
Prairie Warbler (*Dendroica discolor*)
Palm Warbler (*Dendroica palmarum*)
Blackpoll Warbler (*Dendroica striata*)
Black-and-White Warbler (*Mniotilta varia*)
American Redstart (*Setophaga ruticilla*)

Prothonotary Warbler (*Protonotaria citrea*)
Worm-Eating Warbler (*Helmitheros vermivorus*)
Ovenbird (*Seiurus aurocapillus*)
Northern Waterthrush (*Seiurus noveboracensis*)
Louisiana Waterthrush (*Seiurus motacilla*)
Kentucky Warbler (*Oporornis formosus*)
Connecticut Warbler (*Oporornis agilis*)
Common Yellowthroat (*Geothlypis trichas*)
Hooded Warbler (*Wilsonia citrina*)
Wilson's Warbler (*Wilsonia pusilla*)
Canada Warbler (*Wilsonia canadensis*)
Yellow-Breasted Chat (*Icteria virens*)
Summer Tanager (*Piranga rubra*)
Scarlet Tanager (*Piranga olivacea*)
Northern Cardinal (*Cardinalis cardinalis*)
Rose-Breasted Grosbeak (*Pheucticus ludovicianus*)
Blue Grosbeak (*Guiraca caerulea*)
Indigo Bunting (*Passerina cyanea*)
Rufous-Sided Towhee (*Pheucticus melanophalus*)
American Tree Sparrow (*Spizella arborea*)
Chipping Sparrow (*Spizella passerina*)
Field Sparrow (*Spizella pusilla*)
Vesper Sparrow (*Pooecetes gramineus*)
Lark Sparrow (*Chondestes grammacus*)
Savannah Sparrow (*Passerculus sandwichensis*)
Grasshopper Sparrow (*Ammodramus savannarum*)
Henslow's Sparrow (*Ammodramus henslowii*)
Fox Sparrow (*Passerella iliaca*)
Song Sparrow (*Melospiza melodia*)
Lincoln's Sparrow (*Melospiza lincolnii*)
Swamp Sparrow (*Melospiza georgiana*)
White-Throated Sparrow (*Zonotrichia albicollis*)
White-Crowned Sparrow (*Zonotrichia leucophrys*)
Dark-Eyed Junco (*Junco hyemalis*)
Bobolink (*Dolichonyx oryzivorus*)
Red-Winged Blackbird (*Agelaius phoeniceus*)
Eastern Meadowlark (*Sturnella magna*)
Rusty Blackbird (*Euphagus carolinus*)
Common Grackle (*Quiscalus quiscula*)
Brown-Headed Cowbird (*Molothrus ater*)
Orchard Oriole (*Icterus spurius*)
Baltimore Oriole (*Icterus galbula*)
House Finch (*Carpodacus mexicanus*)
American Goldfinch (*Carduelis tristis*)
House Sparrow (*Passer domesticus*)

Appendix H Reptiles and Amphibians Known or Expected in Prince William County, Virginia[8]

Class Amphibia
- Salamanders (Order Caudata)
  - Eastern newt *(Notophthalmus striatus)*
  - Jefferson salamander *(Ambystoma jeffersonianum)*
  - Spotted salamander *(Ambystoma maculatum)*
  - Marbled salamander *(Ambystoma opacum)*
  - Northern dusky salamander *(Desmognathus fuscus)*
  - Two-lined salamander *(Eurycea bislineata)*
  - Three-lined salamander *(Eurycea guttolineata)*
  - Four-toed salamander *(Hemidactylium scutatum)*
  - Redback salamander *(Pletodon cinereus)*
  - Slimy salamander *(Pletodon glutinosus)*
  - Mud salamander *(Pseudotriton montanus)*
  - Red salamander *(Pseudotriton ruber)*

- Toads and Frogs (Order Salientia)
  - American toad *(Bufo americanus)*
  - Fowler's toad *(Bufo woodhousei)*
  - Northern cricket frog *(Acris crepitans)*
  - Cope's gray treefrog *(Hyla crysoscelis)*
  - Green treefrog *(Hyla cinerea)*
  - Spring peeper *(Hyla crucifer)*
  - Gray treefrog *(Hyla versicolor)*
  - Upland chorus frog *(Pseudacris triseriata)*
  - Bullfrog *(Rana catesbeiana)*
  - Green frog *(Rana clamitans)*
  - Pickerel frog *(Rana palustris)*
  - Southern leopard frog *(Rana sphenocephala)*
  - (?) Wood frog *(Rana sylvatica)*

Reptiles (Class Reptilia)
- Turtles (Order Chelonia)
  - Snapping turtle *(Chelydra serpentina)*
  - Eastern mud turtle *(Kinosternon subrubrum)*
  - Eastern musk turtle *(Sternotherus odoratus)*
  - Painted turtle *(Chrysemys picta)*
  - Redbelly turtle *(Chrysemys rubriventris)*
  - Spotted turtle *(Clemmys guttata)*
  - Wood turtle *(Clemmys insculpta)*
  - Eastern box turtle *(Terrapene carolina)*
- Lizards and Snakes (Order Squamata)
  - Skinks and lizards (Sub-order Sauria)
  - Eastern fence lizard *(Sceloporus undulatus)*
  - Five-lined skink *(Eumeces fasciatus)*
  - Southeastern five-lined skink *(Eumeces inexpectatus)*
  - Broadhead skink *(Eumeces laticeps)*
  - Ground skink *(Scincella lateralis)*
  - Six-line racerunner *(Cnemidophorus sexlineatus)*
  - Snakes (Sub-order Serpentes)
  - Worm snake *(Carphophis amoenus)*
  - Scarlet snake *(Cemophora coccinea)*
  - Black racer *(Coluber constrictor)*
  - Ringneck snake *(Diadophis punctatis)*
  - Corn snake *(Elaphe guttata)*
  - Rat snake *(Elaphe obsoleta)*
  - Eastern hognose snake *(Heterodon platyrhinos)*
  - Mole kingsnake *(Lampropeltis calligaster)*
  - Eastern kingsnake *(Lampropeltis getulutus)*
  - Eastern milk snake and Scarlet kingsnake *(Lampropeltis triangulum)*
  - Northern water snake *(Nerodia sipedon)*
  - Rough green snake *(Opheodrys aestivus)*
  - Queen snake *(Regina septemvittata)*
  - Brown snake *(Storeria dekayti)*
  - Redbelly snake *(Storeria occipitomaculata)*
  - Eastern ribbon snake *(Thamnophis sauritus)*
  - Eastern garter snake *(Thamnophis sirtalis)*
  - Smooth earth snake *(Virginia valeriae)*
  - Copperhead *(Agkistrodon contortrix)*

[8]Prepared by Dr. Larry Underwood; Northern Virginia Community College, Woodbridge, Virginia

Appendix I Mammals Known or Expected in Prince William County, Virginia[9]

Pouched Mammals (Marsupialia)

Opossums (Didelphiidae)
Virginia opossum *(Didelphis virginiana)*

Insect-eaters (Order Insectivora)

Shrews (Family Soricidae)
Masked shrew *(Sorex cinereus)*
Southeastern shrew *(Sorex longirostris)*
Pygmy shrew *(Sorex hoyi)*
Least shrew *(Cryptotis parva)*
Northern short-tailed shrew *(Blarina brevicauda)*

Moles (Family Talpidae)
Star-nosed mole *(Condylura cristata)*
Eastern mole *(Scalopus aquaticus)*

Bats (Order Chiroptera)

Plainnose Bats (Vespertilionidae)
Keen's myotis *(Myotis keeni)*
Little brown myotis *(Myotis lucifugus)*
Silver-haired bat *(Lasionycteris noctivagans)*
Eastern pipistrelle *(Pipistrellus subflavus)*
Big brown bat *(Eptesicus fuscus)*
Red bat *(Lasiurus borealis)*
Hoary bat *(Lasiuris cinereus)*
Evening bat *(Nycticeius humeralis)*

Rabbits (Order Lagomorpha)

Rabbits (Family Leporidae)
New England cottontail *(Sylvilagus transitionalis)*

Rodents (Order Rodentia)

Squirrels (Family Sciuridae)
Eastern chipmunk *(Tamias striatus)*
Woodchuck *(Marmota monax)*
Gray squirrel *(Sciurus carolinensis)*
Fox squirrel *(Sciurus niger)*
Red squirrel *(Tamiasciurus hudsonicus)*
Southern flying squirrel *(Glaucomys volans)*

Beavers (Family Castoridae)
Beaver *(Castor canadensis)*

Mice (Family Cricetidae)
Marsh rice rat *(Oryzomys palustris)*
Eastern harvest mouse *(Reithrodontomys humulis)*
Deer Mouse *(Peromyscus maniculatus)*
White-footed mouse *(Peromyscus leucopus)*
Eastern wood rat *(Neotoma floridana)*
Meadow vole *(Microtus pennsylvanicus)*
Woodland vole *(Microtus pinetorum)*
Muskrat *(Ondatra zibethicus)*
Southern bog lemming *(Synaptomys cooperi)*

Rats (Family Muridae)
Black rat *(Rattus rattus)*
Norway rat *(Rattus norvegicus)*
House mouse *(Mus musculus)*

Jumping Mice (Family Zapodidae)
Meadow jumping mouse *(Zapus hudsonius)*

Nutria (Family Myocastoridae)
Nutria *(Myocastor coypus)*

Flesh-eaters (Carnivora)

Dogs, Wolves, and Foxes (Canidae)
Coyote *(Canis lutrans)*
Red fox *(Vulpes vulpes)*
Gray fox *(Urocyon cinereoargenteus)*

Bears (Ursidae)
Black bear *(Ursus americanus)*

Raccoons and Coatis (Procyonidae)
Raccoon *(Procyon lotor)*

Weasels and Skunks (Mustelidae)
Longtail weasel *(Mustela frenata)*
Mink *(Mustela vison)*

[9]Prepared by Dr. Larry Underwood; Northern Virginia Community College, Woodbridge, Virginia

River otter *(Lutra canadensis)*
Striped skunk *(Mephitis mephitis)*

Hoofed Animals (Order Artiodactyla)

Deer (Family Cervidae)
White-tailed deer *(Odocoileus virginianus)*

Appendix J Flora Inventory of Woodbridge Research Facility

PLANTS 10/16/97

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Acer	negundo	Aceraceae	Box Elder, Ash Lea	L.	Maple
Acer	rubrum	Aceraceae	Red Maple	L.	Maple
Achillea	millefoliuum	Asteraceae	Yarrow	L.	Aster
Acorus	calamus	Araceae	Sweet Flags	L.	Arum
Agrimonia	parviflora	Rosaceae	Small-Flowered Ag	Ait.	Rose
Agrostis	stolonifera	Poaceae	Creeping Bent Gras	L.	Grass
Ailanthus	altissima	Simaroubaceae	Tree of Heaven	(Mill.)Swingle	Tree of Heaven
Albizia	julibrissin	Fabaceae	Mimosa	Durazz.	Pea
Alisma	subcordatum	Alismataceae	Small Water Plantai	Raf.	Water Plantain
Allium	canadense	Liliaceae	Wild Garlic, Wild O	L.	Lily
Allium	vineale	Liliaceae	Field Garlic	L.	Lily
Alnus	serrulata	Betulaceae	Tag Alder	(Ait.)Willd.	Birch
Ambrosia	artemisiifolia	Asteraceae	Common Ragweed	L.	Aster
Amelanchier	sp.	Rosaceae	Shadbush		Rose
Amorpha	fruticosa	Fabaceae	Wild Indigo Bush	L.	Pea
Amphicarpa	bracteata	Fabaceae	Hog Peanut	(L.)Fern.	Pea
Anagallis	arvensis	Primulaceae	Scarlet Pimpernel	L.	Primrose
Andropogon	virginicus	Poaceae	Broomsedge	L.	Grass
Antennaria	plantaginifolia	Asteraceae	Plantain Pussytoes	(L.)Richards	Aster
Anthemis	cotula	Asteraceae	Mayweed	L.	Aster
Apios	americana	Fabaceae	Groundnut	Medic.	Pea
Apocynum	cannabinum	Apocynaceae	Indian Hemp, Hem	L.	Parsley
Arisaema	triphyllum	Araceae	Jack-in-the-Pulpit	(L.)Schott	Arum
Arisaema	dracontium	Araceae	Green Dragon	(L.)Schott	Arum
Aristida	dichotoma (curtissii	Poaceae	Three-Awn Grass	Michx.	Grass
Artemisia	annua	Asteraceae	Annual Wormwood	L.	Aster
Artemisia	vulgaris	Asteraceae	Wormwood	L.	Aster
Asarum	canadense	Aristolochiaceae	Wild Ginger	L.	Birthwort
Asclepias	incarnata	Asclepiadaceae	Swamp Milkweed	L.	Milkweed
Asclepias	syriaca	Asclepiadaceae	Common Milkwee	L.	Milkweed
Asclepias (Acerates	viridiflora	Asclepiadaceae	Green Flowered Mi	Raf.	Milkweed
Asimina	triloba	Annonaceae	Paw Paw	(L.)Dunal	Paw Paw
Aster	dumosus	Asteraceae	Bushy Aster	L.	Aster
Aster	lateriflorus	Asteraceae	Calico Aster	(L.)Britt.	Aster
Betula	nigra	Betulaceae	River Birch	L.	Birch
Boehmeria	cylindrica	Urticaceae	False Nettle	(L.)Swartz	Nettle
Botrychium	dissectum var. obliq	Ophioglossaceae	Cut-Leaf Grapefern	Spreng.	Adder's Tongue
Bromus	racemosus	Poaceae	Spiked Bromegrass,	L.	Grass
Campsis	radicans	Bignoniaceae	Trumpet Vine	(L.)Seem.	Bignonia
Carex	crinita	Cyperaceae	Drooping Sedge	Lam.	Sedge
Carex	frankii	Cyperaceae	Frank's Sedge	Kunth.	Sedge
Carex	grayi	Cyperaceae	Gray's Sedge	Dewey	Sedge
Carex	intumescens	Cyperaceae	Swollen Sedge	Rudge	Sedge
Carex	lurida	Cyperaceae	Yellow-Green Sedg	Wahl.	Sedge
Carex	scoparia	Cyperaceae	Broom-Like Sedge	Schk.	Sedge
Carex	squarrosa	Cyperaceae	Wide Spreading Se	Schk.	Sedge
Carex	stipata	Cyperaceae	Crowded Sedge	Muhl. ex Willd.	Sedge
Carex	tribuloides (projecta	Cyperaceae	Tribulus Sedge	Wahl.	Sedge
Carya	glabra	Juglandaceae	Pignut Hickory	(Mill.)Sweet	Walnut

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Carya	tomentosa	Juglandaceae	Mockernut Hickory	(Poir.)Nutt.	Walnut
Cassia (Chamaecris	nictitans	Fabaceae	Wild Sensitive Plan	L.	Pea
Celtis	occidentalis	Ulmaceae	American Hackberr	L.	Elm
Centaurea	maculosa	Asteraceae	Spotted Knapweed	Lam.	Aster
Cephalanthus	occidentalis	Rubiaceae	Button Bush	L.	Bedstraw
Cercis	canadensis	Fabaceae	Redbud	L.	Pea
Chelone	glabra	Scrophulariaceae	Turtlehead	L.	Snapdragon
Chrysanthemum	leucanthemum	Asteraceae	Oxeye Daisy	L.	Aster
Cichorium	intybus	Asteraceae	Chicory	L.	Aster
Cinna	arundinacea	Poaceae	Wood Reed Grass	L.	Grass
Circaea	lutetiana (quadrisul	Onagraceae	Enchanter's Nights	L.	Evening Primrose
Cirsium	discolor	Asteraceae	Field Thistle	(Willd.)Sprengel	Aster
Clematis	terniflora (dioscorei	Ranunculaceae	Japanese Clematis	DC	Buttercup
Commelina	communis	Commelinaceae	Asiatic Dayflower	L.	Spiderwort
Commelina	virginica	Commelinaceae	Virginia Dayflower	L.	Spiderwort
Conoclinium (Eupa	coelestinum	Asteraceae	Mistflower	(L.)DC	Aster
Cornus	amomum	Cornaceae	Bush Dogwood	Mill.	Dogwood
Cornus	florida	Cornaceae	Flowering Dogwoo	L.	Dogwood
Cornus	foemina (stricta)	Cornaceae	Swamp Dogwood	Mill.	Dogwood
Cuscuta	gronovii	Convolvulaceae	Dodder	Willd.	Morning Glory
Cyperus	echinatus (ovularis)	Cyperaceae	Egg Sedge HEDGE	(L.)Wood	Sedge
Cyperus	esculentus	Cyperaceae	Edible Nut Sedge	L.	Sedge
Cyperus	strigosus	Cyperaceae	Umbrella Sedge, G	L.	Sedge
Danthonia	spicata	Poaceae	Poverty Grass	(L.)R.&S.	Grass
Daucus	carota	Apiaceae	Queen Anne's Lace	L.	Parsley
Decodon	verticillatus	Lythraceae	Swamp Loose Strif	(L.)Ell.	Loosestrife
Desmodium	nudiflorum	Fabaceae	Naked-Flower Tick	(L.)DC	Pea
Dianthus	armeria	Caryophyllaceae	Deptford Pink	L.	Pink
Dichanthelium (Pa	clandestinum	Poaceae	Deertongue Grass	(L.)Gould	Grass
Dichanthelium (Pa	ravenellii	Poaceae	Ravenell's Panic Gr	(Scribn. & Merr.)G	Grass
Dichanthelium (Pa	dichotomum (tenue	Poaceae	Bushy Panic Grass	(L.)Gould	Grass
Diodia	teres	Rubiaceae	Annual Buttonwee	Walt.	Bedstraw
Dioscorea	villosa (quaternata)	Dioscoreaceae	Wild Yam	L.	Yam
Diospyros	virginiana	Ebenaceae	Persimmon	L.	Ebony
Echinochloa	crusgalli	Poaceae	Barnyard Grass	(L.)Beauv.	Grass
Eclipta	alba (prostrata)	Asteraceae	Yerba de Tajo	(L.)Hassk.	Aster
Eleocharis	obtusa	Cyperaceae	Blunt Spikerush	(Willd.)Schult. R&	Sedge
Elephantopus	carolinianus	Asteraceae	Elephant's Foot	Raeusch	Aster
Elodea	canadensis	Hydrocharitaceae	Common Elodea	Rich. in Michx.	Frog Bit
Elodea	nuttallii	Hydrocharitaceae	Western Water We	(Planch.St. John	Frog Bit
Elymus	virginicus	Poaceae	Virginia Wild Rye	L.	Grass
Epilobium	coloratum	Onagraceae	Purple-Leaved Will	Biehl.	Evening Primrose
Eragrostis	spectabilis	Poaceae	Purple Love Grass	(Pursh)Steud.	Grass
Erigeron	strigosus	Asteraceae	Lesser Daisy Fleaba	Willd.	Aster
Eryngium	aquaticum	Apiaceae	Rattlesnake Master	L.	Parsley
Eupatoriadelphus (	fistulosus	Asteraceae	Hollow Joe-Pye We	(Barratt)K.&R.	Aster
Eupatoriadelphus (	maculata	Asteraceae	Spotted Joe-Pye We	(L.)K&R	Aster
Eupatorium	hyssopifolium	Asteraceae	Hyssop-Leaved Bo	L.	Aster
Eupatorium	perfoliatum	Asteraceae	Common Boneset	L.	Aster

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Eupatorium	serotinum	Asteraceae	Late Flowering Bon	Michx.	Aster
Fagus	grandifolia	Fagaceae	American Beech	Ehrh.	Beech
Festuca (Vulpia)	myuros	Poaceae	Mouse Tail Fescue	L.	Grass
Fimbristylis	autumnalis	Cyperaceae	Slender Fimbry	(L.)R.&S.	Sedge
Fraxinus	americana	Oleaceae	White Ash	L.	Olive
Fraxinus	pennsylvanica	Oleaceae	Green Ash	Marsh.	Olive
Fraxinus	profunda	Oleaceae	Pumpkin Ash	(Bush)Bush.	Olive
Galium	obtusum	Rubiaceae	Stiff Marsh Bedstra	Bigel.	Bedstraw
Galium	tinctorium	Rubiaceae	Clayton's Bedstraw	L.	Bedstraw
Agalinis (Gerardia)	tenifolia	Scrophulariaceae	Slender Gerardia	(M. Vahl.)Raf.	Snapdragon
Geum	canadense	Rosaceae	White Avens	Jacq.	Rose
Glecoma	hederacea	Lamiaceae	Ground Ivy	L.	Mint
Gleditsia	triacanthos	Fabaceae	Honey Locust	L.	Pea
Gnaphalium	obtusifolium	Asteraceae	Sweet Everlasting	L.	Aster
Gratiola	negelecta	Scrophulariaceae	Clammy Hedge Hy	Torr.	Snapdragon
Hamamelis	virginiana	Hamameliadaceae	Witch Hazel	L.	Witch Hazel
Hedeoma	pulegioides	Lamiaceae	American Pennyroy	(L.)Pers.	Mint
Helenium	autumnale	Asteraceae	Autumn Sneezewe	L.	Aster
Helianthus	decapetalus	Asteraceae	Thin-Leaved Sunfl	L.	Aster
Helianthus	tuberosus	Asteraceae	Jerusalem Artichok	L.	Aster
Hibiscus	moscheutos (palustr	Malvaceae	Swamp Rose Mallo	L.	Mallow
Hibiscus	syriacus	Malvaceae	Rose-of-Sharon	L.	Mallow
Hieracium	paniculatum	Asteraceae	Paniculed Hawkwe	L.	Aster
Hydrocotyle	americana	Apiaceae	Water Pennywort	L.	Parsley
Hypericum (Ascyru	hypericoides (straga	Hypericaceae	St. Andrew's Cross	(L.)Crantz	St. Johnswort
Hypericum	mutilum	Hypericaceae	Dwarf St. Johnswo	L.	St. Johnswort
Hypericum	punctatum	Hypericaceae	Spotted St. Johnsw	Lam.	St. Johnswort
Hypericum (Triade	virginicum	Hypericaceae	Marsh St. Johnswo	L.	St. Johnswort
Ilex	opaca	Aquifoliaceae	American Holly	Ait.	Holly
Ilex	verticilata	Aquifoliaceae	Winterberry	(L.)Gray	Holly
Impatiens	capensis	Balsaminaceae	Spotted Jewelweed	Meerburg	Touch Me Not
Ipomoea	pandurata	Convolvulaceae	Wild Potato Vine	(L.)Meyer	Morning Glory
Ipomoea	purpurea	Convolvulaceae	Common Morning	(L.)Roth.	Morning Glory
Iris	pseudacorus	Iridaceae	Yellow Iris	L.	Iris
Iris	virginica	Iridaceae	Virginia Blue Iris	L.	Iris
Itea	virginica	Saxifragaceae	Virginia Willow	L.	Saxifrage
Juncus	acuminatus	Juncaceae	Tapered Rush	Michx.	Rush
Juncus	effusus	Juncaceae	Common Rush	L.	Rush
Juniperus	virginiana	Cupressaceae	Red Cedar	L.	Cypress
Justicia	americana	Acanthaceae	Water Willow	(L.)Vahl	Acanthus
Kalmia	latifolia	Ericaceae	Mountain Laurel	L.	Heath
Krigia	virginica	Asteraceae	Dwarf Dandelion	(L.)Willd.	Aster
Lactuca	canadensis	Asteraceae	Wild Lettuce	L.	Aster
Lactuca	floridana	Asteraceae	Florida Blue Lettuc	(L.)Gaertn.	Aster
Laportea	canadensis	Urticaceae	Wood Nettle	(L.)Wedd.	Nettle
Lechea	racemulosa	Cistaceae	Spreading Pinweed	Michx.	Rock Rose
Leersia	virginicum	Poaceae	White Grass	Willd.	Grass
Lespedeza	intermedia	Fabaceae	Wand Like Bush Cl	(Watson)Britt.	Pea
Lindera	benzoin	Lauraceae	Spicebush	(L.)Blume	Laurel

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Lindernia	dubia	Scrophulariaceae	False Pinpernel	(L.)Penell	Snapdragon
Liquidambar	styraciflua	Hamameliadaceae	Sweetgum	L.	Witch Hazel
Liriodendron	tulipifera	Magnoliaceae	Tulip Poplar	L.	Magnolia
Lobelia	cardinalis	Campanulaceae	Cardinal Flower	L.	Bluebell
Lonicera	japonica	Caprifoliaceae	Japanese Honeysuc	Thunb.	Honeysuckle
Ludwigia	alternifolia	Onagraceae	Seedbox	L.	Evening Primrose
Ludwigia	leptocarpa	Onagraceae	Narrow-Fruited Pri	(Nutt.)Hara.	Evening Primrose
Ludwigia	palustris	Onagraceae	Water Purslane	(L.)Ell.	Evening Primrose
Lycopus	americanus	Lamiaceae	Water Horehound	Barton	Mint
Lycopus	virginicus	Lamiaceae	Virginia Bugleweed	L.	Mint
Lysimachia	ciliata	Primulaceae	Fringed Loosestrife	L.	Primrose
Maclura	pomifera	Moraceae	Osage Orange	(Raf.)Schneid.	Mulberry
Medicago	lupulina	Fabaceae	Black Medic	L.	Pea
Melilotus	alba	Fabaceae	White Sweet Clove	Medic.	Pea
Melilotus	officinalis	Fabaceae	Yellow Sweet Clov	(L.)Pallas	Pea
Mentha	arvensis	Lamiaceae	Wild Mint	L.	Mint
Microstegium	vimineum	Poaceae	Napal Eulalia	(Trin.)A.Camus	Grass
Mikania	scandens	Asteraceae	Climbing Hempwe	(L.)Scandens	Aster
Mimulus	ringens	Scrophulariaceae	Monkey Flower	L.	Snapdragon
Miscanthus	sinensis	Poaceae	Eulalia, Silver Gras	Anderss.	Grass
Morus	rubra	Moraceae	Red Mulberry	L.	Mulberry
Myosotis	laxa	Boraginaceae	Small Forget-Me-N	Lehm.	Borage
Myriophyllum	aquatica (brasiliens	Haloragaceae	Parrot Feather	(Vell.)Verdc.	Water Milfoil
Nuphar	luteum	Nymphaeaceae	Spatterdock, Yello	(L.)Sibth.&Sm.	Water Lily
Nyssa	sylvatica	Nyssaceae	Black Gum	Marsh.	Sour Gum
Oenothera	fruticosa	Onagraceae	Sundrops	L.	Evening Primrose
Oenothera	laciniata	Onagraceae	Cut Leaved Evenin	Hill	Evening Primrose
Onoclea	sensibilis	Polypodiaceae	Sensitive Fern	L.	Fern
Ophioglossum	vulgatum	Ophioglossaceae	Adder's Tongue Fer	Fern.	Adder's Tongue
Osmunda	regalis	Osmundaceae	Royal Fern	L.	Cinnamon Fern
Oxalis	stricta	Oxalidaceae	Erect Yellow Wood	L.	Wood Sorrel
Oxalis	violacea	Oxalidaceae	Purple Wood Oxali	L.	Wood Sorrel
Panicum	rigidulum	Poaceae	Redtop Panic Grass	Nees	Grass
Panicum	virgatum	Poaceae	Switch Grass	L.	Grass
Parthenocissus	quinquefolia	Vitaceae	Virginia Creeper	(L.)Planch.	Grape
Paspalum	laeve	Poaceae	Panic Grass	Michx.	Grass
Paulownia	tomentosa	Bignoniaceae	Princess Tree	(Thunb.)Steud.	Bignonia
Peltandra	virginica	Araceae	Arrow Arum	(L.)Schott & Endl.	Arum
Phleum	pratense	Poaceae	Timothy	L.	Grass
Phragmites	australis	Poaceae	Common Reed	(Cav.)Trin. ex Steu	Grass
Phytolacca	americana	Phytolaccaceae	Pokeweed	L.	Pokeweed
Pilea	pumila	Urticaceae	Clearweed	(L.)Gray	Nettle
Pinus	strobus	~~Pinaceae~~	White Pine	L.	Pine
Pinus	~~virginiana~~	~~Pinaceae~~	Virginia ~~Scrub~~ Pine	Mill.	Pine
Plantago	aristata	~~Plantaginaceae~~	Bracted Plantain	Michx.	Plantain
Plantago	lanceolata	~~Plantaginaceae~~	English Plantain	L.	Plantain
Plantago	rugelii	~~Plantaginaceae~~	Red-Stemmed Plant	Decne.	Plantain
Platanus	occidentalis	Platanaceae	Sycamore	L.	Plane Tree
Podophyllum	peltatum	Berberidaceae	Mayapple	L.	Barberry

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Polygala	sanguinea	Polygalaceae	Rose Milkwort	L.	Milkwort
Polygonum	arifolium	Polygonaceae	Halberd-Leaved Te	L.	Smartweed
Polygonum	pensylvanicum	Polygonaceae	Pinkweed	L.	Smartweed
Polygonum	perisicaria	Polygonaceae	Lady's Tearthumb	L.	Smartweed
Polygonum	punctatum	Polygonaceae	Water Smartweed	Ell.	Smartweed
Polygonum	sagittatum	Polygonaceae	Arrow Vine	L.	Smartweed
Polygonum (Tovara	virginianum	Polygonaceae	Jumpseed	L.	Smartweed
Polymnia	uvedalia	Asteraceae	Yellow Leaf Cup	(L.)L.	Aster
Polystichum	acrostichoides	Polypodiaceae	Christmas Fern	(Michx.)Schott	Fern
Pontederia	cordata	Pontederiaceae	Pickerel Weed	L.	Pickerel Weed
Populus	deltoides	Salicaceae	Common Cottonwo	(Bartr.)ex Marsh	Willow
Potentilla	canadensis	Rosaceae	Rough-Fruited Cin	L.	Rose
Potentilla	simplex	Rosaceae	Common Cinquefo	Michx.	Rose
Prunella	vulgaris	Lamiaceae	Self Heal	L.	Mint
Prunus	serotina	Rosaceae	Wild Cherry	Ehrh.	Rose
*Pycnanthemum	virginianum	Lamiaceae	Virginia Mountain	(L.)Dur. & Jacks.	Mint
Quercus	alba	Fagaceae	White Oak	L.	Beech
Quercus	coccinea	Fagaceae	Scarlet Oak	Muenchh.	Beech
Quercus	falcata	Fagaceae	Spanish Oak, South	Michx.	Beech
Quercus	palustris	Fagaceae	Pin Oak	Muenchh.	Beech
Quercus	phellos	Fagaceae	Willow Oak	L.	Beech
Quercus	prinus	Fagaceae	Chestnut Oak	L.	Beech
Quercus	stellata	Fagaceae	Post Oak	Wang.	Beech
Rhexia	virginica	Melastomataceae	Virginia Meadow B	L.	Melastoma
Rhus	copallina	Anacardiaceae	Winged Sumac	L.	Cashew
Rhus	glabra	Anacardiaceae	Smooth Sumac	L.	Cashew
Rhus	radicans	Anacardiaceae	Poison Ivy	L.	Cashew
Rhus	typhina	Anacardiaceae	Staghorn Sumac	L.	Cashew
Rhynchospora	macrostachya	Cyperaceae	Large Spike Beakru	Gray	Sedge
Robinia	pseudo-acacia	Fabaceae	Black Locust	L.	Pea
Rosa	multiflora	Rosaceae	Wild Rose	Murr.	Rose
Rosa	palustris	Rosaceae	Swamp Rose	Marsh.	Rose
*Rubus	pubescens	Rosaceae	Dwarf Raspberry	Raf.	Rose
Rudbeckia	hirta	Asteraceae	Black Eyed Susan	L.	Aster
Rumex	acetosella	Polygonaceae	Sheep Sorrel	L.	Smartweed
Rumex	crispus	Polygonaceae	Curled Dock	L.	Smartweed
Sagittaria	latifolia	Alismataceae	Duck Potato, Arro	Willd.	Water Plantain
Salix	nigra	Salicaceae	Black Willow	Marsh.	Willow
Sambucus	canadensis	Caprifoliaceae	Common Elderberr	L.	Honeysuckle
Samolus	parviflorus (floribu	Primulaceae	Water Pimpernel	Raf.	Primrose
Saponaria	officinalis	Caryophyllaceae	Bouncing Bet, Soa	L.	Pink
Sassafras	albidum	Lauraceae	Sassafrass Tree	(Nutt.)Nees	Laurel
Satureja	vulgaris	Lamiaceae	Wild Basil	(L.)Fritsch	Mint
Saururus	cernuus	Saururaceae	Lizard's Tail	L.	Lizzard's Tail
Schoenoplectus (Sc	americanus	Cyperaceae	Three Square	(Persoon)Strong	Sedge
Schoenoplectus (Sc	validus	Cyperaceae	Great Bulrush	(Vahl)Strong	Sedge
Scirpus	cyperinus	Cyperaceae	Woolgrass	(L.)Kunth.	Sedge
Scrophularia	marilandica	Scrophulariaceae	Carpenter's Square	L.	Snapdragon
Scutellaria	integrifolia	Lamiaceae	Narrow-Leaved Sk	L.	Mint

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Scrophularia	lanceolata	Scrophulariaceae	Hare Figwort	Pursh.	Snapdragon
Setaria	glauca	Poaceae	Yellow Foxtail	(L.)Beauv.	Grass
Sicyos	angulatus	Cucurbitaceae	Bur Cucumber	L.	Gourd
Silphium	trifoliatum	Asteraceae	Whorled Rosinwee	L.	Aster
Sisyrinchium	angustifolium	Iridaceae	Stout Blue-Eyed Gr	Mill.	Iris
Smilacina	racemosa	Liliaceae	False Solomon Seal	(L.)Desf.	Lily
Smilax	rotundifolia	Liliaceae	Round Leaf Catbria	L.	Lily
Solanum	carolinense	Solanaceae	Horse Nettle	L.	Night Shade
Solidago	canadensis (altissim	Asteraceae	Tall Goldenrod	L.	Aster
Solidago	gigantea	Asteraceae	Great Goldenrod	Ait.	Aster
Solidago (Euthamia	graminifolia	Asteraceae	Grass-Leaved Gold	(L.)Salisb.	Aster
Solidago	juncea	Asteraceae	Early Goldenrod	Ait.	Aster
Sparganium	eurycarpum	Sparganiaceae	Large Burreed	Engelm.	Burreed
Strophostyles	helvola	Fabaceae	Trailing Wild Bean	(L.)Ell.	Pea
Symphoricarpos	orbiculatus	Caprifoliaceae	Coralberry	Moench.	Honeysuckle
Symplocarpus	foetidus	Araceae	Skunk Cabbage	(L.)Nutt.	Arum
Teucrium	canadense	Lamiaceae	Germander	L.	Mint
Thelypteris	palustris (thelypteri	Polypodiaceae	Marsh Fern	Schott	Fern
Trichostema	dichotomum	Lamiaceae	Bluecurls	L.	Mint
Tridens	flavus	Poaceae	Yellow Fluff Grass	(L.)Hitchc.	Grass
Trifolium	arvense	Fabaceae	Rabbit's Foot Clove	L.	Pea
Trifolium	pratense	Fabaceae	Red Clover	L.	Pea
Trifolium	repens	Fabaceae	White Clover	L.	Pea
Triodanis (Specular	perfoliata (perfoliat	Campanulaceae	Venus Looking Gla	(L.)Nieuw.	Bluebell
Tripsacum	dactyloides	Poaceae	Eastern Gama Gras	(L.)L.	Grass
Typha	angustifolia	Typhaceae	Narrow Leaf Cattail	L.	Cattail
Typha	latifolia	Typhaceae	Broad Leaf Cattail	L.	Cattail
Ulmus	americana	Ulmaceae	American Elm	L.	Elm
Ulmus	rubra	Ulmaceae	Slippery Elm	Muhl.	Elm
Urtica	dioica	Urticaceae	Stinging Nettle	L.	Nettle
Vaccinium	pallidum (vacillans)	Ericaceae	Low Bush Blueberr	Ait.	Heath
Verbascum	blattaria	Scrophulariaceae	Moth Mullein	L.	Snapdragon
Verbascum	thapsus	Scrophulariaceae	Woolly Mullein	L.	Snapdragon
Verbena	hastata	Verbenaceae	Blue Vervain	L.	Vervain
Verbena	simplex	Verbenaceae	Narrow-Leaf Verva	Lehm.	Vervain
Verbena	urticifolia	Verbenaceae	White Vervain	L.	Vervain
Verbesina (Actino	alternifolia	Asteraceae	Yellow Ironweed,	(L.)Britt.	Aster
Vernonia	noveboracensis	Asteraceae	New York Ironwee	(L.)Michx.	Aster
Viburnum	dentatum	Caprifoliaceae	Southern Arrowwo	L.	Honeysuckle
Viburnum	prunifolium	Caprifoliaceae	Black Haw	L.	Honeysuckle
Vitis	aestivalis	Vitaceae	Summer Grape	Michx.	Grape
Vitis	labusca	Vitaceae	Fox Grape	L.	Grape
Zizania	aquatica	Poaceae	Wild Rice	L.	Grass
Saxifraga	virginiensis	Saxifragaceae	Early Saxifrage	Michx.	Saxifrage
*Veronica	hederaefolia	Scrophulariaceae	Ivy Leaf Speedwell	L.	Snapdragon
Lamium	purpureum	Lamiaceae	Purple Dead Nettle	L.	Mint
Lamium	amplexicaule	Lamiaceae	Henbit	L.	Mint
Houstonia (Hedyoti	caerulea	Rubiaceae	Bluet, Quaker Ladi	L.	Bedstraw
Dentaria (Cardimin	laciniata (concatena	Brassicaceae	Cut-Leaf Toothwor	Willd.	Mustard

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Viola	rafinesquii (kitaibeli	Violaceae	Field Pansey	Greene	Violet
Viola	affinis	Violaceae	Pale Violet	Le Conte	Violet
*Vaccinium	corymbosum(atroco	Ericaceae	High Bush Blueber	L.	Heath
Taxus	canadensis	Taxaceae	American Yew	Marsh.	Yew
Taraxacum	officinale	Asteraceae	Dandelion	Wiggers	Aster
Ranunculus	abortivus	Ranunculaceae	Kidney Leaf Butter	L.	Buttercup
Epigaea	repens	Ericaceae	Trailing Arbutus	L.	Heath
Malus	coronaria	Rosaceae	Wild Sweet Crabap	(L.)Mill.	Rose
Viburnum	nudum	Caprifoliaceae	Possum Haw	L.	Honeysuckle
Mitchella	repens	Rubiaceae	Partridge Berry	L.	Bedstraw
Chimaphila	maculata	Ericaceae	Striped Pipsissewa	(L.)Pursh.	Heath
Stellaria	pubera	Caryophyllaceae	Star Chickweed	Michx.	Pink
Arabis	laevigata	Brassicaceae	Smooth Rock Cress	(Willd.)Poir.	Mustard
Alliaria	petiolata (officinalis	Brassicaceae	Garlic Mustard	(Bieb.)C.&G.	Mustard
Barbarea	verna	Brassicaceae	Early Winter Cress	(Mill.)Aschers.	Mustard
Barbarea	vulgaris	Brassicaceae	Yellow Rocket	R. Br.	Mustard
Draba (Erophila)	verna	Brassicaceae	Whitlow Grass	L.	Mustard
Muscari	atlanticum (racemo	Liliaceae	Wild Hyacinth	Boiss. & Reuter	Lily
*Andropogon	gerardii	Poaceae	Big Bluestem Grass	Vitman	Grass
Arthraxon	hispidus	Poaceae	Arthraxon	(Thunb.)Makino	Grass
*Baccharis	halimifolia	Asteraceae	Groundsel Tree	L.	Aster
Carex	vulpinoidea (annect	Cyperaceae	Foxtail Like Sedge	Michx.	Sedge
*Carex	lupulina (lupulifor	Cyperaceae	Hop-Like Grass	Muhl.ex Schk. in	Sedge
Ceratophyllum	demersum	Ceratophyllaceae	Coontail	L.	Hornwort
*Diodia	virginiana	Rubiaceae	Large Buttonweed	L.	Bedstraw
*Echinochloa	walteri	Poaceae	Walter's Millet	(Pursh)Heller	Grass
*Juncus	canadensis	Juncaceae	Canadian Rush	J. Gay ex Laharpe	Rush
*Lemna	minor	Lemnaceae	Lesser Duckweed	L.	Duckweek
*Murdannia (Aneil	keisak	Commelinaceae	Marsh Dayflower	(Hasskk.)Hand.-Ma	Spiderwort
*Potamogeton	crispus	Potamogetonaceae	Curly Pondweed	L.	Pondweed
*Rubus	laciniatus	Rosaceae	Cut Leaved Blackb	Willd.	Rose
*Rumex	verticillatus	Polygonaceae	Swamp Dock	L.	Smartweed
*Schoenoplectus (S	novae-angliae	Cyperaceae	Bulrush	(Britton)Strong	Sedge
*Scirpus	fluviatilis	Cyperaceae	River Bulrush	(Torr.)Gray	Sedge
*Scirpus	georgianus?	Cyperaceae	Bulrush	Harper	Sedge
*Spirodela	polyrhiza	Lemnaceae	Duckweed	(L.)Schleiden	Duckweek
*Sporobolus	vaginiflorus	Poaceae	Annual Dropseed	(Torr.)Wood	Grass
*Utricularia	gibba	Lentibulariaceae	Humped Bladderw	Walt.	Bladderwort
*Valisneria	americana	Hydrocharitaceae	Eelgrass	Michx.	Frog Bit
Hedera	helix	Arailiaceae	Ivy	L.	Ginseng
*Passiflora	lutea	Passifloraceae	Yellow Passion Flo	L.	Passion Flower
Amelanchier	arborea	Rosaceae	Downy Shadbush	(Michx.)Fern.	Rose
Cardamine	rhomboidea (bulbos	Brassicaceae	Spring Cress	(Schreber)BSP.	Mustard
Chaerophyllum	tainturieri	Apiaceae	Wild Chervil	Hooker	Parsley
Corydalis	flavula	Fumariaceae	Yellow Corydalis	(Raf.)DC	Bleeding Heart
Ranunculus	hispidus	Ranunculaceae	Hairy Buttercup	Michx.	Buttercup
Viola	sagittata (fimbriatul	Violaceae	Arrow Leaved Viol	Ait.	Violet
Erodium	cicutarium	Geraniaceae	Heron's Bill Gerani	(L.)L'Her	Geranium
Lysimachia	nummularia	Primulaceae	Moneywort	L.	Primrose

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Malus	pumila	Rosaceae	Apple Tree	Mill.	Rose
Perilla	frutescens	Lamiaceae	Beefsteak Plant	(L.)Britt.	Mint
Veronica	persica	Scrophulariaceae	Bird's Eye Speedwe	Poir.	Snapdragon
Ranunculus	pusillus	Ranunculaceae	Low Spearwort	Poir.	Buttercup
Cerastium	arvense	Caryophyllaceae	Field Chickweed	L.	Pink
*Berteroa	incana	Brassicaceae	Hoary Alyssum	(L.)DC	Mustard
Leucothoe	racemosa	Ericaceae	Fetterbush	(L.)Gray	Heath
Polygonatum	biflorum	Liliaceae	Smooth Solomon S	(Walter)Ell.	Lily
Galium	aparine	Rubiaceae	Cleavers	L.	Bedstraw
Valerianella	olitoria (locusta)	Valerianaceae	Blue Cornsalad	(L.)Poll	Valerian
Valerianella	chenopodifolia	Valerianaceae	White Cornsalad	(Pursh)DC	Valerian
Ranunculus	septentrionalis	Ranunculaceae	Swamp Buttercup	Poir.	Buttercup
Ranunculus	recurvatus	Ranunculaceae	Hooked Crowfoot	Poir.	Buttercup
Lithospermum	arvense	Boraginaceae	Corn Gromwell	L.	Borage
Duchesnea	indica	Rosaceae	Indian Strawberry	(Andrz.)Focke	Rose
Ranunculus	bulbosus	Ranunculaceae	Bulbous Buttercup	L.	Buttercup
Botrychium	virginianum	Ophioglossaceae	Rattlesnake Fern	(L.)Swartz	Adder's Tongue
Viola	primulifolia	Violaceae	Primrose Leaved Vi	L.	Violet
Myriophyllum	spicatum (exalbesce	Haloragaceae	Eurasian Watermilf	L.	Water Milfoil
Vicia	tetrasperma	Fabaceae	Slender Vetch	(L.)Moench	Pea
Salix	sericea	Salicaceae	Silky Willow	Marsh.	Willow
Dactylis	glomerata	Poaceae	Orchard Grass	L.	Grass
Festuca	elatior (arundinacea	Poaceae	Tall Fescue	L.	Grass
Anthoxanthum	odoratum	Poaceae	Sweet Vernal Grass	L.	Grass
Poa	pratensis	Poaceae	Kentucky Blue Gra	L.	Grass
Poa	compressa	Poaceae	Canadian Blue Gra	L.	Grass
*Lysimachia	quadrifolia	Primulaceae	Whorled Loosestrif	L.	Primrose
Equisetum	arvense	Equisetaceae	Field Horsetail	L.	Horsetail
Juncus	tenuis	Juncaceae	Path Rush	Willd.	Rush
Lepidium	campestre	Brassicaceae	Field Peppergrass	(L.)R.Br.	Mustard
Lepidium	virginicum	Brassicaceae	Wild Peppergrass	L.	Mustard
Luzula	echinata	Juncaceae	Sea Urchin Like W	(Small)F.J. Herm.	Rush
*Magnolia	grandiflora	Magnoliaceae	Magnolia	L.	Magnolia
Myosotis	macrosperma	Boraginaceae	White Forget-me-n	Engelm.	Borage
Asparagus	officinalis	Liliaceae	Garden Asparagus	L.	Lily
Lysimachia	terrestris	Primulaceae	Swamp Candles	(L.)B.S.P.	Primrose
Silene	antirrhina	Caryophyllaceae	Sleepy Catchfly	L.	Pink
Plantago	virginica	Plantaginaceae	Dwarf Plantain	L.	Plantain
Holcus	lanatus	Poaceae	Velvet Grass	L.	Grass
Coronilla	varia	Fabaceae	Crown Vetch	L.	Pea
*Eleocharis	palustris (macrostac	Cyperaceae	Marsh Spikerush	(L.) R&S	Sedge
Eleocharis	engelmannii	Cyperaceae	Engelmann's Spiker	Steud.	Sedge
Carex	rosea	Cyperaceae	Rose Like Sedge	Schk.	Sedge
*Carex	bromoides	Cyperaceae	Bromus Like Sedge	Willd.	Sedge
Carex	stricta (walteriana)	Cyperaceae	Erect Sedge. Tusso	Lam.	Sedge
Glyceria	striata	Poaceae	Fowl Mana Grass	(Lam.)Hitchc.	Grass
Hydrocotyle	ranunculoides	Apiaceae	Floating Water Pen	L.F.	Parsley
Lyonia	ligustrina	Ericaceae	Maleberry	(L.)DC	Heath
Convolvulus	arvensis	Convolvulaceae	Field Bindweed	L.	Morning Glory

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Calystegia	sepium	Convolvulaceae	Hedge Bindweed	(L.)R.Br.	Morning Glory
Asclepias	tuberosa	Asclepiadaceae	Butterfly Weed	L.	Milkweed
Acer	saccharinum	Aceraceae	Silver Maple	L.	Maple
*Scutellaria	galericulata (epilobi	Lamiaceae	Marsh Skullcap	L.	Mint
Penstemon	digitalis	Scrophulariaceae	White Beardtongue	Nutt.	Snapdragon
Euphorbia	maculata (supina)	Euphorbiaceae	Spotted Spurge	L.	Spurge
*Senecio	pauperculus	Asteraceae	Balsam Ragwort	Michx.	Aster
Thalictrum	pubescens (polyga	Ranunculaceae	Tall Meadow Rue	Pursh.	Buttercup
Erigeron (Conyza)	canadensis	Asteraceae	Horseweed	L.	Aster
Houstonia (Hedyoti	purpurea	Rubiaceae	Large Leaf Housto	L.	Bedstraw
Lespedeza	hirta	Fabaceae	Hairy Bush Clover	(L.)Hornem.	Pea
Galium	palustre	Rubiaceae	Marsh Bedstraw	L.	Bedstraw
Pycnanthemum	tenuifolium	Lamiaceae	Narrow Leaf Moun	Schrader	Mint
Scutellaria	incana	Lamiaceae	Downy Skullcap	Biehl.	Mint
Gnaphalium	purpureum	Asteraceae	Cudweed	L.	Aster
*Hordeum	jubatum	Poaceae	Squirreltail Grass	L.	Grass
Hordeum	pussilum	Poaceae	Little Barley	L.	Grass
Setaria	geniculata	Poaceae	Bent Foxtail	(Lam.)Beauv.	Grass
Sorghum	halepense	Poaceae	Johnson Grass	(L.)Pers.	Grass
Setaria	viridis	Poaceae	Green Foxtail	(L.)Beauv.	Grass
Lolium	perenne	Poaceae	Italian Rye Grass	L.	Grass
Elytrigia (Agropyro	repens	Poaceae	Quack Grass	(L.)Nevski	Grass
Eleusine	indica	Poaceae	Goose Grass, Crab	(L.)Gaertn.	Grass
*Eragrostis	pectinacea	Poaceae	Carolina Love Gras	(Michx.)Nees	Grass
Poa	annua	Poaceae	Annual Blue Grass	L.	Grass
Rudbeckia	laciniata	Asteraceae	Tall Coneflower	L.	Aster
Ruellia	caroliniensis	Acanthaceae	Hairy Ruellia	(Gmelin)Steudel	Acanthus
Tragopogon	dubius	Asteraceae	Yellow Goatsbeard	Scopoli	Aster
Cynodon	dactylon	Poaceae	Bermuda Grass	(L.)Pers.	Grass
Sabatia	angularis	Gentianaceae	Rose Pink	(L.)Pursh.	Gentian
Sabatia	dodecandra	Gentianaceae	Large Marsh Pink	(L.)B.S.P.	Gentian
*Spiranthes	cernua	Orchidaceae	Nodding Ladies Tre	(L.)L.C. Rich.	Orchid
Helenium	flexuosum (nudiflor	Asteraceae	Purple Headed Sne	Raf.	Aster
Cicuta	maculata	Apiaceae	Water Hemlock	L.	Parsley
Polygonum	cuspidatum	Polygonaceae	Japanese Knotweed	Siebold & Zucc.	Smartweed
*Najas	minor	Najadaceae	Small Naiad	Allioni	Naiad
Penthorum	sedoides	Crassulaceae	Ditch Stonecrop	L.	Sedum
Mimulus	alatus	Scrophulariaceae	Winged Monkey Fl	Ait.	Snapdragon
Xanthium	strumarium	Asteraceae	Cocklebur	L.	Aster
Amaranthus (Acnid	cannabinus (a)	Amaranthaceae	Water Hemp	(L.)J.D. Sauer.	Amaryllis
Cassia	hebecarpa	Fabaceae	Wild Senna	Fern.	Pea
Scutellaria	lateriflora	Lamiaceae	Mad_Dog Skullcap	L.	Mint
Lespedeza	procumbens	Fabaceae	Trailing Bush Clov	Michx.	Pea
Lobelia	inflata	Campanulaceae	Indian Tobacco	L.	Bluebell
Hieracium	gronovii	Asteraceae	Hairy Hawkweed	L.	Aster
Euphorbia	corollata	Euphorbiaceae	Flowering Spurge	L.	Spurge
Solidago	nemoralis	Asteraceae	Gray Goldenrod	Ait.	Aster
*Linum	intercursum	Linaceae	Flax	Bickn.	Flax
Lobelia	puberula	Campanulaceae	Downy Lobelia	Michx.	Bluebell

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Quercus	marilandica	Fagaceae	Blackjack Oak	Muenchh.	Beech
Clematis	virginiana	Ranunculaceae	Virgin's Bower	L.	Buttercup
Strophostyles	umbellata	Fabaceae	Pink Wild Bean	(Willd.)Britton	Pea
Ageratina (Eupatori	rugosum	Asteraceae	White Snakeroot	(L.)K&R	Aster
Asplenium	platyneuron	Polypodiaceae	Ebony Spleenwort	(L.)B.S.P.	Fern
Thelypteris	noveboracensis	Polypodiaceae	New York Fern	(L.)Nieuw.	Fern
Lespedeza	bicolor	Fabaceae	Bicolor Bushclover	Turcz.	Pea
Gaura	biennis	Onagraceae	Biennial Gaura	L.	Evening Primrose
Desmodium	paniculatum	Fabaceae	Lance Leaf Tick Tr	(L.)DC	Pea
Cerastium	fontanum (vulgatu	Caryophyllaceae	Mouse Ear Chickw	Baumg.	Pink
*Proserpinaca	palustris	Haloragaceae	Mermaid Weed	L.	Water Milfoil
Fragaria	virginiana	Rosaceae	Wild Strawberry	Duch.	Rose
Hemerocallis	fulva	Liliaceae	Orange Daylily	(L.)L.	Lily
Menispermum	canadensis	Menispermaceae	Canadian Moonsee	L.	Moonseed
Vicia	sativa (angustifolia)	Fabaceae	Narrow Leaved Vet	L.	Pea
Monarda	punctata	Lamiaceae	Common Horse Mi	L.	Mint
Polygonum	scandens	Polygonaceae	Climbing False Buc	L.	Smartweed
Bidens	polylepis	Asteraceae	Many Bract Tickse	Blake	Aster
*Hydrocotyle	verticillata	Apiaceae	Whorled Water Pen	Thunb.	Parsley
Erchtites	hieracifolia	Asteraceae	Pilewort, Fireweed	(L.)Raf.	Aster
Acalypha	rhomboidea	Euphorbiaceae	Three Seeded Merc	Raf.	Spurge
Polygonum	convolvulus	Polygonaceae	Black Bindweed	L.	Smartweed
Solanum	ptycanthum(nigrum	Solanaceae	Black Nightshade	DC	Night Shade
Datura	stramonium	Solanaceae	Jimsonweed	L.	Night Shade
Chenopodium	album	Chenopodiaceae	Pigweed	L.	Goosefoot
Physalis	sp.	Solanaceae	Ground Cherry		Night Shade
***Bidens	mitis	Asteraceae	Narrow Leaf Ticks	(Michx.)Sherff	Aster
Kickxia	elatine	Scrophulariaceae	Canker Root	(L.) Dumort.	Snapdragon
*Cyperus	bipartitus	Cyperaceae	Shinning Cyperus	Torr.	Sedge
*Cyperus	brevifolius	Cyperaceae	Short Leaved Cyper	(Rottb.)Hassk.	Sedge
*Cyperus	retrofractus	Cyperaceae	Turned Back Cyper	(L.)Torr.	Sedge
*Cyperus	lancastriensis	Cyperaceae	Lancaster's Cyperus	Gray	Sedge
Juncus	marginatus	Juncaceae	Margined Rush	Rostk.	Rush
*Eleocharis	parvula	Cyperaceae	Small Spikerush	(R. & S.) Link	Sedge
*Cyperus	retrorsus	Cyperaceae	Slender Sedge	Chapm.	Sedge
Cuphea	viscosissima (petiol	Lythraceae	Clammy Cuphea	Jacquin	Loosestrife
*Limnobium	spongia	Hydrocharitaceae	American Frog Bits	(Bosc)Steudel	Frog Bit
*Heterantha	reniformis	Pontederiaceae	Mud Plantain	R. & P.	Pickerel Weed
Rhododendron	peridymenoides	Ericaceae	Pixter Azalea	(Michx.)Shinners	Heath
Vaccinium	stamineum	Ericaceae	Deerberry	L.	Heath
Chaerophyllum	procumbens	Apiaceae	Spreading Chervil	(L.)Crantz	Parsley
Athyrium	asplenioides	Polypodiaceae	Southern Lady Fern	A. Eaton	Fern
Geranium	dissectum	Geraniaceae	Cut Leaf Cranesbill	L.	Geranium
Krigia	dandelion	Asteraceae	Potato Dandelion	(L.)Nutt.	Aster
Anthemis	arvensis	Asteraceae	Field Chamomile	L.	Aster
Camelina	microcarpa	Brassicaceae	Small Fruited False	Andrz.	Mustard
Hieracium	caespitosum (praten	Asteraceae	Field Hawkweed	Dumort	Aster
Hieracium	venosum	Asteraceae	Rattlesnake Hawk	L.	Aster
*Rumex	hastatulus	Polygonaceae	Wild Sorrel	Ell.	Smartweed

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Senecio	anonymus (smallii)	Asteraceae	Small's Ragwort	Wood	Aster
Rosa	sp.	Rosaceae	White Rose?		Rose
Rosa	wichuraiana	Rosaceae	Memorial Rose	Crepin	Rose
*Chondrilla	juncea	Asteraceae	Skeleton Weed, Gu	L.	Aster
Pyrus	communis	Rosaceae	Common Pear	L.	Rose
Cardamine	hirsuta	Brassicaceae	Hairy Bitter Cress	L.	Mustard
*Narcissus	tazetta x poeticus	Amaryllidaceae	Pheasant's Eye x Pa		Amaryllis
*Narcissus	incomparabilis	Amaryllidaceae	Daffodil	Mill.	Amaryllis
Viola	papillionacea (soror	Violaceae	Common Blue Viol	Pursh	Violet
Crateagus	phaenopyrum	Rosaceae	Washington Thorn	(L.f.)Medic.	Rose
Arabidopsis	thaliana	Brassicaceae	Mouse Ear Cress	(L.)Heynh.	Mustard
Prunus	americana	Rosaceae	American Wild Plu	Marsh.	Rose
Luzula	multiflora \ bulbosa	Juncaceae	Woodrush	(Reitz.)Lej.	Rush
Callictriche	heterophylla	Callitrichaceae	Large Water Starw	Pursh	Water Starwort
*Hydrocotyle	umbellata	Apiaceae	Water Pennywort	L.	Parsley
Erigeron	annuus	Asteraceae	Daisy Fleabane	(L.)Pers.	Aster
*Hypochoeris	radicata	Asteraceae	Cat's Ear	L.	Aster
Viburnum	recognitum	Caprifoliaceae	Northern Arrowwo	Ait.	Honeysuckle
Eleocharis	tenuis	Cyperaceae	Dog Hair	(Willd.)Schultes	Sedge
Carex	uberior	Cyperaceae			Sedge
Trifolium	hybridum	Fabaceae	Alsike Clover	L.	Pea
Sisyrinchium	mucronatum	Iridaceae	Slender Blue Eyed	Michx.	Iris
Oenothera	biennis	Onagraceae	Common Evening	L.	Evening Primrose
Oxalis	grandis	Oxaldaceae	Great Wood Sorrel	Small	Wood Sorrel
*Rumex	altissimus	Polygonaceae	Water Dock	Wood	Smartweed
Athyrium	filix-femina	Polypodiaceae	Lady Fern	(L.)Roth.	Fern
Philadelphus	coronarius	Saxifragaceae	Mock Orange	L.	Saxifrage
Veronica	arvensis	Scrophulariaceae	Corn Speedwell	L.	Snapdragon
Veronica	serphyllifolia	Scrophulariaceae	Thyme Leaf Speed	L.	Snapdragon
Cornus	florida (rubra)	Cornaceae	Pink Dogwood		Dogwood
*Scleranthus	annuus	Caryophyllaceae	Knawel	L.	Pink
**Nemophila	menzenseis	Hydrophyllaceae	Baby Blue Eyes		Waterleaf
Tusuga	canadensis	Pinaceae	Canadian Hemlock	(L.)Carr.	Pine
Claytonia	virginica	Portulaceae	Spring Beauty	L.	Purslane
Potentilla	recta	Rosaceae	Dwarf Cinquefoil	L.	Rose
Scirpus	maritimus	Cyperaceae	Alkali Bulrush	L.	Sedge
*Cerastium	semidecandrum	Caryophyllaceae		L.	Pink
*Scutellaria	nervosa	Lamiaceae	Veined Skullcap	(Pursh.)	Mint
Prunus	cerasus	Rosaceae	Sour Cherry	L.	Rose
Rubus	flagellaris	Rosaceae	Northern Dewberry	Willd.	Rose
Rubus	trivialis	Rosaceae	Coastal Plain Dewb	Michx.	Rose
*Polygonum	hydropiperoides	Polygonaceae	False Water Peper	Michx.	Smartweed
Carduus	nutans	Asteraceae	Musk Thistle	L.	Aster
Taraxacum	erythrospermum	Asteraceae	Red Seeded Dandel	Andrz.	Aster
Cyperus	lupulinus	Cyperaceae		(Spreng.)Marcks	Sedge
Quercus	rubra	Fagaceae	Red Oak	L.	Beech
Hypericum	perforatum	Hypericaceae	Common St. Johns	L.	St. Johnswort
Utricularia	vulgariis	Lentibulariaceae	Common Bladderw	L.	Bladderwort
Floerkea	proserpinacoides	Limnanthaceae	False Mermaid	Willd.	False Mermaid

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Passiflora	incarnata	Passifloraceae	Passion Flower	L.	Passion Flower
Prunus	virginiana	Rosaceae	Choke Cherry	L.	Rose
Rubus	laciniatus	Rosaceae	Cut Leaf Blackberr	Willd.	Rose
Ribus	rotundifolium	Saxifragaceae	Gooseberry	Michx.	Saxifrage
*Hedeoma	hispidum	Lamiaceae	Rough Pennyroyal	Pursh.	Mint
*Habenaria	lacera	Orchidaceae	Green Ragged Frin	(Michx.) Lodd.	Orchid
*Catalpa	bignonioides	Bignoniaceae	Common Catalpa	Walt.	Bignonia
Bulbostylis	capillaris	Cyperaceae	Hair Like Sedge	(L.)C.B. Clarke	Sedge
Cynanchum (Ampe	laeve (albidus)	Asclepiadaceae	Sandvine	(Nutt.)Britt.	Milkweed
Habenaria	clavellata	Orchidaceae	Club Spur Orchid	(Michx.)Spreng.	Orchid
Asclepias	amplexicaulis	Asclepiadaceae	Blunt Leaf Milkwe	Sm.	Milkweed
Cirsium	pumilium	Asteraceae	Pasture Thistle	(Nutt.)Sprengel	Aster
*Gaillardia	pulchella	Asteraceae	Gaillardia, Fire Whe	Foug.	Aster
*Coreopsis	basilis	Asteraceae	Red eye Coreopsis	(Dietr.)Blake	Aster
Arctium	lappa	Asteraceae	Great Burdock	L.	Aster
**Cosmos	sp.	Asteraceae	Cosmos		Aster
**Delphinium	tricore	Ranunculaceae	Double Larkspur	Michx.	Buttercup
**Monarda	sp.	Laminaceae	Bergamot		Mint
Hypericum	gentianoides	Hypericaceae	Orange Grass	(L.)B.S.P.	St. Johnswort
Spiranthes	gracilis	Orchidaceae	Slender Ladies Tres	(Bigel.)Beck.	Orchid
Juglans	nigra	Juglandaceae	Black Walnut	L.	Walnut
*Commelina	erecta	Commelinaceae	Dayflower	L.	Spiderwort
Linum	virgnanum	Linaceae	Wild Yellow Flax	L.	Flax
*Nymphaea	odorata	Nymphaeaceae	Fragrant Waterlily	Ait.	Water Lily
Lycium	halimifolium	Solanaceae	Matrimonyvine	Mill.	Night Shade
Erianthus	contortus	Poaceae	Contorted Plume G	Ell.	Grass
Phlox	paniculata	Polemoniaceae	Summer Phlox	L.	Phlox
Hypericum	prolificum (spatulat	Hypericaceae	Shrubby St. Johnsw	L.	St. Johnswort
Acer	rubrum var. triloba	Aceraceae	Three Lobed Red		Maple
Myrica	cerifera	Myricaceae	Southern Bayberry	L.	Wax Myrtle
Andropogon	gyrans (elliottii)	Poaceae	Elliott's Broomsedg	Ashe	Grass
Andropogon	ternarius	Poaceae	Splitbeard Broomse	Michx.	Grass
Echinocystis	lobata	Cucurbitaceae	Wild Cucumber, Ba	(Michx.)T.&G.	Gourd
Smilax	glauca	Liliaceae	Glaucous Leaf Gree	Walt.	Lily
Morus	alba	Moraceae	White Mulberry	L.	Mulberry
Polygonum	hydropiper	Polygonaceae	Water Pepper	L.	Smartweed
Quercus	catesbaei	Fagaceae	Turkey Oak		Beech
Quercus	ilicifolia	Fagaceae	Bear Oak	Wang.	Beech
Quercus	lyrata	Fagaceae	Overcup Oak	Walt.	Beech
Quercus	nigra	Fagaceae	Water Oak	L.	Beech
*Coronilla	juncea	Fabaceae	Crown Vetch?????		Pea
*Nymphoides	cordata	Gentianaceae	Little Floating Hear	(Ell.)Fern.	Gentian
*Chasmanthium (U	laxum (laxa)	Poaceae	Tuffted Wild Oats	(L.)Yates	Grass
Ornithogalum	umbellatum	Liliaceae	Star of Bethlehem	L.	Lily
Ranunculus	sceleratus	Ranunculaceae	Cursed Crowfoot	L.	Buttercup
Mollugo	verticillata	Aizoaceae	Carpet Weed	L.	Carpet Weed
*Wolffia	sp.	Lemnaceae	Water Meal		Duckweek
Riccia	fluitans	Ricciaceae	Riccia		
Spiranthes	vernalis	Orchidaceae	Grass Leaf Ladies	Engelm. & Gray	Orchid

GENUS	SPECIES	FAMILY	COMMON_NAM	AUTHOR	COM_FAM
Abutilon	theohrasti	Malvaceae	Velvet Leaf		
Malva	neglecta	Malvaceae	Common Mallow		
Osmunda	cinnamomea	Osmndaceae	Cinnamon Fern		
Bromus	commutatus	Poaceae	Hairy Chess	Schrader	
Sorghastrum	nutans	Poaceae	Indian Grass		
Schizachyrium (An	scoparium	Poaceae	Little Bluestem	(Michx.) Nash.	
*Pluchea	odorata (purpurasce	Asteraceae	Annual Marsh Flea	(L.) Cass.	Aster

Appendix K Office of Fisheries Assistance Report

MEMORANDUM

To: Pam Rooney Date: September 30, 1997

From: Gary Swihart

Subj: Woodbridge Refuge Plan

Pam, sorry but I will not be able to attend the meeting on Oct. 6 and 7 - I will be at a Fisheries Project Leaders' Meeting. Here are my thoughts on the Woodbridge Refuge Plan.

During the week of August 11-15,, 1997 I conducted a fisheries survey in tidal waters on and adjacent to the Refuge to develop base line data on fishes using the habitat. Nine (9) sampling stations were established on or around Neabsco Creek, Farm Creek, Occoquan Bay, Marumsco Creek, South Creek, Refuge Creek, and bay area at the confluence of South, Refuge and North Creeks. North Creek could not be surveyed due to abundant vegetation (see maps).

Results from the surveys (Table 1) indicate that the tidal marshes are important nursery habitat for freshwater, estuarine and marine fish species. Additionally, the waters are populated with many species that can contribute to a high quality recreational sport fishery.

The small freshwater pond (Stratcon Lake) at the Woodbridge Facilities has received fishery management guidance from my office when the pond was under the control of Adelphi Laboratory Center. Please see copies of letters dated July 15, 1992 and July 21, 1994.

The shallow water habitat plus the abundance of fishes using this habitat should provide excellent feeding areas for shore birds. An abundance of submerged aquatic vegetation (SAV) throughout the area provides excellent cover/attraction for the fishes.

It is my understanding that future plans for the development of the Refuge will incorporate shoreline access for fishing. I suggest an accessible fishing pier (at a site yet to be determined) be considered. A pier will be required to reach the deeper water and provide a much greater chance of bringing anglers and fish into contact with each other. Currently most public fishing in Refuge waters must be done from boats. Very limited public access (I think) is available on the upper reaches of Marumsco Creek.

Protection of all marsh habitat from degradation, i.e. siltation, contaminants, etc. should be of the highest priority.

If you have specific questions about fish, aquatic habitat, people use of, etc. please let me know. I'll be back in the office the week of October 20th. A Fishery Management Plan (FMP) for Mason Neck NWR is being developed and will be provided to the Refuge when completed.

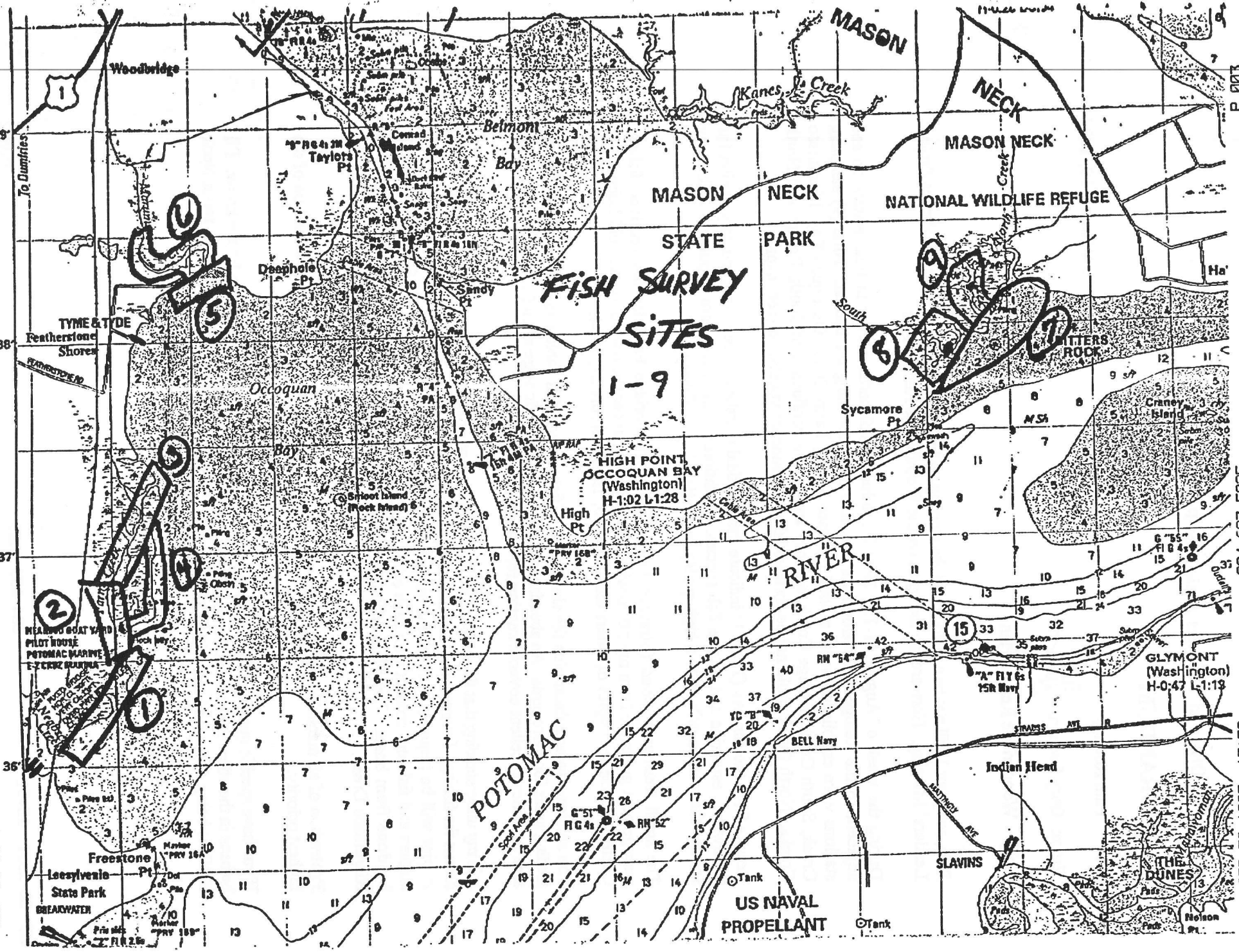

Table 1. Fish Species collected during the survey of the waters around Mason Neck National Wildlife Refuge - August 12 to 18, 1997. Fish were sampled using an electrofishing boat.

ANGUILLIDAE	American Eel	*Anguilla rostrata*
ATHERINIDAE	Inland Silverside	*Menidia beryllina*
CATOSTOMIDAE	Creek Chubsucker	*Erimyzon oblongus*
CENTRARCHIDAE	Bluegill	*Lepomis macrochirus*
	Pumpkinseed	*Lepomis gibbosus*
	Largemouth Bass	*Micropterus salmoides*
CLUPEIDAE	Alewife	*Alosa pseudoharengus*
	Blueback Herring	*Alosa aestivalis*
	Gizzard Shad	*Dorosoma cepedianum*
CYPRINIDAE	Eastern Silvery Minnow	*Hybognathus regius*
	Golden Shiner	*Notemigonus crysoleucas*
	Spottail Shiner	*Notropis hudsonius*
	Common Carp	*Cyprinus carpio*
	Goldfish	*Carassius auratus*
ENGRAULIDAE	Bay Anchovy	*Anchoa mitchilli*
FUNDULIDAE	Mummichog	*Fundulus heteroclitus*
	Banded Killifish	*Fundulus diaphanus*
ICTALURIDAE	Channel Catfish	*Ictalurus punctatus*
	Brown Bullhead	*Ameiurus nebulosus*
	White Catfish	*Ameiurus catus*
LEPISOSTEIDAE	Longnosed Gar	*Lepisosteus osseus*
MORONIDAE	Striped Bass	*Morone saxatilis*
	White Perch	*Morone americana*
PERCIDAE	Tessellated Darter	*Etheostoma olmstedi*
	Yellow Perch	*Perca flavescens*
SCIAENIDAE	Spot	*Leiostomus xanthurus*

United States Department of the Interior

FISH AND WILDLIFE SERVICE
OFFICE OF FISH AND WILDLIFE MANAGEMENT
MID-COUNTY CENTRE, U.S. ROUTE 17
P.O. BOX 480
WHITE MARSH, VA 23183

July 15, 1992

Mr. Ray Roudebush
Chief, Facilities Engineering
Adelphi Laboratory Center
ATTN: ~~SLCHD-SD-F~~ AMSRL-OP-SD-FE
2800 Powder Mill Road
Adelphi, MD 20783

Dear Mr. Roudebush:

An electro-fishing survey was conducted in Facility Pond at the Woodbridge site on July 8, 1992, at the request of Mr. Bob Wardwell. The purpose of the survey was to evaluate the overall condition of the fish population, but primarily to determine if the channel catfish program has been successful and to monitor the development of the largemouth bass population. Following is a brief overview of how I see your fishing program developing.

The results from the survey were very encouraging. Four channel catfish (12-14 inches) were collected during approximately one hour of sampling. While four catfish may not seem like much to get excited about, it does indicate that the fingerling stockings made over the past years have been successful. Because the pond is relatively deep and the catfish are a bottom dwelling species, it takes some luck to be able to shock them up to the surface. The four catfish collected were not the only catfish in the pond. Mr. Harold Allen stated that several large (7-9 pounds) catfish have recently been caught from the pond. The current schedule for stocking channel catfish fingerlings in the fall will continue through October 1992. Future stockings may not be needed if annual surveys indicate that natural reproduction is occurring. It is questionable if the catfish feeding program has contributed to the overall fishery program. I would suggest that the feed you have on hand be fed and then discontinue the feeding program.

The largemouth bass population is developing very well. A total of 11 bass were collected with eight specimens between 14.5 and 19 inches. Reproduction and survival of the bass fry is good. Another indication of a good bass population is the decline in the abundance of the bluegill, white perch and gizzard shad. In past years these species were very abundant. Neither the bluegill nor the white perch were growing large enough to be of interest to the fishermen. However, during the July survey

numerous 7-8.5 inch bluegills were collected along with several 7-9 inch white perch. No gizzard shad were collected and they may have been eliminated from the pond due to the increase in the number of large bass and large channel catfish.

To maintain what now appears to be a balanced fish population capable of providing an excellent fishing experience will require the cooperation of the fishermen. The largemouth bass fishery should be managed as a catch-and-release program. It is vital to the success of any recreational fishing program to maintain a large number of predator species (largemouth bass) to control the numbers of the more numerous and more prolific prey species (bluegill, white perch, gizzard shad, etc.). Without the control, the prey species soon overpopulate, become stunted and will interfere with the spawning success of the bass. In the future we may experience a problem of having too many bass in the pond and not enough forage to maintain their growth. It is possible for the bass to deplete their food supply. If this should appear to be occurring, then a limited harvest of bass would be needed to bring the fish population into balance.

The water control structure is in need of repair or replacement as it is leaking. An additional 1-2 feet of water in the pond would benefit the survival of the small fish by providing areas around the perimeter of the pond where the fish could find cover to hide and not be vulnerable to being eaten.

If you desire my assistance to help manage your fishing program in future years, we need to consider having your funding document (DD Form 448) implemented early in FY-93. This timeframe will enable me to allocate time for a field visit. A fee of $1750 will be required.

Please convey my appreciation to Mr. Wardwell and to the able and enthusiastic group of helpers he had available during the survey of the pond. If I can be of further assistance, please call.

Sincerely,

Gary L. Swihart
Project Leader
(804) 693-7118

DEPARTMENT OF THE ARMY
U.S. ARMY RESEARCH LABORATORY
2800 POWDER MILL ROAD
ADELPHI, MARYLAND 20783-1145

REPLY TO
THE ATTENTION OF
Public Works Division

July 21, 1994

Dear ALC/Woodbridge Research Facility Fishing Permit Holder:

Your participation and interest in the fishing program at the Woodbridge Research Facility is greatly appreciated. I would like to take this opportunity to inform you of some recent developments that could affect the fishing program at the facility.

Recently, an electroshocking survey of the pond was conducted by Fisheries Biologists from the US Fish and Wildlife Service. This survey is conducted every other year and is designed to evaluate both the status of the fish resource and water quality. In general, the results were encouraging with abundant and healthy bluegill and white perch collected. Good water quality was also recorded.

Largemouth Bass reproduction, as evidenced by the large amount of fry seen, was very promising. However, there was one surprising result in regards to the fish. Specifically, the adults collected were significantly smaller and less abundant than would be expected given the policy of catch and release only for these fish. Many factors could account for this including inability to adequately shock the fish or fish moving away from the electrode suspended in the water. Five of the Largemouth Bass collected were measured, weighed and tagged with yellow markers and another survey will be conducted in the fall in order to further evaluate growth patterns and health.

I ask your continued cooperation in the catch and release program for Largemouth Bass and especially request that you return any tagged fish immediately to the water in order to minimize their stress and assure their survival.

If you have any questions concerning this information or the natural resources program at Woodbridge, please feel free to contact Bob Wardwell at (301) 394-1060.

FOR THE DIRECTOR:

Sincerely,

Ray Roudebush
Chief
Public Works Division

CF:
T. Kines, Installation Manager
G. Swihart, USFWS
WRF Conservation Officers
M. Singleton, Public Affairs Officer

Appendix L List of Preparers

Jeff Underwood, Geographic Associate

Pam Rooney, Regional Planner

Earl Possardt, Wildlife Biologist

Greg Weiler, Refuge Manager

Don Conner, RealtySupervisor

James McPherson, Engineer

Yvonne Schultz, Refuge Outdoor Recreation Planner

Frederick Milton, Refuge Manager

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