



Inventory and Monitoring Plan

Ottawa National Wildlife Refuge Complex



(Clockwise from left) Cedar Point NWR, West Sister Island NWR, and Ottawa NWR.

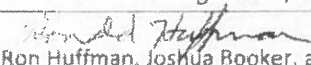
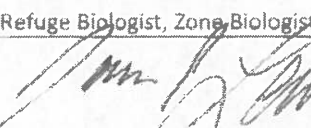
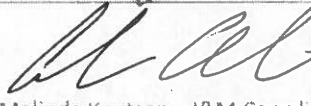
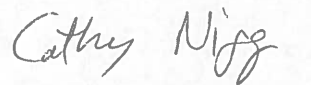
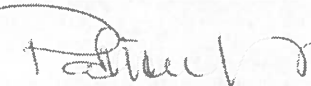
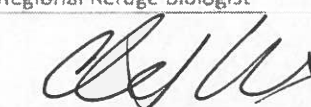
September 2017



Ottawa National Wildlife Refuge Complex

Inventory and Monitoring Plan

Signature Page¹

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¹ Signatures apply to all contents of the IMP.

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Introduction

This Inventory and Monitoring Plan (IMP) documents natural resource surveys that will be conducted at the Ottawa National Wildlife Refuge Complex (Complex) from 2017 through 2032, or until the refuge Habitat Management Plan (HMP) is revised. The majority of surveys considered in this plan address resource management objectives identified in the HMP (2016) for the Complex. Other surveys are a continuation of past monitoring conducted for tracking long-term trends in specific resources or understanding ecological interactions, and are part of cooperative, regional, or national survey efforts. This IMP was developed according to the Inventory and Monitoring (I&M) policy (701 FW 2) for the National Wildlife Refuge System.

The Ottawa Complex is located east of Toledo, Ohio on the southwestern shore of Lake Erie and includes three refuges: West Sister Island National Wildlife Refuge (NWR), Ottawa NWR, and Cedar Point NWR. The three refuges, which together total nearly 10,000 acres, are a diverse mix of forested and shrubland habitats, planted prairie restorations, and lake plain sedge meadows.

Ottawa and Cedar Point NWRs preserve a remnant of the historically vast Lake Erie coastal wetlands, an area formerly known as the Great Black Swamp that was 90% lost to human development and agriculture. The most important role these refuges play in wildlife conservation is providing stopover habitat for migratory birds, particularly songbirds, shorebirds, and waterfowl from both the Mississippi and Atlantic flyways. West Sister Island is home to the largest blue heron and great egret rookery and one of the largest black-crowned night heron rookeries in the U.S. Great Lakes. This plethora of avian diversity led to designation of the Complex as a Globally Important Bird Area by the American Bird Conservancy, an Important Bird Area by Audubon, and a regionally important site for the Western Hemisphere Shorebird Reserve Network.

The Ottawa Complex was established for the following purposes:

West Sister Island National Wildlife Refuge

West Sister Island National Wildlife Refuge was established by Executive Order 7937 on August 2, 1937 "... as a refuge and breeding ground for migratory birds and other wildlife..." and specifically to protect the largest wading bird nesting colony on the U.S. Great Lakes. On January 3, 1975, 77 acres of the 82 acre island were designated as a wilderness, part of the National Wilderness Preservation System (Public Law 93 632).

Ottawa National Wildlife Refuge

Ottawa National Wildlife Refuge was established in 1961 under the authority of the Migratory Bird Conservation Act "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d.

Cedar Point National Wildlife Refuge

Cedar Point National Wildlife Refuge was established in 1964 under the authority of the Migratory Bird Conservation Act "...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. 715d.

Ottawa National Wildlife Refuge Complex

Additional expansion and purposes for the Refuge Complex were established by Public Law 108-23, May 19, 2003, in the “Ottawa National Wildlife Refuge Complex Expansion and Detroit River International Wildlife Refuge Expansion Act.” The law formalized the three Refuges as the Ottawa National Wildlife Refuge Complex. The law specifies that all lands within the Refuge Complex will be administered in accordance with the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd et seq.) and Public Law 108-23. Additional purposes are listed below verbatim from the Act:

(b) ADDITIONAL PURPOSES.—In addition to the purposes of the Refuge Complex under other laws, regulations, Executive orders, and comprehensive conservation plans, the Refuge Complex shall be managed—

(1) To strengthen and complement existing resource management, conservation, and education programs and activities at the Refuge Complex in a manner consistent with the primary purposes of the Refuge Complex—

(A) To provide major resting, feeding, and wintering habitats for migratory birds and other wildlife; and

(B) To enhance national resource conservation and management in the western basin;

(2) In partnership with nongovernmental and private organizations and private individuals dedicated to habitat enhancement, to conserve, enhance, and restore the native aquatic and terrestrial community characteristics of the western basin (including associated fish, wildlife, and plant species);

(3) To facilitate partnerships among the United States Fish and Wildlife Service, Canadian national and provincial authorities, State and local governments, local communities in the United States and Canada, conservation organizations, and other non-Federal entities to promote public awareness of the resources of the western basin; and

(4) To advance the collective goals and priorities that—

(A) Were established in the report entitled “Great Lakes Strategy 2002—A Plan for the New Millennium”, developed by the United States Policy Committee, comprised of Federal agencies (including the United States Fish and Wildlife Service, the National Oceanic and Atmospheric Administration, the United States Geological Survey, the Forest Service, and the Great Lakes Fishery Commission) and State governments and tribal governments in the Great Lakes basin; and

(B) Include the goals of cooperating to protect and restore the chemical, physical, and biological integrity of the Great Lakes basin ecosystem.

The species and natural communities that were identified as priority resources of concern (ROC) in the Ottawa NWR Complex HMP (2016), Table 3-2, are listed in Appendix A.

Methods

Station staff generated a preliminary list of over 50 extant and anticipated surveys by gathering information on current and historic surveys at Ottawa NWRC, cross referencing the objectives and priority resources of concern identified in the Ottawa NWRC HMP, and asking for input from Region 3 Migratory Birds Division, Region 3 Water Resources Branch, and the Ohio Ecological Services Field Office. This extensive list was later refined to exclude general

observations of refuge resources that do not require protocols or data management (reconnaissance). The remaining surveys were then assigned a priority score using 12 pre-defined criteria (Appendix B). Priority scores were used to rank the surveys and are recorded in Appendix C.

Prioritizing and Selecting Surveys

The priority ranking of surveys was conducted during a 2-day workshop at Ottawa NWR on December 7th and 8th, 2016. Refuge staff participating in this process included Ron Huffman (Refuge Wildlife Biologist), Jason Lewis (Refuge Manager), Eddy Pausch (Deputy Refuge Manager), with Joshua Booker (Zone Biologist) leading the workshop. There was also some input from former biotechnicians Kathy Huffman and June Chiu. Background information for each survey was summarized in advance by the Refuge Wildlife Biologist and briefly discussed with other refuge staff while prioritizing the surveys.

After refining the preliminary list down to 29 surveys, the remaining surveys were assigned a priority score using a Simple Multi-Attribute Ranking Technique (SMART tool) developed by the National I&M Coordination Team (Appendix C) and 12 pre-defined criteria (Appendix B).

Estimating Capacity

A cost-benefit analysis (Appendix D) was performed during the 2-day workshop and during a short follow-up meeting on December 14th. The purpose of the analysis was to maximize the value of the selected surveys, given staffing and budget constraints. Selecting only surveys that can be conducted with anticipated resources should lead to high quality surveys; that is, commitment to all components of conducting a survey (planning, administration, implementation, data analysis and archiving, reporting and feedback to management).

In the cost-benefit analysis, the value (i.e., benefit) of a selected survey was estimated from the priority score from the SMART tool ranking process, adjusted for frequency over the life of the IMP. The adjustment helps to identify low frequency surveys with high cost efficiencies (for example, one-time inventories). To determine a cost constraint, the staff responsible for completing natural resource surveys were asked to estimate the portion of their time in a typical year dedicated to activities associated with conducting surveys: data analysis and summary, data management, monitoring, research, and supervision. Ottawa NWRC has a small staff, with only a seasonal biotechnician (if funds allow) and wildlife biologist available to implement surveys. The time dedicated to surveys was estimated in weeks. The time required to implement an annual iteration of a survey was also estimated using past experiences with established protocols or anticipated commitment for protocols that have yet to be developed. The total weeks of time available annually to implement surveys with current staffing is about 25.06 weeks. This estimate is assuming a relatively light management workload (e.g., stable lake levels that require minimal water management, good invasive species response to last year's treatment, etc.).

A high degree of variability is inherent in time estimates within both the estimates of time needed to complete surveys, and the availability of staff time resources. Wildlife biologist time devoted to surveys varies annually depending upon other commitments and station priorities. In

general, conservation delivery actions will take priority over surveys. Biotech availability is station funding dependent, especially with regards to duration of employment, which impacts availability of resources devoted to surveys. Seasonal biotech turnover may occur annually which will decrease availability of time devoted to surveys due to increased training time and time needed to become familiar with the Complex. A biotech's skill set can also have either positive or negative impacts on the amount of time available and efficiency in completing surveys. Finally, other Ottawa NWRC staff (e.g., maintenance, law enforcement) may provide assistance on surveys that is not accounted for in the estimates presented here.

To counteract these uncertainties, survey implementation may be adjusted as needed over the life of this IMP by the following possible actions: 1) adjusting survey implementation year for those surveys occurring less than annually to align biotech skills with survey needs (e.g., schedule Forest Rapid Ecological Assessment during a year with a biotech with a strong forestry and botany background), 2) targeted recruitment of biotech with skill set needed to complete a specific survey, 3) reduction of survey schedules, such as from annually to every other year, 4) reduction of the number of survey samples for a given survey (e.g., complete a subsample of the Great Lakes MMP routes on a rotational basis), 5) cluster less frequent surveys together during years when additional staffing resources are available, and 6) cultivate partnerships and volunteers to assist with surveys.

Later in the IMP development process, after the workshops, three additional surveys that had not come up earlier were identified and considered for selection: Bathymetric survey (Current), Migratory songbird stopover habitat survey (Future), and Pollinator survey (Future). These two Future surveys were not given prioritization scores (and thus do not show up in Appendix C), but the costs were estimated for these surveys. All survey names were updated after the workshop based on national and regional lists of standardized names and available protocols.

Results: Selected Surveys

The process identified 30 surveys to be conducted over the time span of this IMP (Table 1). A final ranking of surveys based upon management information needs was completed by refuge staff, which differs from the SMART tool selection ranking. The SMART tool performed well in ranking broad surveys, but based upon staff selected inputs was lacking in ranking single item surveys that directly drive management actions and decisions such as surveys for Water Level Monitoring, Muskrat house surveys, and White-tailed deer surveys. Surveys are ranked overall at the Complex level, and not at the individual refuge level. Selected surveys include surveys identified for completion with FY2016 levels of staffing and support. The list of surveys selected for implementation represents a commitment to implementation, if staffing remains stable. Box 1 provides rationales for all selected surveys. Changes in HMP objectives or other factors that alter the list of selected surveys through addition or removal of selected surveys will trigger a revision of this IMP (701 FW 2) and updates to the PRIMR database.

Box 1. List of Selected Surveys and Rationale for Selection

Survey Name	Rationale
Water Level Monitoring	Water level information is critical in that it directly informs water level management decisions and actions. Combined with bathymetric data, it allows assessment of meeting HMP habitat goals for the Lake Erie Coastal Wetland Complex. Includes monitoring Lake Erie water level cycles and seiche events to inform water management actions. Informs HMP water level management decision tree (HMP Figure 5.1).
Colonial Waterbird Survey	West Sister Island hosts the largest and most diverse assemblage of colonial waterbirds in the U.S. Great Lakes. The survey allows long term monitoring of the nesting populations, and informs management actions related to keeping double-crested cormorants within habitat carrying capacity, and benefitting black-crowned night herons.
Bathymetric survey	Bathymetric data for all wetland units are required to assess HMP habitat acreage targets for the Lake Erie Coastal Wetland Complex, and allows optimizing water depths to meet habitat requirements for resources of concern.
Muskrat House Survey	Provides annual population index for this keystone species. Population data is used to set annual trapping program units, which keeps populations in balance with habitat conditions. Informs HMP water level management decision tree (HMP Figure 5.1).
Great Lakes Marsh Monitoring Program, Marsh Bird Survey	Provides population data for nesting marsh bird species resources of concern. Data contributes to international Great Lakes assessment of population trends by Bird Studies Canada.
Great Lakes Marsh Monitoring Program, Amphibian Survey	Provides population data for breeding frog species. Data contributes to international Great Lakes assessment of population trends by Bird Studies Canada. Amphibians are sensitive to environmental change and can provide an early warning indicator of environmental issues.
Eastern Prairie Fringed Orchid Inventory and Monitoring	The Complex has the two largest population of this federally threatened species in the state of Ohio. Annual flowering counts and periodic demographic data collection meets HMP habitat and ES goals for monitoring health and long-term viability of the populations.
EDRR Invasive plant mapping	GPS mapping of early invasion species that allows follow up treatment in subsequent years to enable eradication or prevent wide-spread establishment.
Aerial photography for habitat monitoring	Allows periodic (~ 3 year) visual assessment of habitat conditions throughout the Complex and GIS classification of broad habitat categories. With input of additional resources, would permit detailed habitat classification to better assess HMP habitat acreage goals. Supplemented with lower quality freely available products.
Forest Rapid Ecological Assessment	Forest resources are critical migratory songbird stopover habitat. Provides for long-term assessment of forest conditions and ecological function. Current baseline data will allow assessment of recovery from ash tree loss due to emerald ash borer, and evaluation of potential remedial actions if necessary.

Survey Name	Rationale
Habitat photo points	This photo point survey at permanent points provides chronological visual documentation and assessment of changes to wetland, forest, shrubland, and prairie habitats. Documents results of management actions.
White-tailed deer spotlight survey	May be conducted in years when the DOW aerial survey cannot be completed. Data used to set controlled hunting regulations, and assess HMP population goal of overwinter population of 10-15 deer per square mile.
Water Quality Monitoring	Provides periodic assessment of changes to water quality parameters in wetland units and water supplies. Initial baseline conditions collected 2012-2013.
Wilderness Character Monitoring	Incorporates colonial waterbird survey data, other components do not drive management but are required by policy.
Management actions records: spreadsheet	Required to document management activities.
White-tailed deer aerial survey DOW	Data used to set controlled hunting regulations, and assess HMP population goal of overwinter population of 10-15 deer per square mile. Requires snow cover conditions to complete survey.
Lake Erie Marsh Region Shorebird population survey BSBO	This survey provides a long-term record to document changes in migratory shorebird populations. It provides peak migration timing for species which informs management decisions for water level targets to provide stopover habitat.
Migrational movements and habitat usage of passerines BSBO	This survey provides a long-term record to document changes in migratory songbird populations, and has high potential to document effects related to climate change.
Cedar Point point counts	Cooperator survey by the Toledo Naturalist' Association that provides year round bird use data at Cedar Point NWR.
Aerial Waterfowl Survey DOW	Fall DOW survey that provides coarse scale (i.e. Ottawa, Navarre, Darby, Cedar Point) waterfowl use over time, but lacks unit specific data to inform management decisions.
FWS Duck Banding DOW	Cooperator banding that meets needs for FWS Migratory Bird Office, but has no utility at the refuge level.
Common tern nesting platform monitoring	Cooperator monitoring and banding for state endangered species. Complex provides one of two locations in the region for DOW artificial nesting platform program.

Survey Name	Rationale
Bald Eagle Nesting Survey	HMP resource of concern, and species of concern for FWS. Conducted by volunteers, aids in setting closure areas for nest protection and in Section 7 consultations.
Long-term monitoring of butterflies BSBO	Cooperator survey provides species occurrence and abundance data, and contributes to statewide standardized monitoring program.
Audubon's Christmas Bird Count	International bird survey that provides a long term data set of winter bird distribution and abundance; limited utility other than species occurrence at the refuge level.
Monthly bird walk	Initiated in 1969, this is a volunteer conducted long term record of bird occurrence and abundance on Ottawa NWR. Potential uses related to analyzing long term changes in occurrence and abundance, particularly related to climate change.
Trumpeter swan survey DOW	Cooperator survey to track progress of reintroduction of the trumpeter swan to Ohio and document breeding success and population expansion.
Integrated Waterbird Management and Monitoring	This survey was the highest ranked survey during the IMP prioritization process, but also has a high cost. Would provide a direct feedback loop to inform management actions. Expected survey that will be evaluated to assess feasibility within current resources.
Dune and Great Lakes Beach monitoring	Great Lakes Beach habitat is a HMP priority resource for the Complex and supports a variety of state of Ohio rare, threatened, and endangered plant species, several of which are regionally significant populations. The Cottonwood Dune community is a globally imperiled habitat. This expected survey will document and track changes in these rare species and habitats.
Invasive plant control transects	This expected survey will track progress of habitat restoration actions aimed at controlling invasive species, particularly phragmites. Permanent monitoring transects will evaluate and monitor the efficacy of invasive species treatments.

Surveys marked as “Current” (ranked 1-15) are those that are currently ongoing or have been completed within the last several years but may have a less than annual schedule (Table 1). In one instance (white-tailed deer spotlight survey) survey implementation may occur only in years where the cooperator survey (DOW white-tailed deer aerial survey) is not conducted.

Surveys marked as “Current*” (ranked 16-27) are surveys that are dependent upon and completed by cooperators with little input of refuge resources (Table 1). These surveys generally require only an hour annually of the Wildlife Biologist for coordination and permitting and therefore are not included in the estimated staff time to implement surveys. These surveys may contribute information about Complex resources and population trends, or provide data that aids in making management decisions. In general, these surveys provide information of a more

general nature and lack a specific link to habitat management actions. Several of the cooperator surveys also require huge commitments in time (e.g. BSBO surveys) or resources that are unavailable (e.g. DOW aircraft) to the Complex. Therefore, Current* surveys will be eliminated if cooperator's are unable to complete the survey.

Surveys marked as "Expected" (ranked 28-30) are those surveys that the Complex believes can be at least partially implemented over the course of the IMP (Table 1). In terms of Complex priorities, these surveys are of higher priority than cooperator surveys. Of special note is the Integrated Waterbird Management and Monitoring (IWMM) survey, which was the highest rated survey within the SMART prioritization process, and would be in the top five surveys as selected by Complex staff. IWMM will undergo a test implementation phase within the first five years of the IMP to evaluate feasibility and availability of staff resources. See the IWMM survey narrative for further discussion and details.

An additional eleven surveys were identified as "Future" surveys (Appendix E). These surveys are needed to fully address monitoring needs as identified by HMP goals and strategies or to address monitoring requests by other FWS branches, but personnel or monetary resources are not expected to be available during the life of the IMP. Graduate student research projects are one means that these monitoring needs may be partially addressed.

In total, the selected surveys (Current and Expected, excluding Current*) will take an estimated 25.4 weeks per year to fully implement (Current = 18.83; Expected = 6.57). We estimated that there would be 25.06 weeks per year of refuge staff time available to fully conduct surveys (this is assuming a relatively light management workload). A total of 13 different portfolios (combinations of selected surveys) were developed for station staff consideration (Appendix D).

The estimated annual costs for implementing surveys are presented in Appendix F. An estimated Annual Work Schedule for all selected surveys can be found in Appendix G. A Refuge Condition Summary, a reporting tool to summarize status, trends, and desired conditions of the selected surveys, is provided in Appendix H. Environmental Action Statement requirements are addressed in Appendix I.

Table 1. Surveys selected to conduct at Ottawa National Wildlife Refuge Complex 2017—2032.

Survey Priority ¹	Survey ID Number ² (FF03R_)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
1	_OTW00-032, _CDP00-049	Water Level Monitoring (CM)	Current	HMP / 1, 4, 3, 6	Multiple management units	FWS: 0.07	\$300	Recurring -- every year	1985- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
2	_ITS00-034	Colonial Waterbird Survey (CM)	Current	HMP / 2, 3	Entire station	FWS: 0.03	\$200	June to July/ Recurring -- every year	1991- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
3	_OTW00-047, _CDP00-053	Bathymetric survey (CB)	Current	HMP / 1, 4	Entire station	FWS: 0.02, Other: 0.02	\$150	Spring, Summer, Fall/ Recurring -- every year	2012- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
4	_OTW00-034, _CDP00-064	Muskrat House Survey (M)	Current	HMP / 1, 4	Multiple management units	FWS: 0.02	\$50	Oct.-Nov./ Recurring -- every year	2001- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
5	_OTW00-011, _CDP00-060	Great Lakes Marsh Monitoring Program, Marsh Bird Survey (CM)	Current	HMP / 1, 4, 6	Multiple management units	FWS: 0.11, Other: 0.11	\$150	May-July/ Recurring -- every year	1997- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
6	_OTW00-021, _CDP00-059	Great Lakes Marsh Monitoring Program, Amphibian Survey (CM)	Current	HMP / 1, 4, 6	Multiple management units	FWS: 0.07	\$100	Spring-Summer/ Recurring -- every year	1997- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
7	_OTW00-029, _CDP00-056	Eastern Prairie Fringed Orchid Inventory and Monitoring (CM)	Current	HMP / 6	Multiple management units	FWS: 0.03	\$0	June-July/ Recurring -- every year	2003- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority ¹	Survey ID Number ² (FF03R_)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
8	_OTW00-009, _CDP00-057	EDRR Invasive plant mapping (M)	Current	HMP / 2, 1, 4, 3, 5, 6	Entire station	FWS: 0.03	\$333	Spring, Summer, Fall/ Recurring -- every year	2002-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
9	_OTW00-048, _CDP00-050, _ITS00-038	Aerial photography for habitat monitoring (CM)	Current	HMP / 2, 1, 3, 5, 6	Entire station	FWS: 0.0	\$3,000	July-Aug./ Recurring -- every three years	2003-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
10	_OTW00-045, _CDP00-058	Forest Rapid Ecological Assessment (M)	Current	HMP / 2	Multiple management units	FWS: 0.02	\$50	June-Aug./ Recurring -- every decade	2010-Indefinite	Ron Huffman, Wildlife Biologist	Corace and Petrillo 2014	(none)
11	_OTW00-026, _CDP00-061	Habitat photo points (M)	Current	HMP / 2, 1, 3, 6	Entire station	FWS: 0.01	\$50	Fall/ Sporadic or Ad Hoc	1995-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
12	_OTW00-013	White-tailed deer spotlight survey (M)	Current	HMP / 2, 6	Entire station	FWS: 0.0	\$30	Fall, Winter/ Sporadic or Ad Hoc	1994-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
13	_OTW00-044, _CDP00-065	Water Quality Monitoring (CB)	Current	HMP / 1	Multiple management units	FWS: 0.02	\$1,000	Spring, Summer, Fall/ Recurring -- every decade	2012-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
14	_ITS00-001	Wilderness Character Monitoring (BM)	Current	HMP / 2, 3	Single management unit	FWS: 0.01	\$200	Varies/ Recurring -- every year	2012-Indefinite	Jason Lewis, Refuge Manager	(none)	Initial Survey Instructions

Survey Priority ¹	Survey ID Number ² (FF03R_)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
15	_OTW00-055, _CDP00-067, _ITS00-039	Management actions records: spreadsheet (M)	Current	N/A	Entire station	FWS: 0.01	\$0.00	Year-round/ Recurring -- every year	2017- Indefinite	Ron Huffman, Biologist	(none)	Initial Survey Instructions
16	_OTW00-049	White-tailed deer aerial survey DOW (CM)	Current*	HMP / 2, 6	Entire station	FWS: 0.0	\$0	Winter/ Recurring -- every year	2010- Indefinite	Mark Witt, DOW Private Lands Biologist	(none)	Initial Survey Instructions
17	_OTW00-006	Lake Erie Marsh Region Shorebird population survey BSBO (CB)	Current*	HMP / 1, 4	Multiple management units	FWS: 0.0	\$0	Spring, Summer, Fall/ Recurring -- every year	1992- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
18	_OTW00-031	Migrational movements and habitat usage of passerines BSBO (CR)	Current*	HMP / 2, 3	Single management unit	FWS: 0.0	\$0	Spring, Summer, Fall/ Recurring -- every year	1990- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
19	_CDP00-034	Cedar Point point counts (CB)	Current*	HMP / 2, 3, 1	Single management unit	FWS: 0.0	\$0	year round/ Recurring -- every year	2001- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
20	_OTW00-002, _CDP00-051	Aerial Waterfowl Survey DOW (CB)	Current*	HMP / 1	Multiple management units	FWS: 0.0	\$0	Sept.-Jan./ Recurring -- every year	1990- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
21	_OTW00-015	FWS Duck Banding DOW (CB)	Current*	HMP / 1	Multiple management units	FWS: 0.0	\$0	Aug.-Nov./ Recurring -- every year	1992- Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority ¹	Survey ID Number ² (FF03R_)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
22	_CDP00-035	Common tern nesting platform monitoring (CM)	Current*	HMP / 1	Single management unit	FWS: 0.02	\$200	Spring, summer/Recurring -- every year	2015-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
23	_OTW00-020	Bald Eagle Nesting Survey (CB)	Current*	HMP / 2	Entire station	FWS: 0.0	\$0	Feb.-July/Recurring -- every year	2001-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
24	_OTW00-036	Long-term monitoring of butterflies BSBO (CB)	Current*	HMP / 6	Multiple management units	FWS: 0.05	\$0	Spring, Summer, Fall/Recurring -- every year	2003-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
25	_OTW00-024, _CDP00-052	Audubon's Christmas Bird Count (CB)	Current*	HMP / 2, 1, 3, 6	International	FWS: 0.0	\$0	Dec.-Jan./Recurring -- every year	2000-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
26	_OTW00-003	Monthly bird walk (CB)	Current*	HMP / 2, 1, 4, 3, 6	Entire station	FWS: 0.0	\$0	Monthly/Recurring -- every year	1969-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
27	_OTW00-051, _CDP00-063	Trumpeter swan survey DOW (CB)	Current*	HMP / 1	Entire station	FWS: 0.0	\$0	Summer/Recurring -- every year	1996-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions
28	_OTW00-050, _CDP00-062	Integrated Waterbird Management and Monitoring (CM)	Expected	HMP / 1, 4	Multiple management units	FWS: 0.08	\$0	Fall, Winter, Spring/Sporadic or Ad Hoc	2019-Indefinite	Ron Huffman, Wildlife Biologist	Loges et. al. 2014	(none)
29	_CDP00-048	Dune and Great Lakes Beach monitoring (BM)	Expected	HMP / 2, 5	Multiple management units	FWS: 0.03	\$183	June-September/Recurring -- every five years	2020-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions

Survey Priority ¹	Survey ID Number ² (FF03R_)	Survey Name/(Type) ³	Survey Status ⁴	Mgmt. Objective Id ⁵	Survey Area ⁶	Staff Time (FTE) ⁷	Avg. Ann Cost (OPR) ⁸	Survey Timing ⁹	Survey Length ¹⁰	Survey Coord. ¹¹	Protocol	
											Citation ¹²	Status ¹³
30	_OTW00-046	Invasive plant control transects (M)	Expected	HMP / 1, 4, 6	Multiple management units	FWS: 0.01	\$20	Late spring-early fall/Recurring -- every five years	2021-Indefinite	Ron Huffman, Wildlife Biologist	(none)	Initial Survey Instructions

* Surveys that are dependent upon and completed by cooperators. These surveys will be eliminated if cooperator's are unable to complete the survey.

¹ The rank for each survey listed in order of priority (e.g., numeric, tiered, alpha-numeric, or combination of these).

² A unique identification number consisting of refuge code-computer assigned sequential number. Refuge code comes from the FBMS cost center identifier. OTW=Ottawa NWR, CDP=Cedar Point NWR, ITS=West Sister Island NWR

³ Short titles for the survey name, preferably the same name used in refuge work plans. Also include the PRIMR code for survey type in parentheses. These are: Inventory (I), Cooperative Baseline Monitoring (CB), Monitoring to Inform Management (M), Cooperative Monitoring to Inform Management (CM), Research (R), and Cooperative Research (CR).

⁴ Selected surveys planned for the lifespan of this IMP (i.e., Current, Expected).

⁵ The management plan and objectives that justify the selected survey.

⁶ Refuge management unit names, entire refuge, or names of other landscape units included in survey.

⁷ Estimates of Service (FWS) and non-Service (Other) staff time needed to complete the survey (1 work year = 2080 hours = 1 FTE).

⁸ Estimates of average annual operations cost for conducting the survey during the years it is conducted (e.g., equipment, contracts, travel) but not including staff time.

⁹ Timing and frequency of survey field activities.

¹⁰ The years during which the survey is conducted.

¹¹ The name and position of the survey coordinator (the Refuge Biologist or other designated Service employee) for each survey.

¹² Title, author, and version of the survey protocol (if there is no protocol to cite, enter None).

¹³ Scale of intended use (Site-specific, Regional, or National) and stage of approval (Initial Survey Instructions, Complete Draft, In Review, or Approved) of the survey protocol.

Narratives for Selected Surveys

Survey: Water Level Monitoring (FF03ROTW00-032) (FF03RCDP00-049)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 1

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey informs water level management actions for all impounded wetland units on Ottawa NWR Complex. Products derived from the survey are the annual water management book for the Complex. Multi-year hydrographs for each wetland unit are used within the water management book as a reference to prior year activities, and to develop unit goals and strategies for current year activities. Staff gauges are referenced to the International Great Lakes Datum (IGLD85) which is the standard elevation reference system for Great Lakes water levels. Because Lake Erie is the primary water source for the Complex, staff gauges in conjunction with Lake Erie water level information allow us to determine if current lake levels are conducive for free flow filling or draining of wetlands through water control structures.

Water level monitoring in conjunction with bathymetric data for units allows us to set optimal targets to support species specific needs for groups such as shorebirds, waterbirds, and waterfowl. When bathymetry is completed for all wetland units, we will be able to assess HMP habitat targets for acres available by water depth for the Lake Erie Coastal Wetland Complex.

In addition to unit water level, other sources of information are used to evaluate water management actions and capabilities for a given year. Lake Erie water levels are highly variable due to both seasonal water level changes, as well as hourly changes due to wind driven seiche events. Monitoring these products can also identify time periods of potential extreme events where management actions may be needed to mitigate flooding or prevent damage to infrastructure. Primary sources for daily and hourly changes are the Crane Creek water level sonde and the Toledo water level gauge in Lake Erie. Seasonal and 6 month water level forecasts of average Lake Erie water levels are available monthly from the USACE.

This survey includes the associated activity of maintaining and setting water level gauges, and periodically verifying gauge elevations by surveying.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Recurring -- every year; Monthly, varies 1-3 or more per month

Water levels for every impounded wetland are recorded approximately every 10 days spring, summer, and fall. Winter readings are infrequent, and not recorded when wetlands have ice cover. During active water management (drawdowns, flooding), unit readings are often recorded daily to track water delivery rates. The Crane Creek water level sonde is located at the Pool 2b fish passage structure. Water levels are automatically recorded every 15 minutes, and are available real-time. Data are archived and maintained by Region 3 hydrologist staff. Water level data were also collected from a second sonde in Pool 2b from 2009-

2014. Data are stored in WISKI and ServCat, and are available at data.gov in annual data reports: <https://catalog.data.gov/dataset/waterdata-report-413721083124001-pool-2b-at-ottawa-nwr-2009>.

NOAA maintains continuous water level monitoring stations throughout the Great Lakes. This includes both real-time 6 minute water levels, as well as a 5 day operational forecast system of expected winds and water levels at each station. Water level information and forecasted conditions are generally referenced weekly to daily, depending upon average lake levels, weather forecasts, and operational needs. The Toledo station data are available at: <https://tidesandcurrents.noaa.gov/waterlevels.html?id=9063085>

USACE provides weekly and monthly average Great Lakes average water level updates. The 6-month lake level forecast is referenced monthly and is available the first week of each month. Data are available at: <http://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Water-Levels/>

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Fish and Wildlife Service, Water Resources Branch

USFWS Region 3 hydrologist staff are instrumental in aiding in surveying elevations for staff plates and water control structures, and maintaining the Crane Creek water level gauge.

Survey: Colonial Waterbird Survey (FF03RITS00-034)

Refuge: West Sister Island National Wildlife Refuge

Priority: 2

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Shrubland Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

West Sister Island has been identified as the largest and most diverse colonial waterbird nesting area in the U.S. Great Lakes. HMP population objectives (nesting pairs) for the island are to maintain nesting habitat for approximately 1,000 great blue herons, 800 great egrets, 500 black-crowned night-herons and 1,500-2000 double-crested cormorants. The nesting population goal for cormorants contains an upper range target to limit the damage they cause to trees from over abundance.

Annual population estimates are used to track long term nesting population trends for each species. Black-crowned night-heron population estimates are used to document response to forest cuttings to provide shrubby nesting habitat required for this species. Additional forest cuttings are initiated when nesting habitat is saturated and the population is less than 500 nesting pairs. Double-crested cormorant population estimates are used to inform annual control actions needed to limit the population and prevent widespread degradation to the forested community. Lethal removal of cormorants is initiated when populations exceed 2000 nesting pairs in the prior year.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Pelecaniformes (Hérons, Pelicans, Ibises); Suliformes (Cormorants); *Nycticorax nycticorax* (Black-crowned Night-Heron, Black-crowned Night Heron); *Ardea herodias* (Great Blue Heron); *Ardea alba* (Great Egret); *Phalacrocorax auritus* (Double-crested Cormorant); Recurring -- every year; June to July

Index to total nest count for all target species based upon a permanent sampling grid. The grid contains permanent posts that systematically cover the entire island with an approximate spacing of 125 feet between posts. All nests are counted by waterbird species in trees with their base within 25 feet of each grid post. Estimated canopy height and canopy closure within the 25 foot radius is also recorded. Nest counts are extrapolated to an overall island index of total nesting population for each waterbird species. Nest counts are conducted one time annually, in either late June or early July.

An annual island perimeter photo series is taken each year along with aerial photographs every 2-4 years as part of this survey to document habitat conditions.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; Ohio Department of Natural Resources, Division of Wildlife
Additional partner is Black Swamp Bird Observatory.

Survey: Bathymetric survey (FF03ROTW00-047) (FF03RCDP00-053)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 3

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective;

Bathymetric data and maps are critical data in setting appropriate water level management goals for wetland units. In conjunction with water level monitoring, bathymetric data for wetland units allows us to set optimal targets to support species specific needs for groups such as shorebirds, waterbirds, and waterfowl. Unit water depths also provide an indicator of an expected range of vegetation responses to a given flooding range. When bathymetry is completed for all wetland units, we will be able to assess HMP habitat targets for acres available by water depth for the Lake Erie Coastal Wetland Complex.

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Survey grade bathymetry and elevation will eventually be completed for all managed wetland units on Ottawa NWR Complex. Only a subset of wetland management units have bathymetric surveys completed to date. Surveys are generally completed by refuge staff, and raw data are processed by Region 3 hydrologist staff.

Surveying methods vary based upon unit conditions and availability of survey grade GPS equipment. During drawdowns, elevation surveys are accomplished by walking or vehicle mounting a survey grade GPS, with comprehensive survey points taken throughout the unit, dike slopes, and dike tops. During flooded conditions, surveys may be accomplished by taking measurements from the water surface to the bottom of the wetland, while referencing survey grade water level gauge information. This method results in generally wider point spacing and less detailed bathymetric map products.

In non-flooded locations, bathymetric/elevation data may be derived from the statewide Ohio LIDAR products. State LIDAR data are nominally 1 foot accuracy, but testing has shown that actual accuracy is approximately 3-4 inches. This level of accuracy is approximately the same as other survey methods. An example of use is processing pre-restoration LIDAR products to derive post-restoration bathymetric contours and volumes.

What is the population or attribute of interest, what will be measured, and when?

Water; Hydrology; Recurring – every year; Spring, Summer, Fall

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; U.S. Fish and Wildlife Service, Water Resources Branch

USFWS Region 3 Water Resources Division provides assistance with surveys, loan of survey grade GPS equipment, and processes raw survey to produce final end products of bathymetric maps and water volume/depth tables.

Survey: Muskrat House Survey (FF03ROTW00-034) (FF03RCDP00-064)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 4

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Musk rats are a resource of concern for the Complex due to the vital role they play in altering wetland vegetation, and due to the potential damage caused to dike infrastructure through burrowing. Muskrat feeding and house building in emergent vegetation creates vegetation to open water heterogeneity that is beneficial to a wide range of other wetland species. They are also a valuable management tool in helping control dense monotypic emergent vegetation such as narrow-leaved cattail. Thus, they are considered a keystone species for the Complex.

Muskrat populations are managed through the controlled trapping program. In general, population levels are targeted to strike a balance between beneficial effects to wetland conditions and preventing excessive damage to infrastructure. The following factors are considered in setting muskrat population goals for each wetland management unit: 1) Count of muskrat houses within a unit, 2) Amount of vegetative cover relative to unit goals, 3) Amount of burrowing and damage to unit dikes, 4) Prior year trapping in the unit, 5) Current year water levels in the unit, 6) Current year water levels in adjacent units, 7) Future year management plans for the unit. For each wetland unit, population levels are compared to prior year population levels for each unit, and comparison to long term average population levels. As a general rule of thumb, a unit is considered for trapping when population levels exceed long term population average. Muskrat population levels are also part of the water level management decision flow process (Habitat Management Plan, Lake Erie Coastal Wetland Complex strategy, Figure 5.1).

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Mammalia (mammals); Rodentia (rodents); Ondatra (muskrats);
Recurring -- every year; October-November

An index to population levels of muskrats in every wetland unit through a count of all visible houses. Surveys are conducted in late October to early November when houses become readily visible. The entire perimeter of every wetland unit is driven with periodic stops and visual counts of all houses within the unit. Detectability can vary from year to year based upon vegetation conditions in the unit and size of houses. However, detectability variability does not appear to have a significant negative impact in determining relative population levels from year to year.

If unmanned aircraft systems become a viable approved use for refuge surveys in the future, roadside counts may be supplemented or replaced by aerial surveys.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: Great Lakes Marsh Monitoring Program, Marsh Bird Survey (FF03ROTW00-011) (FF03RCDP00-060)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 5

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey provides abundance data for at least 16 HMP avian resources of concern. For breeding avian species, data can be used to assess change over time, habitat associations, and potentially response to management actions. The survey focus is on breeding populations of secretive marsh birds, but also records all avian species that use wetlands and wetland edges such as shrub and tree habitat.

Data are sent to Bird Studies Canada for input and analysis at a regional scale. Products from the Great Lakes Marsh Monitoring Program provide bird population trends for the Great Lakes region of the U.S. and Canada.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); Suliformes (Cormorants); Gruiformes (Rails, Cranes); Passeriformes (Perching Birds); Pelecaniformes (Ibises, Herons, Pelicans); Coraciiformes (Rollers, Kingfishers); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Podicipediformes (Grebes); Recurring -- every year; May-July

Breeding marsh bird populations and habitat are monitored on wetland units throughout Ottawa NWR Complex. Surveys are conducted using standardized protocols from Bird Studies Canada, Great Lakes Marsh Monitoring Program. Surveys are half-circle point counts 15 minutes long, with tape playback to aid in detection of secretive marsh birds. Currently there are 6 survey routes established, with 5-8 survey points per route. Protocols also include an assessment of habitat and vegetation conditions at each survey point. Surveys are conducted in the evening, 2-3 times per year from May 20 to July 5, with at least 10 days between each survey.

Rotational coverage of survey routes may be necessary, with survey coverage on a less than annual basis.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management

Bird Studies Canada, Great Lakes Marsh Monitoring Program

Survey: Great Lakes Marsh Monitoring Program, Amphibian Survey (FF03ROTW00-021) (FF03RCDP00-059)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 6

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey provides abundance data for HMP northern leopard frog resource of concern, along with other frog species. Frog population data can be used to assess change over time, habitat associations, and potentially response to management actions. Amphibians are known to be sensitive to environmental stressors, so monitoring this species group can provide an early warning system for environmental issues.

Data are sent to Bird Studies Canada for input and analysis at a regional scale. Products from the Great Lakes Marsh Monitoring Program provide frog population trends for the Great Lakes region of the U.S. and Canada.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Amphibia (Amphibians); Anura (Frogs, Toads); Recurring -- every year; Spring-Summer

Amphibian populations and habitat are monitored on wetland units throughout Ottawa NWR Complex. Surveys are conducted using standardized protocols from Bird Studies Canada, Great Lakes Marsh Monitoring Program. Surveys are half-circle point counts 3 minutes long. Currently there are 14 survey routes established, with 1-10 survey points per route. Protocols also include an assessment of habitat and vegetation conditions at each survey point. Surveys are conducted in the evening, 3 times per year usually from April-mid June, with at least 15 days between each survey.

Rotational coverage of survey routes may be necessary, with survey coverage on a less than annual basis.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management

Bird Studies Canada, Great Lakes Marsh Monitoring Program

Survey: Eastern Prairie Fringed Orchid Inventory and Monitoring (FF03ROTW00-029) (FF03RCDP00-056)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 7

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Eastern prairie fringed orchid is a federally threatened species recently discovered on the Complex. The Crane Creek population was discovered in 2007, the Young population was discovered in 2009, and a small population was discovered in Cedar Point in 2012. The Crane Creek and Young populations have been the 2 largest flowering populations in the state of Ohio since 2013, and averaged over 1000 flowering plants combined since 2014. Only 8 other populations in the state of Ohio are considered to be moderately to highly viable, thus the Complex populations are significant statewide. Surveys of flowering plants allow evaluation of population status, browsing damage by white-tailed deer, and pollination and seed set rates.

HMP Wet Prairie and Sedge Meadow Habitat Objective 1: Monitor Eastern prairie fringed orchid populations (flowering count annually, and demographics of a subset of the populations every 5 years), and maintain 5-year average flowering population of 200 plants in the Crane Creek population, and 5-year average flowering population of 50 plants in the Young population.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; At-risk Biota; *Platanthera leucophaea* (Eastern prairie fringed orchid) - T- Wherever found; Recurring -- every year; June-July

Total count of all flowering plants detected at each population. Rotational surveys are conducted in suitable habitat every 3-5 years as resources allow to detect new flowering populations. Surveys are also conducted in the year prior to soil disturbing activity in suitable habitat to meet Section 7 consultation requirements.

On approximately a 5 year average, demographics will be assessed for a subset of the flowering populations. Flowering plants will be marked and GPS coordinates recorded, along with plant height and flower count. Survival, browse damage, and seed set data will be collected in the fall from the marked population.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; Ohio Department of Natural Resources, Division of Wildlife; U.S. Fish and Wildlife Service, Ecological Services

Survey: EDRR Invasive plant mapping (FF03ROTW00-009) (FF03RCDP00-057)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 8

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Beach Objective; Forest Objective; Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Early Detection Rapid Response (EDRR) is the most cost and time efficient means of controlling invasive plant species. Successful control efforts are much more likely if they occur during early invasion and can prevent widespread establishment. Early detection allows quick follow up treatment with a primary goal of controlling target species before seed production can occur. Locations are marked by GPS to allow follow up treatments in subsequent years. If seed production is prevented, then eventually the source population can be eliminated as the existing seed bank is depleted. Efforts may also include preventing the spread of established invasive plant species to new areas.

Successful efforts under the EDRR program have included the elimination of early invasion populations of yellow flag iris, hairy willow herb, Japanese barberry, and tree of heaven. The program has also prevented the widespread establishment of poison hemlock and cutleaf teasel, although eradication has not yet been achieved.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Invasive Species; Plantae (plants); Rhamnaceae (buckthorns); Apiaceae (No common name); Simaroubaceae (quassias); Asteraceae (sunflowers); Lythraceae (loosestrife); Oleaceae (olives); Onagraceae (evening primroses); Polygonaceae (knotweed, buckwheat); Butomaceae (No common name); Poaceae (grasses); Berberidaceae (bayberries); Iridaceae (No common name); Fabaceae (legumes, peas); Brassicaceae (mustards, crucifers); Caprifoliaceae (honeysuckle); Hydrocharitaceae (frog's bit, waternymphs, tape-grass); Recurring -- every year; Spring, Summer, Fall

GPS coordinates of all detections of EDRR plant species are recorded in ArcGIS. Currently the program uses the RLGIS database, but this will transition to new databases as technology advances. Stage of plant development, number of plants or percent cover, and other relevant information are recorded. EDRR may be conducted throughout the spring, summer, and fall as most plants are easiest to detect at certain stages of their life cycle, often when flowering.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: Aerial photography for habitat monitoring (FF03ROTW00-048) (FF03RCDP00-050) (FF03RITS00-038)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge, West Sister Island National Wildlife Refuge

Priority: 9

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Beach Objective; Forest Objective; Lake Erie Coastal Wetland Complex Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Aerial photographs allow assessment of habitats, plant populations, and management actions. Current use has been primarily visual inspection of photographs to assess habitat conditions, invasive species treatments, ash mortality due to EAB, plant diversity, emergent plant to open water interspersions, etc. Some coarse scale habitat type mapping was used to provide habitat type maps for the HMP. Periodic aerial photographs also allow assessment of habitat and plant population changes over time. They also provide a means of assessing progress towards meeting HMP habitat acreage goals.

With the input of additional staff or monetary resources, aerial photographs would be used more extensively to derive fine scale habitat or vegetation type maps. If unmanned aircraft systems (UAS) become a viable approved use for refuge surveys in the future, aerial photos may be supplemented with more frequent and cost effective UAS photos or videos.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Plantae (plants); Nymphaeaceae (water lilies); Juncaceae (rushes, Rush Family); Lythraceae (loosestrife); Juglandaceae (walnuts); Oleaceae (olives); Sapindaceae (soapberries); Pontederiaceae (pickerel-weed); Malvaceae (mallows); Poaceae (grasses); Typhaceae (No common name); Cornaceae (dogwoods); Fagaceae (No common name); Alismataceae (arrowhead, water-plantain); Potamogetonaceae (pond weed, pondweed, Pondweed family); Cyperaceae (sedges); Hydrocharitaceae (frog's bit, waternymphs, tape-grass); Recurring -- every three years; July-August

Assessment of habitats, plant populations, HMP habitat acreage goals, and management actions. Current plans call for obtaining high resolution (6" or better ground resolution) aerial photographs using the R3 aircraft on an approximately 3 year basis for the entire Complex, depending upon funding levels. Digital photographs may be true color, color infrared, or hyperspectral depending upon sensor platform capabilities and operational needs. Photography missions are flown during the growing season, usually July or August, depending upon aircraft availability. After orthorectification, the photos are used in ArcGIS to perform a variety of assessments, and may be used to create polygons for habitat type, plant communities, or management actions. Lower quality freely available aerial photography (e.g., NAIP) is used for assessments during years when higher resolution photography cannot be obtained.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Fish and Wildlife Service, Regional Office, R3 Twin Cities Regional pilot and GIS staff

Survey: Forest Rapid Ecological Assessment (FF03ROTW00-045) (FF03RCDP00-058)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 10

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The initial Forest Rapid Ecological Assessment in 2010 provided baseline assessment of ecological conditions and forest stand structure and composition. This survey was completed as widespread loss of ash species was beginning to occur due to the emerald ash borer, thus providing a historical record of pre-invasion forests. Periodic surveys will allow assessment of changes to forest systems in comparison to this baseline, and evaluation of recovery of the forest through natural regeneration. If forest recovery is not meeting habitat objectives, then remedial forest management actions will be needed.

Forested areas on the Complex are small and fragmented, but are extremely important migratory songbird stopover habitat in spring and fall. Massive fallout of migratory songbirds occurs in these habitats in April and May as the birds encounter the geographical barrier of Lake Erie during northbound migration. Monitoring forest ecosystems is necessary to ensure that issues are identified and addressed, so that high quality stopover habitat is provided into the future.

This survey collects information in the ROC Cottonwood Dune forest community that occurs on the Complex. Cottonwood dune is a globally-rare natural community with probably fewer than 60 occurrences and 1000 acres range wide.

What is the population or attribute of interest, what will be measured, and when?

Landscapes (Ecosystem Pattern and Processes); Landscape Dynamics; Recurring -- every decade; June-August

Forest stand composition and ecological processes such as regeneration and disturbance are the attributes of interest. Survey protocol involves collecting a number of attributes related to forest stands, including composition, structure, coarse woody debris, snags, etc. Survey schedule is planned for about a 5-10 year data collection cycle. Additional survey locations will likely be added over time, particularly in the GLRI reforestation planting areas and at the Navarre Marsh beach ridge. Survey plots could also be established on West Sister Island if resources permit.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Initial survey in 2010 was a cooperative effort survey by the Great Lakes Biologist Network.

Survey: Habitat photo points (FF03ROTW00-026) (FF03RCDP00-061)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 11

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Lake Erie Coastal Wetland Complex Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Photo points are a long term visual record of habitat conditions on management units throughout the Complex. These visual records in conjunction with management history (water level manipulation, mowing, burning, disking, etc.) provide a means to visually assess changes in habitats in relation to management actions, in the absence of more time intensive habitat or vegetation sampling methods. For instance, visual assessment of the extent of wild rice populations in relationship to water level records during the growing season can over time inform future management decisions about optimal water levels to maximize wild rice production.

What is the population or attribute of interest, what will be measured, and when?

Landscapes (Ecosystem Pattern and Processes); Landscape Dynamics; Sporadic or Ad Hoc; Fall

Digital photographs are taken in August-September at permanent photo points throughout all habitat types. Photographs are taken at an exact point and direction so that they are comparable from year to year. Ideally photos would be taken annually, but will likely be on a more ad hoc basis of 1-3 years, based upon resources available.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: White-tailed deer spotlight survey (FF03ROTW00-013)

Refuge: Ottawa National Wildlife Refuge

Priority: 12

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

HMP forest and wet prairie and sedge meadow habitat objectives call for an over-winter deer population of 10-15 per square mile, to protect forest regeneration and understory health, and to reduce browsing of the federally threatened Eastern prairie fringed orchid. This ground spotlight survey provides population estimates to determine if we are meeting population and habitat objectives. If surveys are below this range, then controlled hunting effort can be reduced. If surveys are over population target levels, then hunting intensity or areas can be adjusted to increasing deer harvest.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Mammalia (mammals); Artiodactyla (artiodactyls, even-toed ungulates, cloven-hoofed ungulates); *Odocoileus virginianus* (White-tailed Deer, white-tailed deer); Sporadic or Ad Hoc; Fall, Winter

The metric for this survey will be an extrapolated index to over-winter number of white-tailed deer per square mile. Historically, this survey was conducted in fall or winter to set hunting regulations for the white-tailed deer controlled hunt program. During the time period of the 1990's and early 2000's, white-tailed deer populations were averaging 35-50 deer per square mile, which produced significant negative habitat impacts to forest understory and tree regeneration through browsing. In 2010, surveys were discontinued with the implementation of Ohio DOW aerial winter deer counts, and as population levels fell within target levels of 10-15 deer per square mile. However, experience in the aerial counts has revealed that conditions of snow cover that allow reliable aerial deer counts may be sporadic. Therefore, ground spotlight surveys may be implemented in years where aerial surveys may not be completed in any 1-2 year period.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

This is not a cooperative survey per se, but is linked to the Ohio DOW aerial winter deer survey. This survey may be conducted in years where aerial surveys are not possible due to weather conditions.

Survey: Water Quality Monitoring (FF03ROTW00-044) (FF03RCDP00-065)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 13

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Initial synoptic water quality sampling allowed the Complex to determine a basic set of baseline conditions for water quality parameters and metal levels in sediments. Water sources for the Complex contain high sediment and nutrient loads due to the surrounding agricultural landscape. Future samples will allow a comparison to the baseline and evaluation of changes over time. No conditions for each variable of interest have been set that would trigger management actions, and it is not known if any remedial actions are even available.

Included in initial water quality sampling was continuous data loggers operated by Region 3 Water Resources Branch staff and USGS-Great Lakes Science Center in Crane Creek and Pool 2b. These data will be assessed by USGS as a part of the evaluation of the fish passage re-connection of Pool 2b to Crane Creek hydrology.

What is the population or attribute of interest, what will be measured, and when?

Water; Water Quality; Recurring -- every decade; Spring, Summer, Fall

Variables or constituents tested in synoptic sampling included ammonia, nitrite + nitrate, phosphorous, orthophosphate, total nitrogen, and total dissolved solids. Samples were collected 3 times during the initial round conducted in Spring, Summer, and Fall. The initial samples collected in 2012 and 2013 provided a baseline for water quality parameters on impounded and connected wetlands, as well as Crane Creek. Due to cost, future sampling timeframes are difficult to estimate and depend upon funding and personnel, but are initially planned on a 5-10 year basis. Future sampling for metals in sediments may not be continued unless sufficient resources are available.

Continuous seasonal (spring, summer, fall) YSI water quality probes (Model 6920) were operated from 2009-2014 in Crane Creek and Pool 2b (<https://catalog.data.gov/dataset/waterdata-report-413721083124001-pool-2b-at-ottawa-nwr-2009>). Variables were recorded on 30 minute intervals and included specific conductance, water temperature, dissolved oxygen, pH, and turbidity. It is unknown if these samples will be repeated in the future.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; U.S. Fish and Wildlife Service, Water Resources Division; U.S. Fish and Wildlife Service, Ecological Services

USGS-Great Lakes Science Center and USGS-National Water Quality Lab were cooperators during the initial baseline surveys conducted in 2012-2013. USGS-Great Lakes Science Center was a cooperator on the continuous water quality probes for Crane Creek and Pool 2b from 2009-2013.

Survey: Wilderness Character Monitoring (FF03RITS00-001)

Refuge: West Sister Island National Wildlife Refuge

Priority: 14

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Shrubland Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This is required monitoring by policy. Results of Colonial Waterbird Survey (FF03RITS00-034) are incorporated into reporting for this survey. Otherwise this survey has limited value for refuge management decisions or evaluating management actions.

What is the population or attribute of interest, what will be measured, and when?

Human Use; Visitor and Recreation Use; Recurring -- every year; Varies

Majority of items are related to wilderness character and public use. Other indicators are recorded at NOAA mainland monitoring stations for climatic data, which reflect regional climatic trends but will be different from climatic conditions on the island due to the influence of Lake Erie.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: Management actions records: spreadsheet (FF03ROTW00-055) (FF03RCDP00-067) (FF03RITS00-039)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge, West Sister Island National Wildlife Refuge

Priority: 15

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

This survey does not address any specific station objectives.

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The purpose of this survey is to document all management actions implemented on the refuge. Until a standardized approach is delivered to field stations, Ottawa will use a combination of water records/reports, pesticide spray records, GIS/RLGIS, and other spreadsheets to record the date and general area of management activities.

What is the population or attribute of interest, what will be measured, and when?

Human Use; Point Source Human Effects; Recurring -- every year; Year-round

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Survey: White-tailed deer aerial survey DOW (FF03ROTW00-049)

Refuge: Ottawa National Wildlife Refuge

Priority: 16

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

HMP forest and wet prairie and sedge meadow habitat objectives call for an over-winter deer population of 10-15 per square mile, to protect forest regeneration and understory health, and to reduce browsing of the federally threatened Eastern prairie fringed orchid. This aerial visual survey provides population estimates to determine if we are meeting population and habitat objectives. If surveys are below this range, then controlled hunting effort can be reduced. If surveys are over population target levels, then hunting intensity or areas can be adjusted to increasing deer harvest.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; *Odocoileus virginianus* (White-tailed Deer, white-tailed deer); Recurring - every year; Winter with snow cover

This survey measures the number of white-tailed deer per square mile. This survey was implemented in 2010 by the Ohio Division of Wildlife, and includes both federal and state property in the region. Surveys are conducted in the winter when snow cover permits visual detection of deer. Surveys are conducted by helicopter flying belt transects with 2 observers. However, experience in the aerial counts has revealed that conditions of snow cover that allow reliable aerial deer counts may be sporadic. Therefore, ground spotlight surveys (White-tailed deer spotlight survey FF03ROTW00-013) may be implemented in years where aerial surveys may not be completed in any 1-2 year period.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; Ohio Department of Natural Resources

This survey will be discontinued if partner resources are not available.

Survey: Lake Erie Marsh Region Shorebird population survey BSBO (FF03ROTW00-006)

Refuge: Ottawa National Wildlife Refuge

Priority: 17

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey provides information on shorebird species use of stopover habitats during spring and fall migration. It monitors HMP ROC for two species, lesser yellowlegs and dunlin, and has the ability to detect the presence of the endangered piping plover (*Charadrius melodus*). Surveys on the Complex are a subset of a wider coverage area for shorebird surveys from Detroit, MI to Huron, OH. Survey results have also provided peak stopover time periods for shorebird species, allowing the Complex to plan for and provide habitat coinciding with migratory periods.

These survey results were used in the designation of the Lake Erie Marshes as a Regional WHSRN site. The long term nature of the dataset (1992-present) also provides potential for assessing long term trends in species and climate change impacts.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); Recurring -- every year; Spring, Summer, Fall

This survey follows the International Shorebird Survey protocol and has been conducted since 1992. Counts of shorebirds by species are conducted in suitable habitat throughout the Complex. Coverage area varies by year, but generally covers management units in drawdown, and shallow water and mudflats in coastal wetlands. Surveys cover the spring and fall migration period for shorebirds.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring

Black Swamp Bird Observatory conducts the surveys and provides annual progress reports. Survey lead is Mark Shieldcastle, Research Director, BSBO.

This survey will be discontinued if partner resources are not available, but may be incorporated as a component of IWMM if FWS resources permit.

Survey: Migrational movements and habitat use of passerines BSBO (FF03ROTW00-031)

Refuge: Ottawa National Wildlife Refuge

Priority: 18

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Shrubland Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey is a long term research project by Black Swamp Bird Observatory, initiated in 1990. Up to 15,000 birds are banded annually during migration. In addition, this survey includes both point counts and a Monitoring Avian Productivity and Survivorship (MAPS) station initiated in 1992. Very long term data sets of this magnitude are very rare, and the information collected has vast potential for future analysis, such as for climate change impacts. The data set has provided stopover use and nesting information by species and highlighted the extreme importance of the region as a migratory stopover area for songbirds. Direct ties to management actions are difficult, but knowledge of the importance of the area for songbirds during migration has helped prioritize HMP management and restoration goals to provide migratory songbird stopover habitat. This survey provides information for ten HMP resources of concern and has the ability to detect the presence of the endangered, Kirtland's warbler (*Setophaga kirtlandii* (= *Dendroica kirtlandii*).

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Columbiformes (Pigeons, Doves); Piciformes (Woodpeckers); Cuculiformes (Cuckoos); Apodiformes (Hummingbirds, Swifts); Passeriformes (Perching Birds); Recurring -- every year; Spring, Summer, Fall

Migratory songbirds are mist netted during both spring and fall migration. Breeding songbirds are mist netted during summer. Birds are fitted with a Bird Banding Lab leg band, and a variety of condition and morphometric parameters, sex, and age data are collected. Data are archived on the Midwest Avian Data Center, and contributed to The Institute for Bird Populations, MAPS program.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Research

Black Swamp Bird Observatory conducts the surveys and provides annual progress reports. Survey lead is Mark Shieldcastle, Research Director, BSBO.

This survey will be discontinued if partner resources are not available due to the massive personnel time involved.

Survey: Cedar Point point counts (FF03RCDP00-034)

Refuge: Cedar Point National Wildlife Refuge

Priority: 19

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Lake Erie Coastal Wetland Complex Objective; Shrubland Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This survey documents the occurrence, distribution, and numbers of all avian species using all habitats on Cedar Point NWR. It provides seasonal use patterns since the survey goal is at least one survey per month. This survey covers all 23 avian species resources of concern in the HMP and has the potential to detect the presence of the endangered Kirtland's warbler and possibly the piping plover

Results have a limited ability to document response to management actions due to survey limitations (lack of habitat assessment, variable coverage annually, no detectability component, etc.) but may have use in documenting changes in species occurrence or abundance over time. Lake Erie waterfowl population counts are useful in documenting near shore use, and provide data to resist proposed use of near shore areas as dredge disposal locations.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Anseriformes (Geese, Waterfowl, Swans, Screamers, Ducks); Cuculiformes (Cuckoos); Pelecaniformes (Pelicans, Herons, Ibises); Charadriiformes (Gulls, Auks, Alcids, Plovers, Oystercatchers, Shore Birds); Passeriformes (Perching Birds); Gaviiformes (Loons); Apodiformes (Hummingbirds, Swifts); Accipitriformes (Hawks); Galliformes (Fowls, Gallinaceous Birds); Coraciiformes (Rollers, Kingfishers); Gruiformes (Rails, Cranes); Piciformes (Woodpeckers); Falconiformes (Falcons, Falconiforms); Suliformes (Cormorants); Recurring – every year; year round

Point counts of all avian species at permanent survey stations annually since 2001 within wetland impoundments, including shrub and tree edges. Numbers of surveys per year varies annually, with a goal of once per month. Surveys during winter months can only be accomplished during mild winters when roads are passible. If possible, more than 1 survey per month may occur during migration periods. Since 2013, the survey has included an estimated count of waterfowl species in Lake Erie.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring

The Toledo Naturalists' Association. Elliot Tramer is project lead.

This survey will be discontinued if partner resources are not available.

Survey: Aerial Waterfowl Survey DOW (FF03ROTW00-002) (FF03RCDP00-051)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 20

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The bi-weekly aerial waterfowl survey provides abundance information for Lake Erie wetlands and some open lake locations. Summary data are reported for Cedar Point NWR, Ottawa NWR main unit, Navarre Marsh, and Darby Marsh. Data provide overall abundance numbers and peaks of migration. Management level unit data are not recorded. Survey data are of primarily intended to inform the public about waterfowl activity, particularly for waterfowl hunters.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Recurring -- every year; September-January

Aerial count of waterfowl by species is conducted over larger wetland complexes in the Lake Erie marsh region. Surveys are visual estimates by two person crews in the DOW airplane. Surveys are currently conducted bi-weekly September-January on the closest available date to the 1st and 15th of each month. Surveys are not conducted when wetlands are frozen over.

Historically, this survey provided more extensive coverage, from September through March, and up to one survey per week.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Ohio Department of Natural Resources, Division of Wildlife

This survey would be discontinued without cooperator support.

Survey: FWS Duck Banding DOW (FF03ROTW00-015)

Refuge: Ottawa National Wildlife Refuge

Priority: 21

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The USFWS waterfowl banding program helps collect information on breeding and wintering distribution, behavior, migratory routes, survival and reproduction. In Ohio, annual waterfowl banding quotas are the responsibility of the Ohio Division of Wildlife due to lack of NWR's in the state. This survey contributes data to meet FWS needs, but has little relevance to management of the refuge.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Recurring -- every year; August-November

Waterfowl capture and banding by the DOW is conducted through a combination of rocket netting and swim in traps. Refuge staff provide advice on potential capture locations within the Complex, which can vary annually. Historically refuge staff provided more assistance with setup, capture, and baiting, but there is currently infrequent and limited involvement. Most banding is conducted at state wildlife areas, and banding may not occur on the refuge every year.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Ohio Department of Natural Resources, Division of Wildlife

Local survey coordinator is Patrick Baranowski, Wildlife Area Manager at Magee Marsh WA. This survey would be discontinued without cooperator support.

Survey: Common tern nesting platform monitoring (FF03RCDP00-035)

Refuge: Cedar Point National Wildlife Refuge

Priority: 22

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The common tern is an endangered species for the State of Ohio. The Complex has supported state efforts to benefit this species by providing a location for artificial nesting platforms. As staff resources are available, refuge staff and interns may also assist in the maintenance and installation of platforms, monitoring nest success, and predator control. The HMP strategy for common terns is: "Over the next five years, evaluate locations, productivity, predator impacts, and staff capability to sustain nesting platforms for common terns."

Nesting platforms are flat decks (pontoon boat shells) covered in gravel with predator guard fencing and wire. Predation by great horned owls has been a problem and monitoring of predation through nest checks and by cameras may trigger predator trapping or control. Poor nest success or fledging rates may lead to re-evaluation of platform placement sites, and movement to new locations. For instance, prior to 2015, the primary location sites were Ottawa NWR Pool 1, and MS 5. However, high predation rates and very limited fledging rates lead to the relocation of the platforms to Cedar Point Pool 1. The Ohio DOW also maintains another artificial nesting platform location at Willow Point Wildlife Area.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); *Sterna hirundo* (Common Tern); Recurring -- every year; Spring, summer

The number and productivity of breeding common terns on artificial nesting platforms is monitored annually by the Ohio Division of Wildlife. Information on number of breeding pairs, number of nests, number of banded and fledged chicks, number of young per nest, and nest success is collected during the breeding season, generally late spring through summer. Predator trapping or control is initiated on an as needed basis.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; Ohio Department of Natural Resources, Division of Wildlife

Laura Kearns, Ohio DOW, is the lead research coordinator.

This survey may be scaled back or eliminated without cooperator support.

Survey: Bald Eagle Nesting Survey (FF03ROTW00-020)

Refuge: Ottawa National Wildlife Refuge

Priority: 23

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The bald eagle is an HMP resource of concern, and also a species of concern for the FWS. Active nest site locations are tracked to evaluate potential impacts of management activities, construction projects, research projects, and public use to nesting pairs. This information is used in evaluating and minimizing impacts to eagles for Section 7 consultations. Generally monitoring at Cedar Point NWR is more of a spot check for activity. Knowledge of nest incubation start date allows fostering of orphan nestlings when needed into nests of appropriate aged nestlings.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; At-risk Biota; Aves (Birds); Accipitriformes (Hawks); *Haliaeetus leucocephalus* (Bald Eagle); Recurring -- every year; February through July

This survey tracks bald eagle nest locations, active nests, incubation initiation date, and productivity on Ottawa NWR. Nest monitoring and productivity is primarily done by refuge volunteers. The location of active bald eagle nests is tracked annually in ArcGIS to evaluate potential impacts to nesting pairs.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Ohio Department of Natural Resources

Ohio Division of Wildlife maintains statewide record of number of active bald eagle nests, and data is contributed to this program.

The amount of monitoring on Ottawa would be scaled back without volunteer involvement to just track active nest locations.

Survey: Long-term monitoring of butterflies BSBO (FF03ROTW00-036)

Refuge: Ottawa National Wildlife Refuge

Priority: 24

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Pollinators in general face a variety of threats such as loss of habitat, climate change, insecticides, etc.

Pollinators are sensitive to environmental stressors, and can serve as an early warning indicator of environmental issues. A large number of pollinators are experiencing population declines, including precipitous declines in some cases such as the monarch butterfly and the rusty patched bumble bee.

This survey focuses on butterflies and moths, with data reported to the Ohio Lepidopterists. These data may be used at a statewide scale to assess abundance, distribution, and population changes over time.

Ideally this survey would transition to a more comprehensive assessment of all pollinator species. However, this is very unlikely due to lack of resources and expertise.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Arthropoda (arthropods); Lepidoptera (butterflies, moths); Recurring -- every year; Spring, Summer, Fall

Surveys are conducted once every seven days from April-October. Surveys are conducted along permanent transects, with transects divided into subsections for recording observations. All butterflies observed within a 15 foot wide by 15 foot high strip along the transect are counted by species. Notes on habitat, management activity, and weather conditions are also recorded.

Note costs assume establishment of an additional survey route by refuge staff, which is dependent upon availability of resources.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring

Black Swamp Bird Observatory conducts the surveys and provides annual progress reports. Survey lead is Mark Shieldcastle, Research Director, BSBO.

This survey may be discontinued if partner resources are not available, or could be transitioned to a more generalized pollinator survey.

Survey: Audubon's Christmas Bird Count (FF03ROTW00-024) (FF03RCDP00-052)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 25

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Lake Erie Coastal Wetland Complex Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The Christmas Bird Count is an international bird survey, and provides a long term data set of winter bird distribution and abundance. Data have been used in numerous publications and are important in looking at changes in populations and distributions, and in assessing impacts to birds such as those due to climate change.

Data at the local level have limited use in refuge management, but provide a long term record of winter bird use of refuge and nearby habitats.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Falconiformes (Falconiforms, Falcons); Gaviiformes (Loons); Strigiformes (Owls, Goatsuckers); Columbiformes (Pigeons, Doves); Piciformes (Woodpeckers); Suliformes (Cormorants); Gruiformes (Rails, Cranes); Passeriformes (Perching Birds); Galliformes (Fowls, Gallinaceous Birds); Accipitriformes (Hawks); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); Pelecaniformes (Ibises, Herons, Pelicans); Coraciiformes (Rollers, Kingfishers); Anseriformes (Ducks, Waterfowl, Swans, screamers, Geese); Podicipediformes (Grebes);
Recurring -- every year; December 14-January 5

Total count of all birds observed within a 15 mile survey radius. Locations covered within the survey radius and the number of participants will typically vary annually. Data are submitted to the National Audubon Society.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; National Audubon Society

Surveys are conducted by volunteers, interested members of the public, and occasionally refuge staff. Survey would be discontinued without cooperator support.

Survey: Monthly bird walk (FF03ROTW00-003)

Refuge: Ottawa National Wildlife Refuge

Priority: 26

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Forest Objective; Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Shrubland Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The monthly bird walk was initiated in 1969 just a few years after the refuge was established. The survey records detections of all bird species and thus includes all avian resources of concern in the HMP. It is extremely rare to have such a long term data set recording bird observations monthly, and the data set has much unexplored potential. To date, bird data have only been used for establishing a seasonal bird checklist for the refuge.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Aves (Birds); Strigiformes (Owls, Goatsuckers); Falconiformes (Falconiforms, Falcons); Gaviiformes (Loons); Columbiformes (Pigeons, Doves); Piciformes (Woodpeckers); Gruiformes (Rails, Cranes); Passeriformes (Perching Birds); Galliformes (Fowls, Gallinaceous Birds); Accipitriformes (Hawks); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); Apodiformes (Hummingbirds, Swifts); Coraciiformes (Rollers, Kingfishers); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Podicipediformes (Grebes); Recurring -- every year; Monthly

The monthly bird count records bird observations during a daylong count within consistent coverage areas on Ottawa NWR. The count is open to the public, but is dependent upon a dedicated group of volunteers to complete the survey. Number of observers each month varies. The survey is conducted on the first Monday of each month year round.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring

Volunteers and interested members of the public conduct the survey. Current count compilers are Ed Pierce and Douglas Vogus.

Survey would be discontinued without cooperator support.

Survey: Trumpeter swan survey DOW (FF03ROTW00-051) (FF03RCDP00-063)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 27

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The trumpeter swan is a State of Ohio threatened species. Reintroductions of the species began in 1996, and the Complex was one of the release areas. Over the course of this survey, refuge staff have supported reintroductions, aided capture and banding efforts, conducted mute swan control, and provided supplemental sightings of swan pair nesting and cygnet production. The Complex currently supports a sizable breeding population, and provides a source population that gradually is spreading to other parts of the state and into Michigan. Surveys results are not used in refuge management decisions.

Trumpeter swans are nearing state population goals, and it is possible that the species could be delisted and surveys discontinued within the next several years.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; *Cygnus buccinator* (Trumpeter Swan); Recurring -- every year; Summer

Ohio Division of Wildlife conducts annual aerial helicopter surveys in summer to document number of breeding pairs and cygnets for trumpeter swans. Non-breeding birds are also documented when seen. Ground observations are used to confirm aerial sightings. Surveys are supplemented by observations reported by the public and by refuge staff.

Previous more intensive efforts by Ohio DOW included leg bands and neck collars during the early years of reintroduction.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Baseline Monitoring; Ohio Department of Natural Resources

Laura Kearns, Ohio DOW, is the lead research coordinator. This survey will be eliminated without cooperator support.

Survey: Integrated Waterbird Management and Monitoring (FF03ROTW00-050) (FF03RCDP00-062)

Refuge: Ottawa National Wildlife Refuge, Cedar Point National Wildlife Refuge

Priority: 28

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

This was the highest ranked survey in the IMP prioritization process. With adequate resources, it would also be ranked in the top five surveys as prioritized by refuge staff. Highly ranked characteristics of the survey include coverage of a large number of resources of concern in the highest priority habitat in the HMP, habitat assessment protocols, direct feedback loop to management actions, and a developed protocol, database, and reporting tool. Concerns about the survey are primarily related to survey timing, large time commitment, and lack of resources to complete the surveys. Much of the survey period falls outside of the time that seasonal summer help is available, and it would have to be accomplished with permanent staff, which appears to be very difficult to achieve. Also, due to the nature of the large number of small wetland management units on the Complex, there are major concerns in that numerous units would need to be surveyed in order to achieve the goal of assuring the management feedback loop.

For the above reasons, we have identified this as an expected survey. The preliminary plan is to begin a pilot test of the survey on a small number of units sometime in the first five years of the plan, to assess survey procedures, time commitments, and capability. Based upon results of the pilot surveys, we will assess our capability and determine if the survey cannot be achieved with current resources, could be partially implemented, or could have comprehensive implementation.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Other Biota; Plantae (plants); Aves (Birds); Charadriiformes (Auks, Shore Birds, Gulls, Plovers, Alcids, Oystercatchers); Suliformes (Cormorants); Gruiformes (Rails, Cranes); Anseriformes (Ducks, Waterfowl, Swans, Screamers, Geese); Podicipediformes (Grebes); Sporadic or Ad Hoc; Fall, Winter, Spring

IWMM targets stopover and wintering populations of shorebirds, waterfowl, wading birds, and other wetland avian species. It also includes assessment of habitat conditions. Implementation will be in test phases, and could be sporadic based upon personnel resources.

Is this a cooperative survey? If so, what partners are involved in the survey?

Coop Monitoring to Inform Management; U.S. Fish and Wildlife Service, Migratory Birds

Survey: Dune and Great Lakes Beach monitoring (FF03RCDP00-048)

Refuge: Cedar Point National Wildlife Refuge

Priority: 29

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Beach Objective; Forest Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

Great Lakes Beach habitat is a priority resource for the Complex and supports a variety of rare, threatened, and endangered plant species. Some of these represent regionally significant populations, with the largest known populations in the State of Ohio of bushy cinquefoil and three-square bulrush occurring at Cedar Point. Great Lakes beach habitats gradate to the Cottonwood Dune community, a globally rare habitat and a priority resource for the Complex. Both communities are very rare in the Western basin of Lake Erie due to the widespread distribution of hardened shorelines. These communities are highly dynamic and interrelated, driven by ecosystem processes such as littoral drift, seiche and wave action. Community changes can also respond to and migrate with changes in lake level.

The best way to monitor these dynamic ecosystems is yet to be determined. At a minimum, documenting changes in the extent and density of the rare plant populations will be a priority, along with monitoring and control of invasive species. Extended low lake levels could lead to the expansion or development of new communities, with monitoring to document new species occurrence and mitigate threats of invasive plants. However, in the event of extended very high lake levels, there is little leeway for some areas to migrate as would have occurred historically, and limited management actions that could be initiated to limit decreases in these communities.

This is an expected survey, but the extent and timing of the survey will depend upon availability of resources.

What is the population or attribute of interest, what will be measured, and when?

Landscapes (Ecosystem Pattern and Processes); Landscape Dynamics; Plantae (plants); Recurring -- every five years; June-September

The location, distribution, extent, and density of rare plant species and invasive plants that threaten the communities will be monitored through periodic sampling (5 year average) and mapping. Other parameters may be monitored but will be determined in the future. If cooperator resources can be leveraged, then additional sampling will be implemented.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Potential for future cooperative sampling efforts, for instance with the Cleveland Natural History Museum, and Ohio DNR botanists.

Survey: Invasive plant control transects (FF03ROTW00-046)

Refuge: Ottawa National Wildlife Refuge

Priority: 30

Which station management objective does the survey support? Is the objective derived from the CCP, interim objectives, HMP, or other?

HMP: Lake Erie Coastal Wetland Complex Objective; Moist Soil and Mudflat Objective; Wet Prairie and Sedge Meadow Objective;

Why is it important to conduct the survey? Describe how survey results will be used to make better informed refuge management decisions. If survey results are used to trigger a management response, identify the management response and threshold value for comparison to survey results.

The Complex expends a tremendous amount of time and money on the control of invasive plant species. While some efforts do not need extensive monitoring to determine efficacy of treatments and assure efficient use of resources, other situations provide considerable uncertainty on long term outcomes. Permanent monitoring plots can clarify if treatments are effective, and help identify retreatment regimes to aid in future planning. This effort would target the most problematic invasive species (phragmites), and could include other species such as flowering rush, narrow-leaved cattail, reed canary grass, European frogbit, etc.

This is listed as an expected survey, with the extent of monitoring efforts to be determined based upon available resources. Some permanent monitoring transects were established in 2007 to look at phragmites and flowering rush treatment response, but further expansion or alteration of the current methods will be considered.

What is the population or attribute of interest, what will be measured, and when?

Biological Integrity; Invasive Species; Plantae (plants); Butomaceae (No common name); Poaceae (grasses); Recurring -- every five years; Late spring-early fall

The intended goal is to monitor the long term efficiency of invasive plant control efforts (chemical application, mowing, disking, water level management, prescribed fire, etc), verify control efforts are meeting objectives, and determine retreatment schedules. Invasive plant species of interest and native plant community recovery would be assessed through establishment of permanent sampling transects. Frequency of sampling will be determined by availability of resources, with an initial goal of at least once every five years.

Is this a cooperative survey? If so, what partners are involved in the survey?

NO

Revising the IMP

The Project Leader will review the refuge capacity and status of surveys annually and determine which of the selected surveys will be implemented in that year. The PRIMR database was updated along with this IMP; it will be updated as approved protocols are linked to the selected surveys and when surveys are added or removed from the set of selected surveys.

The IMP will be revised according to I&M Policy and as CCP and HMP plans are modified (see Appendix J). An IMP revision is triggered when surveys are added or removed from the set of selected surveys. IMP revisions require signatures from refuge staff, Regional I&M staff, Regional Refuge Biologist/Natural Resources Division Chief, but not the Refuge Supervisor or Regional Chief of Refuges.

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Appendix A. Resources of Concern (ROC)

The following species and natural communities were identified as priority resources of concern in the Ottawa NWR Complex HMP (2016); Table 3-2:

Resource of concern	Lake Erie Coastal Wetland Complex	Wet Prairie/Sedge meadow	Moist Soil/Mud	Beach	Shrubland	Forest
American Black Duck	x					
Least Bittern	x					
Lesser Scaup	x					
Marsh Wren	x					
Pied-billed Grebe	x					
Virginia Rail	x					
Wood Duck	x					
Northern Pike	x					
Muskrat	x					
Fragile Papershell	x					
Wild Rice	x					
Blanding's Turtle	x					
Northern Leopard Frog	x					
Dickissel		x				
Grasshopper Sparrow		x				
Eastern Prairie Fringed Orchid		x				
Eastern Fox Snake		x				
Blue-winged Teal			x			
Dunlin			x			
Lesser Yellowlegs			x			
Great Lakes Beach				x		
American Woodcock					x	
Black-crowned Night-heron					x	
Gray Catbird					x	
Yellow-rumped Warbler					x	
Bald Eagle						x
Black-throated Green Warbler						x
Downy Woodpecker						x
Great Blue Heron						x
Great Egret						x
Warbling Vireo						x
White-throated Sparrow						x
Cottonwood Dune						x
Northern (Great Lakes) Flatwoods						x

Appendix B. Criteria and Weights Used to Prioritize Surveys

This section describes the 12 criteria that can be used alone or in conjunction with a SMART Tool to help refuge staff prioritize its surveys. Each criterion is grouped under one of eight themes that describe a survey's general contribution to a refuge's or broader needs. Rating values (1—2, 1—3, or 1—4) that are used to score each survey are also given for each criterion. Ottawa NWRC staff came to a consensus on weights to be applied to each criterion, which are shown in parentheses next to the criterion name.

NOTE: The 24 criteria recommended by the NRPC were reduced to the following 13 for use in Region 3. The 11 criteria were removed because they would not apply to refuges in the Midwest, were redundant with other criteria, or would not add discrimination among surveys in the Midwest. One additional criterion was removed (Controversy) by Ottawa staff due to irrelevancy (no surveys are considered controversial).

1. Refuge Priorities and Management Needs

B. CCP or Other Management Plan Objectives (11%)

How many refuge CCP or other management plan objectives (e.g., HMP, Fire Management Plan, Recovery Plan, Integrated Pest Management Plan) are met by the focus of this survey? *Double-counting objectives from different sources is acceptable*

Example 1: A survey of staff gauge readings for water levels in representative units can be used to evaluate a range of wetland habitat objectives including seasonal, emergent, and permanent types.

Example 2: An Early Detection Rapid Response survey can be used to discover the presence of highly invasive plant species in multiple refuge habitats.

1. Does not address an objective
2. Addresses one objective
3. Addresses two objectives
4. Addresses three or more objectives

D. Management Utility (Decision Support) for the Refuge (12%)

Does the survey provide data for recurring management decisions, especially as part of an existing decision framework that is implemented on a regular basis?

Surveys providing information to either directly evaluate or serve as indicators of high- priority management actions can be considered as earning a 3 or 4 rating for this criterion.

1. No set application for the refuge
2. May have management implications, but they are not explicitly defined
3. Has management implications, but no current decision framework
4. Part of an existing adaptive management decision framework, such that a management decision is triggered (can include informal adaptive management frameworks)

2. Partner Priorities and Management Needs

A. FWS Programs (7%)

Does the survey provide information that directly contributes to evaluating the status

and trends of resources that are a priority for another FWS regional or national program (e.g., Migratory Birds, Ecological Services, Water Resources/Hydrology *other than ESA species*)?

Example 1: North American Breeding Bird Survey, North American Amphibian Monitoring program, Mid-Winter Waterfowl Survey, and Circumpolar Biodiversity Monitoring Network are priority surveys for regional or national FWS programs.

1. Does not address a management priority identified by a FWS regional or national program or initiative
2. Addresses a management priority identified by 1 FWS regional or national program or initiative
3. Addresses a management priority identified by 2 FWS regional or national programs or initiatives
4. Addresses a management priority identified by ≥ 3 FWS regional or national programs or initiatives

B. FWS Partners (7%)

Does the survey address an identified priority of a conservation partner, such as a Landscape Conservation Cooperative(s) (LCC), state agencies, TNC, Ducks Unlimited?

These priorities should be obtained from documents such as the State Wildlife Action and Joint Venture plans. The staff should document where they obtained these priorities and if they were high- or medium-level priorities. The refuge itself does not count as a partner.

1. Does not focus a management priority identified by FWS partners (e.g., LCC, state agency)
2. Focus on a management priority identified by one FWS partner (e.g., LCC, state agency)
3. Focus on a management priority identified by two FWS partners (e.g., LCC, state agency)
4. Focus on a management priority identified by three or more FWS partners (e.g., LCC, state agency)

3. Ecological Applications

A. Ottawa HMP PROC (11%)

Does the survey focus on a PROC species selected in the Ottawa NWR HMP?

This also includes any survey that focuses on the habitat of a PROC.

1. No
2. Yes, one FWS surrogate species
3. Yes, two FWS surrogate species
4. Yes, three or more FWS surrogate species

B. Refuge Processes (8%)

Does the survey focus on an ecological process (e.g., fire, water temperature, climate) that is changing at a rate that is important to the refuge?

1. No
2. Yes, one significant ecological process
3. Yes, two or more significant ecological processes

C. Survey Breadth (6%)

The focus of the survey is:

1. A single species or abiotic parameter
2. Multi-species or multi-abiotic parameters
3. A community – multi-trophic level or biota
4. An ecosystem – biotic community and abiotic parameters

4. Additional Legal Mandates

A. Listed species or vegetation communities (10%)

Is the objective of the survey a species or vegetation community federally listed under ESA, state listed (threatened or endangered only), ranked by the state's natural heritage program (S1 or S2 rank only), globally ranked by NatureServe (G1 or G2 rank only), or globally listed on the IUCN Red List of Threatened Species (Critically Endangered, Endangered, or Vulnerable only)?

1. Not state, federally or globally ranked
2. Yes, state listed or ranked by state's natural heritage program
3. Yes, globally listed by NatureServe or IUCN
4. Yes, federally listed under the ESA as threatened or endangered

5. Immediacy of Need

B. Threat (10%)

Does the survey support decision-making to monitor and mitigate a known or suspected threat to refuge resources?

Note: This criterion scores surveys addressing known or suspected threats. It does not apply to baseline monitoring intended to detect new (i.e., unknown) threats or changes. Examples of threats may include invasive species, pollutants or toxins, and climate change.

1. No existing threat or potential for a threat to Refuge resources (the survey does not relate to threat reduction strategies)
2. No known threat, but potential for a threat to Refuge resources (Yes, supports decision making to address a threat reduction strategy)
3. Known threat to Refuge resources, but immediate management action is not currently needed but may be in the near future (Yes, supports decision making to address a threat reduction strategy)
4. Urgent threat to Refuge resources; immediate data are needed to support management action (Yes, supports decision making to address a threat reduction strategy)

6. Scope and Scale

A. Baseline data (7%)

Does the survey provide high-priority information that contributes to baseline data needs?

Example: Inventories of species guilds (e.g., invertebrates, plants, reptiles) or abiotic parameters (soils, waters).

1. No
2. Yes

C. Spatial Scale (6%)

What is the largest scale at which survey results will be applied for resource management?

Note: Only surveys with a protocol that establishes methods for data management and analysis are scored higher than a 1. The area of inference for larger-scale surveys (e.g., North American Amphibian Monitoring Program) should be considered from the refuge perspective unless the refuge directly contributes to analyses at a larger scale. This criterion is applicable to surveys covering areas on and adjacent to the refuge. Example: If a refuge participates and contributes to a regional survey involving neighboring US Forest Service lands, then this criterion would apply.

1. Small scale: Applicable to only a single refuge or sites on a refuge
2. Medium scale: Applicable to a few refuges, a refuge complex, or includes the refuge and a small area beyond the refuge boundary
3. Large scale: Applicable to multiple refuges/complexes across an entire ecoregion, LCC, or region
4. Continental scale: Component of a large landscape level survey (e.g., North American Breeding Bird Survey, North American Amphibian Monitoring Program, and Circumpolar Biodiversity Monitoring Network) or anything outside of Region 3

7. Protocol

C. Protocol development & data management, analysis, and reporting (7%)

At what stage of development is the protocol development, data management, analysis, and reporting?

1. Survey has no written protocol, data management, analysis, and/or reporting
2. Written protocol is in development (drafted) or written, but only used at Ottawa
3. Written protocol is in formal review or used by others but not in formal review
4. There is a published record or I&M approved protocol

Terms Used in the Prioritization Criteria

For Criterion #1, refuge purpose is defined within the National Wildlife Refuge System Mission and Goals and Refuge Purposes policy (601 FW 1).

The NWRS Improvement Act defines “purposes of the refuge” as the “purposes specified in or derived from the law, proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.”

Refuges acquired under the authority of general conservation laws take on the purpose of the law. Examples of such laws include the Endangered Species Act of 1973, as amended; the Migratory Bird Conservation Act; the Fish and Wildlife Act of 1956, as amended; the Fish and Wildlife Coordination Act, as amended; the Emergency Wetlands Resources Act of 1986; and the Alaska National Interest Lands Conservation Act of 1980. Executive orders and proclamations, Secretary’s Orders, public land orders, and refuge-specific legislation generally declare the purpose(s) of the refuge, sometimes broadly (e.g., “as a preserve and breeding ground for native birds”) and sometimes very specifically (e.g., “to protect and preserve in the national interest the Key deer and other wildlife resources in the Florida Keys”).

As written in the Wilderness Act of 1964, the purposes of the Act are to be “within and supplemental” to the purpose(s) of those refuges with designated wilderness. We interpret this to mean the wilderness purposes become additional purposes of the refuge, yet apply only to those areas of the refuge designated as wilderness. Wilderness designations provide additional considerations for determining the administrative and management actions we need to take to achieve a refuge’s purpose(s) on designated wilderness areas within the Refuge System.

Throughout the criteria, the term refuge refers to one or more refuges in the NWRS. Based upon 601 FW 1, a refuge is defined as “...all lands, waters, and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas managed by the Refuge System for the protection and conservation of fish and wildlife, including threatened and endangered species, as determined in writing by the Director of the Service, by Secretary’s Order, or so directed by the President.”

Definitions of refuge management activities and refuge uses derived from the Compatibility policy (603 FW 2.6) that apply to all refuges:

Refuge management activity—An activity conducted by the Service or a Service-authorized agent to fulfill one or more purposes of the national wildlife refuge, or the National Wildlife Refuge System mission. Service-authorized agents include contractors, cooperating agencies, cooperating associations, refuge support groups, and volunteers.

Refuge management economic activity—A refuge management activity on a national wildlife refuge that results in generation of a commodity which is or can be sold for income or revenue or traded for goods or services. Examples include: farming, grazing, haying, and timber harvesting.

Refuge use; use of a refuge. A recreational use (including refuge actions associated with a recreational use or other general public use), refuge management economic activity, or other use of a national wildlife refuge by the public or other non-National Wildlife Refuge System entity

Appendix C. Prioritization Scores of All Ranked Surveys

Values used to prioritize and select the surveys likely to be conducted through 2032 at Ottawa National Wildlife Refuge Complex. Prioritization scores were generated for candidate surveys by refuge staff using 12 criteria for each survey (Appendix B). Candidate surveys represent specific surveys or general information needs and were not always associated with specific protocols. Scores were then used as a starting reference to assign the survey status.

Table C-1 Ranking of priority scores from the SMART tool for all considered surveys.

Survey	Final Rank	Final Score	Status
Integrated Waterbird Management and Monitoring	1	0.86	Expected
Bathymetric survey	2	0.78	Current
Great Lakes Marsh Monitoring Program, Marsh Bird Survey	3	0.68	Current
Point counts breeding birds	4	0.68	Future
Forest Rapid Ecological Assessment	5	0.65	Current
Colonial waterbird survey, West Sister Island NWR	6	0.63	Current
Eastern Prairie Fringed Orchid inventory and monitoring	7	0.61	Current
Water level monitoring	8	0.61	Current
Aerial photography for habitat monitoring	9	0.60	Current
Great Lakes Marsh Monitoring Program, Amphibian Survey	10	0.58	Current
EDRR invasive plant mapping	11	0.55	Current
Invasive plant control transects	12	0.54	Expected
Dune and Great Lakes Beach monitoring	13	0.53	Expected
Habitat photo points	14	0.53	Current
Mussel monitoring	15	0.52	Future
Water quality monitoring	16	0.50	Current
Northern pike monitoring	17	0.46	Future
Bat inventory	18	0.46	Future
Muskrat house survey	19	0.44	Current
White-tailed deer Spotlight Survey	20	0.42	Current
Long-term monitoring of butterflies BSBO	21	0.39	Current
Wilderness character monitoring	22	0.34	Current
FWS Woodcock Singing Ground Survey	23	0.33	Historic
Blanding's Turtle monitoring	24	0.31	Future
Common tern nesting platform monitoring	25	0.28	Current
Eastern Fox Snake monitoring	26	0.26	Future
Breeding bird survey	27	0.23	Future

Appendix D. Cost-benefit Analysis

The following table includes results from direct selections and linear programming approaches (all optimized sets). The optimized portfolios used the total of all frequency adjusted scores as an objective function. Main constraints included costs (weeks) and surveys selected prior to solving the linear function (summation of frequency adjusted scores across all surveys). Portfolios represent sets of selected surveys as IMP variants.

Table D-1. Parameters framing IMP portfolios presented in Table D-2.

Portfolio	Parameters
A	The best scoring surveys were directly selected in descending order until Ottawa's available staff time was depleted.
B	Optimized by Solver, constrained by selecting all surveys identified as priorities by Ohio Ecological Services Field office
C	Optimized by Solver, constrained by selecting all surveys identified as priorities by Migratory Birds
D	Optimized by Solver, constrained by selecting all surveys identified as priorities by Water Resources branch
E	Optimized by Solver, constrained by selecting all inventory surveys
F	Optimized by Solver to maximize benefit, constrained only by staff time
G	Direct selection of all surveys that were priorities for other programs
H	Direct selection of all surveys that are currently completed by refuge staff
I	Direct selection of surveys by Eddy Pausch*
J	Direct selection of surveys by Ron Huffman*
K	Direct selection of surveys by Jason Lewis*
L	Direct selection of surveys by all three participating staff*
R	Final selection

*These selections were done during the workshop and before adjustments were made to the time estimates.

Table D-2 Efficiencies in terms of frequency adjusted benefit for 13 potential IMP portfolios (1= selected, 0= not selected). Portfolios were created by direct selections or by solving for optimal sets (maximum benefit within constraints) as described in Table D-1. Benefit scores are derived from the ranking results presented in Table C-1.

Survey Name	A	B	C	D	E	F	G	H	I	J	K	L	R
Aerial photos	1	1	1	1	1	1	0	1	1	1	1	1	1
Bat inventory	0	1	1	1	1	1	0	0	0	0	0	0	0
Blanding's Turtle monitoring	0	1	0	0	0	0	1	0	0	0	0	0	0
Breeding bird survey	0	1	1	1	1	1	1	0	0	0	0	0	0
Colonial waterbird monitoring	1	1	1	1	1	1	1	1	1	1	1	1	1
Common tern nesting platform monitoring	0	0	1	0	0	0	0	1	1	0	0	0	0
Dune and Great Lakes Beach habitat monitoring	1	0	0	1	1	1	0	0	0	1	0	0	1
Eastern Fox Snake monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0
Eastern Prairie Fringed Orchid monitoring	1	1	1	1	1	1	1	1	1	1	0	1	1
EDRR RLGIS invasive plant mapping	1	1	1	1	1	1	0	1	1	1	1	1	1
Forest health monitoring	1	1	1	1	1	1	0	1	1	1	1	1	1
FWS Woodcock Singing Ground Survey	0	1	1	1	1	1	1	1	0	1	0	0	0
MMP, Amphibian Survey	1	1	1	1	1	1	1	1	0	0	1	1	1
MMP, Marsh Bird Survey	1	0	0	0	1	1	1	1	0	1	1	1	1
Habitat photo points	1	1	1	1	1	1	0	1	0	1	0	0	1
Integrated Waterbird Management and Monitoring	1	0	1	0	0	0	1	0	0	0	1	0	1
Invasive transects	1	1	1	1	1	1	0	1	1	1	0	0	1
Long-term monitoring of butterflies	0	1	0	0	0	0	1	0	0	0	0	0	0
Muskrat house survey	0	1	1	1	1	1	0	1	1	1	1	1	1
Mussel monitoring	0	1	1	1	1	1	0	0	0	0	0	0	0
Northern pike monitoring	0	1	1	1	1	1	0	0	0	0	0	0	0
Point counts breeding birds	1	1	1	1	1	1	0	0	1	0	0	0	0
Water level monitoring	1	0	0	1	0	0	1	1	1	1	1	1	1
Water quality monitoring	0	1	1	1	1	1	1	1	1	1	1	1	1
Wilderness character monitoring	0	1	1	1	1	1	0	1	0	1	1	1	1
White-tailed deer Spotlight Survey	0	1	1	1	1	1	1	1	0	1	0	0	1
Bathymetric survey	1	1	1	1	1	1	0	0	0	1	0	0	1
Management action records: spreadsheet*	1	1	1	1	1	1	1	1	1	1	1	1	1
Benefit	8.83	10.55	10.9	10.99	11.06	11.06	6.07	8.30	6.10	8.74	6.53	6.28	9.86
Weeks/year	24.8	24.7	24.5	24.4	23.9	23.9	23.6	20.7	16.3	19.5	20.4	17.8	25.4
# Surveys	15	22	22	22	22	22	13	17	12	17	12	12	18

*This survey is required and must be selected. It was not scored or ranked, but was included in portfolios for time estimates.

Appendix E. Non-selected Surveys

A status of future denotes surveys that have been prioritized but have low chance of being conducted during the span of the IMP because of low priority or because the capacity to conduct the survey will be difficult to secure. Historic status surveys have been recently completed or discontinued and were not ranked.

Survey Name	Survey ID Number	Survey Priority	Survey Status
Forest Rapid Ecological Assessment	FF03RITS00-037	10	Future
Common tern nesting platform monitoring	FF03ROTW00-010	21	Historic
Migratory songbird stopover habitat use survey	FF03ROTW00-052, FF03RCDP00-066	31	Future
Blanding's turtle monitoring	FF03ROTW00-041, FF03RCDP00-045	32	Future
Northern Pike Monitoring	FF03ROTW00-043	33	Future
Pollinator survey	FF03ROTW00-053	34	Future
Unionid monitoring	FF03ROTW00-038, FF03RCDP00-044	35	Future
Eastern Fox Snake monitoring	FF03ROTW00-040, FF03RCDP00-055	36	Future
Bat inventory	FF03ROTW00-042, FF03RCDP00-054	37	Future
Point Counts Breeding Birds	FF03ROTW00-054	38	Future
Breeding Bird Survey	FF03ROTW00-039	39	Future
Wild Rice Monitoring	FF03ROTW00-004, FF03RCDP00-043	40	Future
Goose roundup/ goose collar surveys	FF03ROTW00-005	NA	Historic
Small nest box monitoring	FF03ROTW00-007	NA	Historic
USFS gypsy moth monitoring	FF03ROTW00-008	NA	Historic
Breeding Bird Atlases	FF03ROTW00-014	NA	Historic
Emerald Ash Borer (EAB) survey	FF03ROTW00-016	NA	Historic
Cavity nesting waterfowl, nest box monitoring	FF03ROTW00-018	NA	Historic
Ohio Winter Bird Atlas, conducted by Black Swamp Bird Observatory (BSBO)	FF03ROTW00-019	NA	Historic
American Woodcock Singing-ground Survey	FF03ROTW00-022	NA	Historic
Migrational movements and habitat usage of rails in the Lake Erie Marsh region, Ohio, conducted by Black Swamp Bird Observatory	FF03ROTW00-023	NA	Historic
Point Counts Breeding Birds	FF03ROTW00-028	NA	Historic

Survey Name	Survey ID Number	Survey Priority	Survey Status
Habitat Monitoring	FF03ROTW00-030	NA	Historic
Owl survey	FF03ROTW00-033	NA	Historic
Purple loosestrife biocontrol monitoring	FF03ROTW00-035	NA	Historic
Habitat Monitoring	FF03RCDP00-001	NA	Historic
Double-crested cormorant management and monitoring	FF03RITS00-035	NA	Historic

Appendix F. Estimated Annual Costs for Implementing Surveys

(Selected surveys with a historic status are excluded).

Survey Name	Survey ID Number	Survey Priority	Survey Status	FWS Staff Total	Total Cost
Water Level Monitoring	FF03ROTW00-032, FF03RCDP00-049	1	Current	\$ 4,588	\$ 4,888
Colonial Waterbird Survey	FF03RITS00-034	2	Current	\$ 2,477	\$ 2,677
Bathymetric survey	FF03ROTW00-047, FF03RCDP00-053	3	Current	\$ 1,154	\$ 1,154
Muskrat House Survey	FF03ROTW00-034, FF03RCDP00-064	4	Current	\$ 2,092	\$ 2,142
Great Lakes Marsh Monitoring Program, Marsh Bird Survey	FF03ROTW00-011, FF03RCDP00-060	5	Current	\$ 5,423	\$ 5,573
Great Lakes Marsh Monitoring Program, Amphibian Survey	FF03ROTW00-021, FF03RCDP00-059	6	Current	\$ 3,346	\$ 3,446
Eastern Prairie Fringed Orchid Inventory and Monitoring	FF03ROTW00-029, FF03RCDP00-056	7	Current	\$ 2,215	\$ 2,215
EDRR Invasive plant mapping	FF03ROTW00-009, FF03RCDP00-057	8	Current	\$ 2,192	\$ 2,526
Aerial photography for habitat monitoring	FF03ROTW00-048, FF03RCDP00-050, FF03RITS00-038	9	Current	\$ 385	\$ 3,385
Forest Rapid Ecological Assessment	FF03ROTW00-045, FF03RCDP00-058, FF03RITS00-037	10	Current	\$ 3,692	\$ 3,742
Habitat photo points	FF03ROTW00-026, FF03RCDP00-061	11	Current	\$ 1,442	\$ 1,492
White-tailed deer spotlight survey	FF03ROTW00-013	12	Current	\$ 481	\$ 511
Water Quality Monitoring	FF03ROTW00-044, FF03RCDP00-065	13	Current	\$ 5,838	\$ 6,838
Wilderness Character Monitoring	FF03RITS00-001	14	Current	\$ 577	\$ 777
Management actions records: spreadsheet	FF03ROTW00-055, FF03RCDP00-067, FF03RITS00-039	15	Current	\$ 831	\$ 831
White-tailed deer aerial survey DOW	FF03ROTW00-049	16	Current*	\$ 48	\$ 48

Survey Name	Survey ID Number	Survey Priority	Survey Status	FWS Staff Total	Total Cost
Lake Erie Marsh Region Shorebird population survey BSBO	FF03ROTW00-006	17	Current*	\$ 48	\$ 48
Migrational movements and habitat usage of passerines BSBO	FF03ROTW00-031	18	Current*	\$ 48	\$ 48
Cedar Point point counts	FF03RCDP00-034	19	Current*	\$ 48	\$ 48
Aerial Waterfowl Survey DOW	FF03ROTW00-002, FF03RCDP00-051	20	Current*	\$ 48	\$ 48
FWS Duck Banding DOW	FF03ROTW00-015	21	Current*	\$ 96	\$ 96
Common tern nesting platform monitoring	FF03RCDP00-035	22	Current*	\$ 1,231	\$ 1,431
Bald Eagle Nesting Survey	FF03ROTW00-020	23	Current*	\$ 144	\$ 144
Long-term monitoring of butterflies BSBO	FF03ROTW00-036	24	Current*	\$ 2,331	\$ 2,331
Audubon's Christmas Bird Count	FF03ROTW00-024, FF03RCDP00-052	25	Current*	\$ 48	\$ 48
Monthly bird walk	FF03ROTW00-003	26	Current*	\$ 48	\$ 48
Trumpeter swan survey DOW	FF03ROTW00-051, FF03RCDP00-063	27	Current*	\$ 48	\$ 48
Integrated Waterbird Management and Monitoring	FF03ROTW00-050, FF03RCDP00-062	28	Expected	\$ 7,000	\$ 7,000
Dune and Great Lakes Beach monitoring	FF03RCDP00-048	29	Expected	\$ 2,815	\$ 2,999
Invasive plant control transects	FF03ROTW00-046	30	Expected	\$ 2,300	\$ 2,320
Migratory songbird stopover habitat use survey	FF03ROTW00-052, FF03RCDP00-066	31	Future	\$ 6,923	\$ 7,123
Blanding's turtle monitoring	FF03ROTW00-041, FF03RCDP00-045	32	Future	\$ 3,915	\$ 4,182
Northern Pike Monitoring	FF03ROTW00-043	33	Future	\$ 5,777	\$ 5,810
Pollinator survey	FF03ROTW00-053	34	Future	\$ 5,846	\$ 5,946
Unionid monitoring	FF03ROTW00-038, FF03RCDP00-044	35	Future	\$ 6,969	\$ 8,003
Eastern Fox Snake monitoring	FF03ROTW00-040, FF03RCDP00-055	36	Future	\$ 4,962	\$ 5,028

Survey Name	Survey ID Number	Survey Priority	Survey Status	FWS Staff Total	Total Cost
Bat inventory	FF03ROTW00-042, FF03RCDP00-054	37	Future	\$ 13,962	\$ 22,462
Point Counts Breeding Birds	FF03ROTW00-054	38	Future	\$ 4,125	\$ 4,225
Breeding Bird Survey	FF03ROTW00-039	39	Future	\$ 577	\$ 627
Wild Rice Monitoring	FF03ROTW00-004, FF03RCDP00-043	40	Future	\$ 988	\$ 1,088
				Staff Total	Total Cost
Total for selected (current and expected) surveys:				\$ 53,036	\$ 58,902
Total for future surveys:				\$ 54,044	\$ 64,494

* Surveys that are dependent upon and completed by cooperators. These surveys will be eliminated if cooperators are unable to complete the survey.

Appendix G. Estimated Annual Work Schedule for Selected Surveys, January – December.

Survey Name	Survey Priority	Refuge ¹	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Comments
Water Level Monitoring	1	OTW, CP	FW, A, R	FW	FW	T, FW	FW	FW	FW	FW	FW	FW	FW	FW, DE	Winter field work limited, may occur if no ice cover
Colonial Waterbird Survey	2	WSI		P					T, FW	DE, A, R					Intensive 1 day survey with FWS staff, DOW, BSBO
Bathymetric survey	3	OTW, CP	A, R	A, R		P, T, FW	FW	FW	FW	FW	FW			A, R	Depends on staff resource availability, intensity and timing varies greatly, Water Resources branch completes analysis and reporting
Muskrat House Survey	4	OTW, CP										FW	FW, DE, A, R		FW after muskrat houses established
Great Lakes Marsh Monitoring Program, Marsh Bird Survey	5	OTW, CP				P, T	FW	FW	FW	DE	DE				Number of surveys completed dependent upon Biotech skills and availability
Great Lakes Marsh Monitoring Program, Amphibian Survey	6	OTW, CP				P, T, FW	FW	FW		DE	DE				Number of surveys completed dependent upon Biotech skills and availability
Eastern Prairie Fringed Orchid Inventory and Monitoring	7	OTW, CP			P			T, FW	DE, A, R						Intensive 2 day survey of main populations; ES and volunteers assist
EDRR Invasive plant mapping	8	OTW, CP			P, T	FW, DE	FW, DE	FW, DE	FW, DE	FW, DE	FW, DE		A, R		
Aerial photography for habitat monitoring	9	All			P				FW	FW		A			Funding dependent, goal every 3-5 years
Forest Rapid Ecological Assessment	10	All	DE, A, R		P			T, FW	T, FW	T, FW					5-10 year sample schedule, WSI addition if resources available

Survey Name	Survey Priority	Refuge ¹	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Comments
Habitat photo points	11	OTW, CP								P, FW	FW	DE, A			May be done less than annually
White-tailed deer spotlight survey	12	OTW	FW, A, R	FW, A, R										P, T	May occur in years that DOW aerial survey cannot be completed
Water Quality Monitoring	13	OTW, CP		P, T	FW	FW	FW	FW	FW	FW	FW	FW	DE, A, R		5-10 year schedule, requires assistance of Water Resources branch
Wilderness Character Monitoring	14	WSI	P				FW		FW					DE, A, R	Some components have low refuge priority but are required by policy, includes results of colonial waterbird survey
Management actions records: spreadsheet	15	All	DE	DE	DE	DE	DE	DE	DE	DE	DE	DE	DE	DE	
White-tailed deer aerial survey DOW	16*	OTW, CP	P, A, R												WB coordination, requires snow pack for survey
Lake Erie Marsh Region Shorebird population survey BSBO	17*	OTW, CP		P, A											WB coordination
Migrational movements and habitat usage of passerines BSBO	18*	OTW		P											WB coordination
Cedar Point point counts	19*	CP		P											WB coordination
Aerial Waterfowl Survey DOW	20*	OTW, CP	R												
FWS Duck Banding DOW	21*	OTW							P						WB coordination

Survey Name	Survey Priority	Refuge ¹	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Comments
Common tern nesting platform monitoring	22*	CP		P		(FW)	(FW)	(FW)	(FW)	(FW)	(FW)				(FW) Interns and volunteers may assist as time permits, WB coordination
Bald Eagle Nesting Survey	23*	OTW, CP	P	FW, (FW)	A, R										WB coordination, map development, set closure areas. (FW) volunteer monitoring. CP location of active nests only.
Long-term monitoring of butterflies BSBO	24*	OTW		P											WB coordination
Audubon's Christmas Bird Count	25*	OTW, CP	R												
Monthly bird walk	26*	OTW	R												
Trumpeter swan survey DOW	27*	OTW, CP		P				(FW)	(FW)						(FW) Interns and volunteers may assist as time permits, WB coordination
Integrated Waterbird Management and Monitoring	28	OTW, CP	FW, DE, A, R	FW, DE	FW, DE	FW, DE	FW, DE	P, T	FW, DE	FW, DE	FW, DE	FW, DE	FW, DE	FW, DE	Pilot test of survey feasibility, then determine sampling intensity. May require cooperator. FW timing assumes inclusion of shorebird and waterfowl migration, and overwinter bird use.
Dune and Great Lakes Beach monitoring	29	CP	DE, A, R					P, T, FW	FW	FW					5-10 year schedule, may require cooperator or contractor assistance
Invasive plant control transects	30	OTW						P, T, FW	FW	FW	FW	DE, A, R			Schedule TBD but less than annual

Tasks: P=Planning, T=Training, FW=Field Work, DE=Data Entry, A=Analysis, R=Reporting. WB: wildlife biologist

¹ OTW=Ottawa NWR, CP=Cedar Point NWR, WSI=West Sister Island NWR

*: Cooperator survey, limited FWS involvement, would be eliminated or replaced at reduced intensity without cooperator involvement.

Appendix H. Refuge Condition Summaries

This summary can be used as a reporting tool throughout the life of the IMP to track the status, trends, and desired conditions of the selected surveys. Updates to summary can be made during annual reviews and reported in Annual Habitat Work Plans (AHWP). Updates to this table do not require an IMP revision, but should be uploaded as a digital file associated with the ServCat record that contains the approved IMP.

Ottawa Complex - REFUGE SUMMARY TABLE

Date of last update: 3/23/2017

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Biological Integrity	Other Biota	Acreage within HMP habitat classes	See HMP Table 4-1	HMP	See HMP Habitat Objectives	HMP	Yes	OTW, CP, WSI	Aerial photography for habitat monitoring
Biological Integrity	Other Biota	Fall migratory waterfowl abundance and distribution	See Ohio DOW website	http://wildlife.ohiodnr.gov/species-and-habitats/fish-and-wildlife-research/bi-weekly-aerial-waterfowl-survey	N/A	N/A	N/A	OTW, CP	Aerial Waterfowl Survey DOW
Biological Integrity	Other Biota	Occurrence and abundance of wintering bird populations	N/A	2016 Christmas Bird Count	N/A	N/A	N/A	OTW, CP	Audubon's Christmas Bird Count
Biological Integrity	Other Biota	Occurrence and abundance of bird populations, change over time	Varies	TNA annual reports	N/A	N/A	N/A	CP	Cedar Point point counts

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Biological Integrity	Other Biota	Nesting pairs of colonial waterbirds	Nesting Pairs: Great Blue Heron- 588, Great Egret- 840, Black-crowned Night-heron-313, Double-crested Cormorant- 2164	Annual waterbird survey	Nesting Pairs: Great Blue Heron- 1000, Great Egret- 800, Black-crowned Night-heron- 500, Double-crested Cormorant- 1500 to 2000	HMP Forest Objective 4, 5; HMP Shrubland objective 3	Great Egret- Yes, Double-crested Cormorant- within sampling confidence interval, other species-No	WSI	Colonial Waterbird Survey
Biological Integrity	Other Biota	Number of breeding pairs of Common Terns	2016-69 pairs, 5-year average 72 pairs	http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/research/Population%20Status%20Report/commonternreport2016final.pdf	5-average of 100 or greater pairs	http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/research/Population%20Status%20Report/commonternreport2016final.pdf	No	CP	Common tern nesting platform monitoring
Biological Integrity	Other Biota	Waterfowl banding	Varies	N/A	N/A	N/A	N/A	OTW	FWS Duck Banding DOW
Biological Integrity	Other Biota	Abundance of frog populations	Varies	2016 MMP amphibian surveys	N/A	N/A	N/A	OTW, CP	Great Lakes Marsh Monitoring Program,

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
									Amphibian Survey
Biological Integrity	Other Biota	Abundance of nesting marsh bird populations	Varies	2016 MMP bird surveys	N/A	N/A	N/A	OTW, CP	Great Lakes Marsh Monitoring Program, Marsh Bird Survey
Biological Integrity	Other Biota	Abundance of waterbirds, habitat characteristics	N/A	N/A	N/A	N/A	N/A	OTW, CP	Integrated Waterbird Management and Monitoring
Biological Integrity	Other Biota	Abundance and timing of shorebirds during spring and fall migration	Varies	BSBO annual shorebird report	N/A	N/A	N/A	OTW	Lake Erie Marsh Region Shorebird population survey BSBO
Biological Integrity	Other Biota	Abundance of lepidoptera	Varies	BSBO annual butterfly report	N/A	N/A	N/A	OTW	Long-term monitoring of butterflies BSBO
Biological Integrity	Other Biota	Abundance, timing, and energetic condition of landbirds during spring and fall migration	Varies	BSBO annual passerine report	N/A	N/A	N/A	OTW	Migrational movements and habitat usage of passerines BSBO

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Biological Integrity	Other Biota	Occurrence and abundance of bird species	Varies	Monthly bird walk list	N/A	N/A	N/A	OTW	Monthly bird walk
Biological Integrity	Other Biota	Index to abundance of muskrat populations	Varies	Annual muskrat survey	Varies	Varies	Varies	OTW, CP	Muskrat House Survey
Biological Integrity	Other Biota	Number and distribution of breeding pairs of Trumpeter Swans statewide	46 breeding pairs but just one year, 14 counties	http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/research/swansummerreport2016_final.pdf	40 breeding pairs for greater than one year; breeding in 15 counties	http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/research/swansummerreport2016_final.pdf	No	OTW, CP	Trumpeter swan survey DOW
Biological Integrity	Other Biota	Over-winter abundance of White-tailed Deer per square mile	2015- 7.1 deer per square mile	Ohio DOW	10-15 deer per square mile, overwinter	HMP Forest Objective 6; HMP Prairie objective 2	No	OTW	White-tailed deer aerial survey DOW
Biological Integrity	Other Biota	Over-winter abundance of White-tailed Deer per square mile	2015- 7.1 deer per square mile	Ohio DOW	10-15 deer per square mile, overwinter	HMP Forest Objective 6; HMP Prairie objective 2	No	OTW	White-tailed deer spotlight survey
Biological Integrity	At-risk Biota	Location and activity of nesting bald eagles	Varies	2017 volunteer bald eagle monitoring	N/A	N/A	N/A	OTW	Bald Eagle Nesting Survey

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Biological Integrity	At-risk Biota	5-year average of flowering orchids for Crane Creek and Young populations	5-year average: Crane Creek-452; Young 557	2016 EPFO survey	5-year average: Crane Creek-200; Young 50	HMP Prairie objective 1	Yes	OTW, CP	Eastern Prairie Fringed Orchid Inventory and Monitoring
Biological Integrity	Invasive Species	Habitat conditons and density of invasive species within treatment transects	N/A	N/A	N/A	N/A	N/A	OTW	Invasive plant control transects
Biological Integrity	Invasive Species	Location and abundance of EDRR invasive plants	Varies	RLGIS	Varies; goals include eradication, prevention of seed production and widespread invasion	HMP	Varies	OTW, CP	EDRR Invasive plant mapping
Water	Hydrology	Bathymetric contour maps of wetland units, volume capacity tables	Varies	Bathymetric maps and tables for wetland units with completed surveys	Completed surveys for all wetland units	HMP	No	OTW, CP	Bathymetric survey
Water	Hydrology	IGLD85 water levels for all wetland units	Varies	Annual water management plan	Varies	Annual water management plan	Varies	OTW, CP	Water Level Monitoring

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Water	Water Quality	Water quality parameters including turbidity, nitrogen, phosphorous, etc.	Varies	2012-2013 water quality testing	Unknown	N/A	N/A	OTW, CP	Water Quality Monitoring
Landscapes (Ecosystem Pattern and Processes)	Landscape Dynamics	Plant community composition, distribution, and structure; disturbance dynamics	Unknown	N/A	Unknown	N/A	N/A	CP	Dune and Great Lakes Beach monitoring
Landscapes (Ecosystem Pattern and Processes)	Landscape Dynamics	Forest stand composition, structure, and ecological characteristics	Varies	https://ecos.fws.gov/ServCat/Reference/Profile/64385	See HMP Forest Objective	HMP Forest Objective	Varies	OTW, CP	Forest Rapid Ecological Assessment
Landscapes (Ecosystem Pattern and Processes)	Landscape Dynamics	Chronological photo record wetland, forest, shrubland, and prairie habitats and change over time. Document results of management actions.	Varies	Habitat photo points	Varies	HMP objectives	Varies	OTW, CP	Habitat photo points

Resource Theme Level 1 ¹	Resource Theme Level 2 ¹	Attribute ²	Current Condition (values) ³	Source of Current Condition ⁴	Desired Condition (values) ⁵	Source of Desired Condition ⁶	Within Desired Condition? ⁷	Refuge ⁸	Survey Name ⁹
Human Use	Visitor and Recreation Use	Wilderness - Effects of human use; habitat characteristics, climatic condition trends, wildlife populations	Varies	https://ecos.fws.gov/ServCat/Reference/Profile/24952 , https://ecos.fws.gov/ServCat/Reference/Profile/56947	Varies	https://ecos.fws.gov/ServCat/Reference/Profile/24952 , https://ecos.fws.gov/ServCat/Reference/Profile/56947	Varies	WSI	Wilderness Character Monitoring

¹ Level 1 and 2 refer to the PRIMR Resource Themes 1 and 2 and cannot be altered.

² Characteristics of a system that are of interest of survey and can be observed or estimated.

³ If known, current conditions of system being measured.

⁴ Document in which current condition is reported. If not available enter "unknown" or "N/A".

⁵ Desired conditions of system being measured.

⁶ Document in which desired condition is reported. If not available enter "unknown" or "N/A".

⁷ Does the current condition and desired condition match? YES/NO/To Be Determined (TBD)

⁸ OTW=Ottawa NWR, CP=Cedar Point NWR, WSI=West Sister Island NWR

⁹ Survey name should match PRIMR record.

REFERENCES:

U.S. Fish and Wildlife Service. 2016. Ottawa NWR Complex Habitat Management Plan. USFWS Region 3. Ft. Snelling, MN.

Appendix I. Environmental Action Statement (EAS)

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA) (40 CFR 1500-1508), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the following proposed action does not require additional NEPA documentation.

Proposed Action, Alternatives, and NEPA Documentation

The proposed action is to implement an Inventory and Monitoring Plan (IMP) for the Ottawa National Wildlife Refuge Complex. This IMP is a step down plan from the 2000 Comprehensive Conservation Plan (CCP) and associated Environmental Assessment (EA) for the Complex and from the 2016 Habitat Management Plan for the Ottawa NWR Complex. This IMP provides more-specific guidance for surveys of Complex's fish, wildlife, plant, habitat, and abiotic resources to fulfill the Complex's purposes and help achieve Complex's goals and objectives.

The EA for Ottawa NWR Complex CCP included goals and objectives for the refuge and assessed the impacts associated with a range of reasonable alternatives to achieve those goals and objectives. The rationale for selection of one specific alternative for implementation is explained in the Finding of No Significant Impact (FONSI) accompanying the final CCP. The goals, objectives, and survey strategies included in this IMP fall within the bounds of those described and assessed in the CCP and EA or EIS.

Pursuant to 40 CFR 1502.9, no additional NEPA documentation is required to implement this IMP beyond the EA and FONSI prepared concurrently with the CCP. No substantial changes to the proposed action alternative that was identified, analyzed, and selected for implementation within the CCP, EA, and FONSI are proposed through this IMP. Similarly, no significant new information or circumstances exist relevant to environmental concerns and bearing on the proposed action or its impacts.

In accordance with 43 CFR 46.205 and 40 CFR 1508.4, surveys within this IMP are covered by the following Departmental categorical exclusion because they would not have significant environmental effects.

"Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources which involve negligible animal mortality or habitat destruction, no introduction of contaminants, or no introduction of organisms not indigenous to the affected ecosystem." 516 DM 8.5B(1)


Project Leader/Refuge Manager

10/5/2017
Date

[Note: this signature and dating is not required if a statement is placed below the IMP signature page indicating that the Project Leaders signing of that page applies to all contents of this IMP].

Reference: U.S. Fish and Wildlife Service. 2000. *Comprehensive Conservation Plan and Environmental Assessment for Ottawa National Wildlife Refuge Complex*. USFWS Region 3. Bloomington MN.

Appendix J: IMP Revision Signature Page

An IMP will be revised according to I&M Policy and as CCP and HMP plans are modified. IMP revisions require signatures from the staff listed in table below, which does not include the Refuge Supervisor or Regional Chief of Refuges. A revised IMP will include the completed and signed Revision Signature Page which will be placed at the beginning of the IMP and before the original signed IMP signature page.

IMP Revisions Ottawa National Wildlife Refuge Complex		
<i>Action</i>	<i>Signature /Printed Name</i>	<i>Date</i>
Survey list and priority changed:		
Submitted By:	Refuge Manager/Project Leader	
Reviewed By:	Regional I&M Coordinator	
Approved By:	Refuge Supervisor	