**U.S. Fish & Wildlife Service**  

**Inventory and Monitoring Plan**

**Detroit River International Wildlife Refuge**

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Humbug Marsh Unit, DRIWR. (Photo credit: William Welsh, Eastern Michigan University)



May 2015

**Detroit River International Wildlife Refuge**

**Inventory and Monitoring Plan**

# Signature Page[[1]](#footnote-2)

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| --- | --- | --- |
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# Introduction

This Inventory and Monitoring Plan (IMP) documents the inventory and monitoring surveys that will be conducted at Detroit River International Wildlife Refuge from 2015 through 2030, or until the refuge’s Comprehensive Conservation Plan (CCP) and Habitat Management Plan (HMP) are revised.

The majority of surveys considered in this plan address resource management objectives identified in the CCP (2005) and HMP (2015) for this refuge. Other surveys are a continuation of past monitoring conducted for the purpose of understanding long-term trends in specific resources or are part of regional and 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.

Detroit River IWR has its origins in an agreement among many partners contained in a 2001 vision document which recognized the significant ecological resources of the region and identified conservation priorities in the Detroit River corridor (MAC 2001). Through memoranda of understanding and cooperative management agreements, both Canadian and U.S. registries of lands have been established in the spirit and intent of the 2001 Canada-U.S. Conservation Vision for the Lower Detroit River Ecosystem and the Detroit River International Wildlife Refuge. On the Canadian registry of lands are 3,797 acres of Essex Region Conservation Authority land and 981 acres of City of Windsor lands. On the U.S. registry of lands are 7,897 acres of Michigan Department of Natural Resources land and 5,787 acres of lands owned and/or cooperatively managed by U.S. Fish and Wildlife Service. When totaled between Canada and U.S. that means that 18,462 acres of land in southwest Ontario and southeast Michigan are now being managed collaboratively for conservation and outdoor recreation in the spirit and intent of the 2001 Conservation Vision and the Detroit River International Wildlife Refuge. This IMP focuses on the approximately 5,800 acres under the primary management control of the USFWS.

# Methods

Station staff generated a list of extant and anticipated surveys. This extensive list was later refined to exclude general observations (reconnaissance) of refuge resources that do not require protocols or data management. The remaining 31 surveys were then assigned a priority score using 17 pre-defined criteria (Appendix A). Priority scores were used to assign each survey to one of three groups that defined the status of the surveys (Appendix B).

## Prioritizing and Selecting Surveys

The priority ranking of surveys was determined during a one-day meeting at Detroit River IWR on July 9th, 2013. Assistant Refuge Manager Steve Dushane and Refuge Wildlife Biologist Greg Norwood met with Region 3 Zone Biologist Sean Blomquist to prioritize the surveys. Background information for each survey was summarized in advance by the Wildlife Refuge Biologist and briefly discussed prior to prioritizing the surveys. The 17 criteria, assignment rules, weighting and score calculation process followed the Criteria for Prioritizing Surveys Entered into the PRIMR Database[[2]](#footnote-3) (Appendix A). The Detroit River International Refuge staff made all decisions required to produce the survey priority scores (Appendix B).

## Estimating Capacity

A cost-benefit analysis (Appendix C) was performed 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, e.g., 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 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 staffs 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. The time dedicated to surveys was converted to 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. Estimated annual costs for implementing surveys are documented in Appendix D.

# Results: Selected Surveys

The prioritization and cost-benefit analysis were used in deliberative selection of surveys to be completed over the life of the IMP. In addition to the priority scores, the level of effort required to complete a survey as well as input from Region 3 Migratory Birds Division and East Lansing Ecological Services Field Office was considered in the selection process. Selected surveys include surveys identified for completion with FY2014 levels of staffing and support (Table 1). The list of surveys selected for implementation with existing resources represents a commitment to implementation by refuge staff. Changes in available capacity, CCP objectives, 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.

The process identified 5 surveys that can be completed with current staffing levels and budget for the duration of this IMP (Table 1). An estimated annual work schedule for selected surveys is shown in Appendix E, and non-selected surveys are listed in Appendix F. Survey names were updated after the ranking exercise based on national and regional lists of standardized names, available protocols and companion surveys that must be completed simultaneously to maximize value. The NOAA Lake level monitoring and USGS stream gauge monitoring surveys are essentially the same survey and were combined and renamed Water level gauges of Detroit River and Lake Erie. Environmental Action Statement requirements are addressed in Appendix G.

## List of Selected Surveys and Rationale for Selection

|  |  |
| --- | --- |
| Name | Rationale |
| Impoundment levels | This survey is intended to monitor the water levels of all units on the Refuge, with particular attention given to units with water control structures. |
| Treatment Evaluation of Phragmites, Invasive Cattail, and Reed Canary Grass | This survey will gather the minimum information necessary to plan treatments for the current growing season and assess effectiveness of previous treatments. |
| Aerial Deer Survey | The survey determines the number of additional deer to take through MDNR permits. |
| Water level gauges of Detroit River and Lake Erie | Water level trend data can be obtained readily on-line from gauges in western Lake Erie and Detroit River that are managed by the National Oceanic and Atmospheric Administration (NOAA). These data inform Refuge managers about water level averages and seiche events over time in and around coastal marshes and impoundments. This information has many uses relating to ecosystem functions, rehabilitation projects, and management of water control structures. |
| Hydrogeomorphic (HGM) Wetland Classification | This information is the basis for determining available appropriate options for ecologically-based habitat management and rehabilitation. |

## **Table 1.** Surveys selected for conduct at Detroit River International Wildlife Refuge 2015—2029.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Survey Priority 1** | **Survey ID Number 2** | **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** | **Protocol Status 13** |
| 1 | FF03RDTR00-045 | Impoundment water levels (M) | Current | HMP / Page 71 | Entire station | FWS: 0.02 | $0.00 | Throughout the year/ Recurring -- every year | 2015- Indefinite | Greg Norwood, Refuge Biologist | (none) | Initial Survey Instructions |
| 2 | FF03RDTR00-036 | Treatment Evaluation of Phragmites, Invasive Cattail, and Reed Canary Grass (M) | Current | HMP / Page 69, Page 71, Page 70 | Management units with emergent wetlands, wet prairie, or moist soil/mud where invasive species have been treated the previous year. | FWS: 0.13 | $600.00 | Summer/ Recurring -- every year | 2007- Indefinite | Greg Norwood, Refuge Biologist | (none) | Initial Survey Instructions |
| 3 | FF03RDTR00-041 | Aerial Deer Survey (M) | Current | HMP / Page 72 | Humbug Marsh and Gibraltar Wetlands Units | FWS: 0.11 | $600.00 | Summer/ Recurring -- every year | 2015- Indefinite | Greg Norwood, Refuge Biologist | (none) | Initial Survey Instructions |
| 4 | FF03RDTR00-047 | Water level gauges of Detroit River and Lake Erie (CM) | Current | HMP / Page 69, Page 74, Page 71, Page 70 | Regional | FWS: 0.03 | $0.00 | Throughout the year/ Recurring -- every year | 2015- Indefinite | (none) | (none) | Initial Survey Instructions |
| 5 | FF03RDTR00-026 | Hydrogeomorphic (HGM) Wetland Classification (BM) | Expected | HMP / Page 69, Page 74, Page 71, Page 72, Page 70 | Entire station | FWS: 0.1 | $0.00 | Summer/ Occurs one time only | 2017- 2017 | Josh Eash, Hydrologist, USFWS | (none) | Initial Survey Instructions |

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.

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 Surveys selected for the timecol-md- 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:** *Impoundment water levels (FF03RDTR00-045)*

**Refuge:***Detroit River International 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: Wet Prairie;

**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 intended to monitor the water levels of all units on the Refuge, with particular attention given to units with water control structures.

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

Water; Hydrology; Recurring -- every year; Summer

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

NO

**Survey:** *Treatment Evaluation of Phragmites, Invasive Cattail, and Reed Canary Grass (FF03RDTR00-036)*

**Refuge:** *Detroit River International 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: Emergent Wetlands; Moist Soil/Mud; Wet Prairie;

**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 intended to monitor the abundance of invasive species following treatment according to emergent wetlands strategy 2, wet prairie strategies 2 and 4, and moist soil/mud strategy 2

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

Biological Integrity; Invasive Species; *Phragmites australis* (common reed); *Phalaris arundinacea* (reed canarygrass, reed canary grass); *Typha* X *glauca* (white cattail); Recurring -- every year; Summer

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

NO

**Survey:** *Aerial Deer Survey (FF03RDTR00-041)*

**Refuge:** *Detroit River International 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: Wet-Mesic Forest

**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 required in order to apply for appropriate number of Deer Damage Permits or Deer Management Assistance Permits from the Michigan DNR in order to take the necessary number of deer to meet habitat objectives according to wet-mesic forest strategy 2 as identified in the HMP.

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

Biological Integrity; Other Biota; Odocoileus (white-tailed deer, mule deer); Recurring -- every year; Summer

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

NO

**Survey:** *Water level gauges of Detroit River and Lake Erie (FF03RDTR00-047)*

**Refuge:** *Detroit River International 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: Emergent Wetlands; Moist Soil/Mud; Submergent Wetlands / Open Water; Wet Prairie;

**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.**

Water level trend data can be obtained readily on-line from gauges in western Lake Erie and Detroit River that are managed by the National Oceanic and Atmospheric Administration (NOAA). These data inform Refuge managers about water level averages and seiche events over time in and around coastal marshes and impoundments. This information has many uses relating to ecosystem functions, rehabilitation projects, and management of water control structures.

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

Water; Hydrology; Recurring -- every year; Throughout the year

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

Coop Monitoring to Inform Management; National Oceanic and Atmospheric Administration; U.S. Geological Survey

**Survey:** *Hydrogeomorphic (HGM) Wetland Classification (FF03RDTR00-026)*

**Refuge:** *Detroit River International 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: Emergent Wetlands; Moist Soil/Mud; Submergent Wetlands / Open Water; Wet Prairie; Wet-Mesic Forest

**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 important to characterize the hydrology and geomorphic setting of the Refuge's wetlands in order to prioritize and carry out projects that increase/ maximize the long-term ecological and societal functions of the lands as described in the HMP.

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

Water; Hydrology; Occurs one time only; Summer

**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 Revision Signature Page). 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.

# Appendix A. Criteria and Weights Used to Prioritize Surveys

1. **Station purpose:** Does the survey provide information to evaluate if the station is achieving its purpose(s)?

*Note: Refuge purpose is defined in Appendix 1. A survey addressing wilderness character addresses purpose for a station with proposed or designed wilderness.*

* 1. No
  2. Yes

1. **Other legal mandates**: Does the survey provide information to evaluate whether or not the station is addressing legal mandates besides refuge purposes such as Biological Integrity, Diversity, and Environmental Health (BIDEH); NWR Resources of Concern (e.g., migratory birds, anadromous fishes, marine mammals); maintaining water rights; and compatibility of refuge uses especially wildlife-dependent recreation?

*Note: Federally listed species are addressed under criterion #7 so they should not be considered as a NWR Resources of Concern under this criterion. For BIDEH, only consider surveys addressing the highest measure of biological integrity, which is viewed as those intact and self-sustaining habitats and wildlife populations existing during historic conditions (see 601 FW 3.10). Example 1: Because 99% of the wet prairie habitat has been lost throughout the Willamette Valley, remnant prairie on WL Finley NWR represents the highest order of BIDEH on the refuge where habitat monitoring is a priority survey. Example 2: The refuge staff at Detroit River IWR is currently preparing its hunt plan where monitoring the population of white-tailed deer during the hunting season on refuge would inform this plan.*

* 1. No
  2. Yes

1. **Large investment in management actions**: Does the survey inform whether or not the station is achieving one or more CCP, HMP, or other management plan objectives involving management actions requiring substantial expenditure of funding and staff time?

*Example: If conducting wetland management actions requires considerable staff time and funding annually, then surveys that evaluate response of vegetation and waterfowl to wetland management actions could be considered a high priority.*

* 1. No
  2. Yes

1. **Controversy**: Does the survey support decision making to assess a suspected or known controversial refuge management action, refuge use, or species?

*Note: Terms are defined in Appendix 1. Examples of suspected or known controversial refuge management actions include mammalian predator control and use of pesticides. Examples of suspected or known controversial refuge uses (recreational and economic) can include establishing new close areas from waterfowl hunting, opening a refuge to white-tailed deer hunting, use of genetically modified crops, and livestock grazing.*

* 1. No
  2. Yes

1. **Known or suspected threats:** Will the survey provide information to potentially reduce the duration of the threat(s) to the station, cost to the station due to those threat(s), or effect station resources of concern due to those threat(s) during the current or future CCP planning cycles?

*Examples of known or suspected threats include the following: proposed water withdrawal within the station’s watershed, a new invasive species, impacts of proposed development, combinations of threats such as increased fire cycles promoting invasive species, and man-made and natural disasters (e.g., hazardous spills, hurricanes).*

* 1. The survey does not address threat(s)
  2. Low: The survey potentially informs 1 of 3 factors (duration, cost, or effect on resources)
  3. Medium: The survey potentially informs 2 of 3 factors (duration, cost, or effect on resources)
  4. High: The survey potentially informs all 3 factors (duration, cost, and effect on resources)

1. **Baseline data:** Does the survey provide high-priority information that contributes to baseline data needs? *Example: Inventories of species guilds (e.g., invertebrates, plants, reptiles) or abiotics (soils, waters).* 
   1. No
   2. Yes
2. **Species or vegetation community with a listing status**: Is the species or vegetation community (the focus of the survey) 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)?

*Example 1: An inventory of small mammals where one or more of the species likely or suspected to be found on the refuge is state or globally listed. Example 2: Surveys of abiotic factors affecting species should be considered under this criterion. Monitoring water quality parameters in wetlands inhabited by state-listed aquatic birds to assess potential effects to avian species.*

* 1. Not state or federally listed nor globally ranked
  2. State listed or ranked by state’s natural heritage program
  3. Globally listed only (G1 or G2)
  4. Federally listed (Endangered, Threatened, or Candidate)

1. **FWS priorities:** Does the survey provide information that directly contributes to evaluating the status and trends of resources that are a priority for the NWRS or other FWS regional or national program (e.g., Migratory Birds, Fisheries, T&E species, Water Resources/Hydrology) or the national I&M initiative (e.g., phenology, baseline inventories, water quality)?

*Example 1: North American Breeding Bird Survey, Woodcock Singing Ground Counts, North American Amphibian Monitoring Program, Mid-Winter Waterfowl Survey, and Circumpolar Biodiversity Monitoring Network are priority surveys for regional or national FWS programs. Example 2: A survey to determine the status and trends of a federally listed landbird species would be a priority for both the Migratory Birds and T&E Species 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

1. **Survey coverage for species or vegetation community:** What proportion (%) of the species’ (sub)population or vegetation communities’ geographic range under U.S. jurisdiction will be covered by the survey on the station?

*Example 1: 75% of Laysan Albatross population nest on Midway NWR. Conducting a survey to monitor the breeding population size on the refuge would cover >10% of the entire species’ population and score 3.*

*Note: Surveys of abiotic factors affecting these species or vegetation communities should also be considered for this criterion. Example 2: 60% of the wintering waterfowl in the Pacific Flyway use wetlands in the Central Valley of California including the San Luis NWRC. Monitoring water levels by reading staff gauges weekly from October to March in managed wetlands is an important abiotic survey to indicate if there are sufficient acres of suitable foraging habitat to support 60% of the wintering waterfowl. Because water is essential to maintain refuge wetlands for wintering waterfowl, “survey coverage” would equate to waterfowl population surveys and score 3.*

1. Low: Survey covers <1% of the species’ or communities’ population/range

2. Medium: Survey covers 1-10% of the species’ or communities’ population/range

3. High: Survey covers ≥10% of the species’ or communities’ population/range

1. **Survey utility**: How many station CCP, HMP, or other management plan objectives can be evaluated by the survey?

*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 1 objective
  3. Addresses 2 objectives
  4. Addresses 3 or more objectives

1. **Survey leveraging**: Is the survey conducted or integrated with one or more other surveys? Applies to multiple stations and/or on/off refuge property.

*Note: This criterion applies to surveys that were designed to be conducted in conjunction with each other in order to fully evaluate the status and trends of the target resource and its habitat. Example 1: The landbird point count protocol requires habitat parameters be collected in conjunction with avian data. Example 2: Habitat parameters and avian population counts are collected for the Integrated Waterbird Management and Monitoring project.*

* 1. Survey is not integrated with other surveys
  2. Survey is integrated with 1 other survey
  3. Survey is integrated with >1 other surveys

1. **FWS partners**: Does the survey address high or medium priorities of relevant Landscape Conservation Cooperatives (LCC), state agencies, or other conservation partners?
   1. Does not address a management priority identified by FWS partners (e.g., LCC, state agency).
   2. Addresses a management priority identified by 1 FWS partner (e.g., LCC, state agency).
   3. Addresses a management priority identified by 2 FWS partners (e.g., LCC, state agency).
   4. Addresses a management priority identified by ≥3 FWS partners (e.g., LCC, state agency).
2. **Cooperative surveys**: At what scale does the survey most benefit the science information needs required for resource management?

*Note: Only surveys with a standard protocol and established systems of data management and analysis are scored higher than a 1. Terms are defined in the Appendix. This criterion is applicable to surveys covering areas on and adjacent to the station. 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 1 refuge.
  2. Medium scale: Applicable to a smaller group of refuges or single refuge complex.
  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, Woodcock Singing Ground Counts, North American Amphibian Monitoring Program, and Circumpolar Biodiversity Monitoring Network).

1. **Survey duration**: Over what time scale will the objective(s) addressed by the survey need to be evaluated?

*Note: Long-term surveys will need to be consistently implemented over multiple generations of the species or successional stages of habitat to evaluate achievement of objective(s).*

* 1. Short-term: 1-15 years
  2. Long-term: >15 years.

1. **Cost of data collection, analysis, and reporting**: What is the cost (e.g., staff time, contractor cost, equipment, sample analysis/processing, annual funding) for survey design, implementation, data management, data analysis, and reporting?

*Note: Surveys requiring novel techniques, many repeated visits or large numbers of staff will likely be more expensive to implement. Similarly, surveys requiring assistance for the development of protocols and analysis of data will be more costly. Conversely, if a standardized protocol, database, analysis, and/or reporting system are available, then the costs of implementing such a survey may be much lower than if these elements must be designed and tested upfront. Also, consider partners (e.g., universities), who assist or fully implement surveys, as a basis for estimating costs.*

* 1. High: >5% of annual funding or staff time for the refuge biological program is dedicated to the survey
  2. Medium: 1-5% of annual funding or staff time for the refuge biological program is dedicated to the survey
  3. Low: 0.1- 1% of annual funding or staff time for the refuge biological program is dedicated to the survey
  4. Very Low: <0.1% of annual funding or staff time dedicated for the refuge biological program is dedicated to the survey

1. **Data analysis**: Are the survey data analyzed for use at the station level?

*Note: The frequency and intensity of management is dependent upon station objectives. In some cases, baseline inventory or monitoring is appropriate if active management is not anticipated for the foreseeable future. In contrast, monitoring to detect threshold conditions or for adaptive management may be needed to maintain certain habitats (e.g., moist-soil wetlands) requiring considerable, annual management activities to achieve desired conditions.*

* 1. None: Study design does not allow data to be analyzed
  2. Low: Data have not been analyzed but they are available for analysis
  3. Medium: Data can/have been analyzed on infrequent basis
  4. High: Data can/have been analyzed on regular basis

1. **Data use**: Are the survey results reported and used to inform current and future management decisions?

*Note: See description from criterion #15.*

* 1. None: Study design does not allow results to be readily reported. Therefore, results are not used in management decisions.
  2. Low: Date have not been analyzed but are available for reporting so they may be used to inform management at the refuge(s).
  3. Medium: Results can/have been reported, but these results have not been used to guide management at the station, regional, or larger landscape levels.
  4. High: Currently reported on regular intervals and used to inform management at the refuge(s), regional, or larger landscape levels.

**Table A1. Weight Applied to Prioritization Criteria.**

The following 17 criteria were weighted by refuge staff at Detroit River IWR (relative values in parentheses with highest values representing criteria that are most important to refuge staff) and used to rank surveys through a Simple Multi-Attribute Rating Technique (SMART tool).

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Criteria** | **Station-specific weight** | **Comparison to even weight** |
| 1 | Station purpose | 0.10 | 0.04 |
| 2 | Other legal mandates | 0.05 | 0.00 |
| 3 | Large investment in management actions | 0.07 | 0.01 |
| 4 | Controversy | 0.04 | -0.02 |
| 5 | Known or suspected threats | 0.05 | -0.01 |
| 6 | Baseline data | 0.06 | 0.00 |
| 7 | Species or vegetation community listing status | 0.04 | -0.02 |
| 8 | FWS priorities | 0.07 | 0.01 |
| 9 | Survey coverage for species or vegetation community | 0.05 | -0.01 |
| 10 | Survey utility | 0.06 | 0.00 |
| 11 | Survey leveraging | 0.06 | 0.00 |
| 12 | FWS partners | 0.05 | -0.01 |
| 13 | Survey spatial context | 0.05 | -0.01 |
| 14 | Survey duration | 0.00 | -0.06 |
| 15 | Cost of data collection, analysis, and reporting | 0.06 | 0.00 |
| 16 | Data analysis | 0.08 | 0.02 |
| 17 | Data Use | 0.11 | 0.05 |

# Appendix B. Prioritization Scores of All Ranked Surveys

Values used to prioritize and select the surveys likely to be conducted through 2030 at Detroit River International Wildlife Refuge. Prioritization scores were generated for candidate surveys by refuge staff using 17 criteria for each survey (Appendix A). 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 of priority scores from the SMART tool for all considered surveys.

|  |  |  |  |
| --- | --- | --- | --- |
| **Survey** | **Final Score** | **Score Rank** | **Status** |
| NOAA lake level monitoring | 0.700 | 1 | Current |
| USGS stream gauge monitoring | 0.685 | 2 | Current |
| Aerial Deer Survey | 0.565 | 6 | Current |
| Treatment Evaluation of Phragmites, invasive cattail, reed canary grass | 0.430 | 16 | Current |
| Impoundment water levels | 0.371 | 21 | Current |
| HGM | 0.445 | 13 | Expected |
| Eastern Prairie Fringed Orchid | 0.598 | 3 | Future |
| Marshbird Survey | 0.595 | 4 | Historic |
| Wetland Vegetation Cover Survey with annual summary of mean daily Lake Erie water level/water level management. | 0.536 | 7 | Future |
| Wet Prairie Monitoring | 0.512 | 9 | Future |
| Waterfowl survey | 0.586 | 5 | Historic |
| Grassy Island ground water monitoring | 0.515 | 8 | Historic |
| American Woodcock Survey | 0.489 | 10 | Historic |
| Shorebird Survey | 0.461 | 11 | Historic |
| Bald Eagle Monitoring | 0.446 | 12 | Future |
| Gibraltar Wetlands Forest Invasives Inventory | 0.439 | 14 | Future |
| Lower Great Lakes January Waterfowl Survey (as part of Mid-Winter Waterfowl Survey) | 0.434 | 15 | Historic |
| Humbug Marsh Deer Browse Evaluation | 0.422 | 17 | Historic |
| Forest Ecological Inventory | 0.421 | 18 | Future |
| Phragmites Reduction: Comparison via remote-sensing of 2017 Imagery to 2009 Baseline | 0.407 | 19 | Historic |
| Coordinated Canvasback Survey | 0.396 | 20 | Historic |
| Fish survey | 0.369 | 22 | Historic |
| Lake sturgeon | 0.339 | 23 | Future |
| Common Tern Monitoring | 0.322 | 24 | Historic |
| Muskrat Monitoring | 0.316 | 25 | Future |
| Fox Snake Survey | 0.309 | 26 | Historic |
| Rusty Blackbird Survey | 0.307 | 27 | Historic |
| Northern Flicker Survey | 0.291 | 28 | Historic |
| Blanding's Turtle Survey | 0.246 | 29 | Historic |
| Detroit River Hawk Watch | 0.215 | 30 | Historic |
| Multi-agency water quality in the lower Detroit River and the western Lake Erie basin. | 0.172 | 31 | Historic |

# 

# Appendix C. Cost-benefit Analysis

We used linear programming to find the optimum sets of ranked surveys using 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 alternative sets of selected surveys and are used for decision support; they do not dictate survey selections.

**Table C-1** Efficiencies in terms of frequency adjusted benefit for 15 potential IMP portfolios. A through F were optimized for maximum 15 year benefit from all selected surveys (1= selected, 0= not selected). The portfolios G to O were chosen by the Detroit River IWR staff for comparison with the optimized portfolios.



**Appendix D. Estimated Annual Costs for Implementing Surveys**

(Historic surveys are excluded, total cost includes operating and staff time costs).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Survey Name** | **Survey ID Number** | **Survey Priority** | **Survey Status** | **FWS Staff Total** | **Total Cost** |
| Impoundment water levels | FF03RDTR00-045 | 1 | Current | $1,038.00 | $1,038.00 |
| Treatment Evaluation of Phragmites, Invasive Cattail, and Reed Canary Grass | FF03RDTR00-036 | 2 | Current | $6,750.00 | $7,350.00 |
| Aerial Deer Survey | FF03RDTR00-041 | 3 | Current | $5,712.00 | $6,312.00 |
| Water level gauges of Detroit River and Lake Erie | FF03RDTR00-047 | 4 | Current | $2,885.00 | $2,885.00 |
| Hydrogeomorphic (HGM) Wetland Classification | FF03RDTR00-026 | 5 | Expected | $5,400.00 | $5,400.00 |
| Bald Eagle Monitoring | FF03RDTR00-009 |  | Future | $962.00 | $962.00 |
| Eastern Prairie Fringed Orchid Survey | FF03RDTR00-038 |  | Future | $5,192.00 | $5,692.00 |
| Forest Ecological Inventory | FF03RDTR00-046 |  | Future | $11,423.00 | $11,423.00 |
| Gibraltar Wetlands Forest Invasive Species Survey | FF03RDTR00-040 |  | Future | $11,423.00 | $12,023.00 |
| Lake Sturgeon Survey | FF03RDTR00-012 |  | Future | $481.00 | $481.00 |
| Muskrat Monitoring | FF03RDTR00-044 |  | Future | $935.00 | $935.00 |
| Wet Prairie Monitoring | FF03RDTR00-039 |  | Future | $7,269.00 | $7,869.00 |
| Wetland Vegetation Cover Survey | FF03RDTR00-037 |  | Future | $15,385.00 | $15,985.00 |
|  |  |  |  | Staff Total | Total Cost |
| Total for selected (current and expected) surveys: | | | | $21,785.00 | $22,985.00 |
| Total for future surveys: | | | | $53,070.00 | $55,370.00 |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Survey Name | Survey Priority | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
| Impoundment water levels | 1 | FW,DE | FW,A | FW,R | FW | FW | FW | FW | FW | FW | FW | T,A | P,R |
| Treatment Evaluation of Phragmites, Invasive Cattail, and Reed Canary Grass | 2 | P | P | P | T | T | FW | FW, A, R | R, P | P | P | P | P |
| Aerial Deer Survey | 3 | FW | FW | DE | DE | DE | A | R | P | P | P | P | FW |
| Water level gauges of Detroit River and Lake Erie | 4 | P,R | DE,R | DE,R | DE | DE | DE | DE | DE | DE | DE | DE | DE,AA |
| Hydrogeomorphic (HGM) Wetland Classification | 5 | P, R | R | R | R | R | FW | FW | DE | DE | DE | DE | A |
| P=Planning, T=Training, FW=Field Work, DE=Data Entry, A=Analysis, R=Reporting | | | | | |  |  |  |  |  |  |  |  |
| \* Indicates inventory or monitoring survey that is conducted in multi-year intervals (not annual) | | | | | | | |  |  |  |  |  |  |

# Appendix F. 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.

|  |  |  |
| --- | --- | --- |
| ***Survey Name*** | ***Survey ID Number*** | ***Survey Status*** |
| Bald Eagle Monitoring | FF03RDTR00-009 | Future |
| Eastern Prairie Fringed Orchid Survey | FF03RDTR00-038 | Future |
| Forest Ecological Inventory | FF03RDTR00-046 | Future |
| Gibraltar Wetlands Forest Invasive Species Survey | FF03RDTR00-040 | Future |
| Lake Sturgeon Survey | FF03RDTR00-012 | Future |
| Muskrat Monitoring | FF03RDTR00-044 | Future |
| Wet Prairie Monitoring | FF03RDTR00-039 | Future |
| Wetland Vegetation Cover Survey | FF03RDTR00-037 | Future |
| Aquatic Macrophyte Survey | FF03RDTR00-014 | Historic |
| Breeding Bird Atlas | FF03RDTR00-005 | Historic |
| Common Tern Monitoring | FF03RDTR00-008 | Historic |
| Detroit River Hawk Watch | FF03RDTR00-007 | Historic |
| Fish Inventory | FF03RDTR00-019 | Historic |
| Frog and Toad Inventory (Calls Only) | FF03RDTR00-021 | Historic |
| Grassy Island Water Monitoring | FF03RDTR00-023 | Historic |
| Herpetological Inventory | FF03RDTR00-002 | Historic |
| Marsh Bird Inventory | FF03RDTR00-020 | Historic |
| Marsh Bird Inventory (MNFI) | FF03RDTR00-022 | Historic |
| Mussel Inventory | FF03RDTR00-004 | Historic |
| Near-Shore Fish Inventory | FF03RDTR00-018 | Historic |
| North American Migration Count | FF03RDTR00-003 | Historic |
| Odonata and Lepidoptera Inventory | FF03RDTR00-015 | Historic |
| Phragmites Reduction: Comparison Via Remote-Sensing of 2017 Imagery to 2009 Baseline | FF03RDTR00-042 | Historic |
| Plant Community Database Inventory | FF03RDTR00-013 | Historic |
| Plant Species Inventory | FF03RDTR00-017 | Historic |
| Spring Bird Migration Survey | FF03RDTR00-016 | Historic |

# Appendix G. 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 Detroit River International Wildlife Refuge. This IMP is a refinement of the 2005 Comprehensive Conservation Plan (CCP) and associated Environmental Assessment (EA) for the Refuge. This IMP provides more-specific guidance for surveys of Refuge’s fish, wildlife, plant, habitat, and abiotic resources to fulfill the Refuge’s purposes and help achieve Refuge’s goals and objectives.

The EA for Detroit River International Wildlife Refuge’s 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 CRF 46.205 and 40 CFR 1508.4, some 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)

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Project Leader/Refuge Manager 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. 2005. Comprehensive Conservation Plan and Environmental Assessment for Detroit River International Wildlife Refuge. USFWS Region 3. Bloomington MN.*

# IMP Revision Signature Page

**IMP Revisions**

Detroit River International Wildlife Refuge

|  |  |  |
| --- | --- | --- |
| Action | Signature /Printed Name | Date |
| Survey list and priority changed: | |  |
| Submitted By: | Refuge Manager/Project Leader |  |
| Reviewed By: | Regional I&M Coordinator |  |
| Approved By: | Refuge Supervisor |  |

1. Signatures apply to all contents of the IMP. [↑](#footnote-ref-2)
2. Planning and Reporting Inventory and Monitoring at Refuges (PRIMR) Database (https://ecos.fws.gov/primr/index.gsp). A database developed by the I&M initiative that describes and archives the surveys conducted on refuges, and which is also used to generate summaries for an IMP. [↑](#footnote-ref-3)