

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

2.1 What is the purpose of this chapter? This chapter provides guidance on how the National Wildlife Refuge System (Refuge System) conducts scientifically rigorous natural resource surveys, and promotes efficiency in their conduct and collaboration with survey partners. The chapter:

- A.** Describes the process by which the U.S. Fish & Wildlife Service (Service) lists, prioritizes, and selects natural resource surveys;
- B.** Provides guidance for the evaluation and selection of survey protocols. It also provides guidance for developing new protocols, including survey design, data collection, management and analysis, and the reporting of survey results; and
- C.** Promotes planning and coordination of inventory and monitoring (I&M) activities at the local, landscape, Regional, national, and international scales, both within and outside of Refuge System lands and waters, and with Federal, State, and other partners.

2.2 What is the scope of this chapter? This chapter:

- A.** Applies to all surveys of fish, wildlife, plants, habitats, abiotic components, and wilderness character on refuges. This includes I&M activities on a single refuge, coordinated monitoring on multiple refuges, and collaboration with partners;
- B.** Applies to research survey activities that are conducted to inform resource management or that will require significant refuge participation; and
- C.** Does not apply to routine refuge operations, or to scientific activities conducted by independent entities on Service lands (e.g., surveys conducted for outreach or visitor services, non-Service research) that are not intended for resource management. External research is regulated by special use permits subject to appropriateness and compatibility (see 603 FW 1 and 2).

2.3 What are the objectives of this policy? Through this policy, the Service seeks to:

- A.** Inform planning and resource management decisions at multiple scales;
- B.** Promote consistency in the conduct of natural resource surveys throughout the Refuge System;
- C.** Implement scientifically rigorous surveys that support informed management decisions, and increase public understanding of Refuge System decisions affecting natural resources;
- D.** Meet Service and Refuge System legal mandates, administrative directives, and other monitoring needs that support the Service's approach to landscape conservation;
- E.** Guide and coordinate the inventory and monitoring of fish, wildlife, plants, habitats, ecological communities, invasive species, abiotic components, and wilderness character on refuges to:
 - (1)** Gather baseline data and record benchmark conditions used to support refuge planning;
 - (2)** Estimate the status of, and trends in fish, wildlife, plant populations, and their habitats;
 - (3)** Assess trends in biological integrity, biological diversity, and environmental health (601 FW 3);
 - (4)** Evaluate the effectiveness of management actions in contributing to established goals for fish and wildlife conservation by using adaptive management (522 DM 1);

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

- (5) Provide surveillance to detect changes in the structure and function of ecological systems;
- (6) Establish baseline measures and monitor wilderness character of designated wilderness on refuges to evaluate the effects of refuge management activities and uses (610 FW 2);
- (7) Record impacts of environmental stressors, including climate change, on natural resources and ecological processes; and
- (8) Support the Service's goal of landscape conservation by assessing similar management actions across refuges and with Service partners, including actions by multiple refuges, one or more Regions, Joint Ventures (JVs), and Landscape Conservation Cooperatives (LCCs).

2.4 What is the Refuge System's I&M policy?

A. The policy requires that refuges develop and follow an Inventory and Monitoring Plan (IMP). An IMP:

- (1) Is an operational plan for one or more refuges that clearly states I&M priorities and clarifies operational commitments, depending on available capacity;
- (2) Relates to and follows from a refuge's Comprehensive Conservation Plan (CCP);
- (3) Provides the management rationale, timing, and costs for conducting refuge surveys;
- (4) Lists the prioritized surveys, identifies the surveys selected for implementation, and documents the protocols that describe the survey objectives and methods; and
- (5) Should be reviewed by the Project Leader, Regional I&M Coordinator, Regional Refuge Biologist/Division Chief, and Refuge Supervisor. The Regional Refuge Chief approves the IMP.

B. All refuges will use approved protocols when conducting surveys.

- (1) Survey protocols are scientific documents that are reviewed and approved at the appropriate level by Refuge Biologists, I&M Zone Biologists, Regional I&M Coordinators, or national I&M staff.
- (2) Assignment of an appropriate protocol to each selected survey is documented in an IMP (see Exhibit 1).
- (3) Protocol development, review, and approval is a complementary process described in *How to Develop Survey Protocols: A Handbook (Survey Protocol Handbook)*.

C. The Service established the Refuge System I&M initiative to support implementation of this policy.

- (1) The initiative is organized to assist refuges in planning and coordinating natural resource surveys, and consists of:
 - (a) The Natural Resource Program Center Chief and staff, Regional I&M Coordinators and I&M Data Managers, I&M Zone Biologists, Refuge Biologists, and field technicians; and
 - (b) The National I&M Coordination Team, which is comprised of the National I&M Manager, National I&M Data Manager, Lead Biologist from the national I&M office, and all Regional I&M Coordinators.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

(2) We address broad information needs that may reach beyond individual refuges, and support conservation with partners at the local, landscape, Regional, national, and international scales.

(3) We participate in surveys that support joint management information needs within the Service, or needs of other agencies or organizations. We may implement these cooperative surveys at individual refuges, multiple refuges, or outside Refuge System lands, as appropriate.

D. All refuges collect and manage survey data for consistency, applicability, and scientific rigor so that we can make informed, transparent, and defensible management decisions.

(1) Survey data, including information describing the surveys in the IMP, are permanent records that we must maintain and archive with associated metadata. I&M Data Managers work with refuge staff to ensure that these data are created and maintained in accordance with Service policy on electronic records management (282 FW 4).

(2) We will use approved data standards. One example is the Integrated Taxonomic Information System (ITIS), a database with standardized species names and their hierarchical taxonomic classifications and taxonomic serial numbers that we use as the species identifier for all survey databases.

E. Survey data from refuges should be analyzed and results reported in a timely manner to address management needs and decisions. To promote accountability, survey results should be accessible in the Service's document catalog (ServCat).

(1) Survey results should be disseminated in scientific journals or other appropriate media for broader use (see 117 FW 1).

(2) Survey documentation and results, including reports, posters, graphs, and maps are stored in ServCat.

2.5 What is the authority for this policy? The authority for this policy is the Refuge Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), 16 U.S.C. 668dd-668ee. The Act mandates that we "monitor the status and trends of fish, wildlife, and plants and their habitats in each refuge."

2.6 What terms do you need to know to understand this chapter?

A. Adaptive Management. A structured process that promotes flexible, informed decisions that allow us to make adjustments as we better understand outcomes from management actions and other events. Careful monitoring of these outcomes advances scientific understanding and helps adjust policies or operations as part of an iterative learning process (see section H(2), *Monitoring to Inform Management* below and the Department of the Interior's *Adaptive Management Technical Guide*).

B. Cooperative Surveys. Inventories or monitoring involving partners and designed to meet legal or other directives, assess large-scale resource issues, or improve the effectiveness of the Refuge System. Cooperators include other refuges, Service programs, other Federal or State agencies, or private partners. These surveys may extend beyond refuge boundaries.

C. Habitat Management Plan (HMP). A document guided by the refuge Comprehensive Conservation Plan (CCP) that provides further guidance for managing habitat to achieve long-term refuge goals (see 620 FW 1).

D. Inventory. A survey that estimates the presence, abundance, or distribution of species, habitats, ecological communities, or abiotic features at a particular time.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

E. Inventory and Monitoring Plan (IMP). A description and justification of the selected surveys that a refuge plans to conduct using assigned survey protocols (see Exhibit 1).

F. Landscape Conservation Cooperative (LCC). A partnership that may include State, Federal, tribal, and local governments and nongovernmental organizations established to conduct landscape-scale biological planning and conservation design within designated areas. LCC staff work with other agency and conservation partners to plan, design, and evaluate landscape-scale conservation.

G. Metadata. Description of the content, quality, history, condition, and other characteristics of recorded information. Federal agencies must create metadata that meets specific standards for newly collected or produced geospatial and biological data (see Executive Order 12906, as amended by Executive Order 13286, Federal Geographic Data Committee 2000).

H. Monitoring. A survey repeated through time to document changes in select attributes of wildlife, plants, habitats, ecological communities, or abiotic resources. Two types of monitoring in the policy are:

(1) Baseline Monitoring. Monitoring that is not tied to specific predictions of how a natural resource will respond to management or environmental stressors, but instead is designed to document change over time of a natural resource. Also referred to as surveillance monitoring, examples include monitoring wildlife population trends, disease incidence, climate change, and wilderness character.

(2) Monitoring to Inform Management. Monitoring to assess whether a natural resource is approaching or exceeding a known threshold, or if a resource is responding to a management action or system stressor in a specified manner. This type of monitoring involves defining the threshold values or expected response, then surveying to measure the response or a closely related indicator. Comparing monitoring results with these expected values may show a need for initiating, intensifying, or altering management actions. In this policy, it generally means monitoring in an adaptive management context to improve management or evaluate progress toward achieving management objectives. It is also considered a type of targeted monitoring.

I. Planning and Review of Inventory and Monitoring at Refuges (PRIMR) Database. 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.

J. Protocol. Detailed instructions for conducting a survey. This includes information on sampling procedures, data collection, management and analysis, and reporting of results. Approved survey protocols promote continuity of data collection methods for both the duration of the survey on a refuge and among similar surveys on different refuges. This term collectively refers to a survey protocol framework and a site-specific survey protocol.

(1) Survey Protocol Framework. A survey protocol that was written for application at many locations, but lacks the site-specific information necessary to implement the protocol at an individual refuge (see the *Survey Protocol Handbook*).

(2) Site-specific Survey Protocol. A complete set of instructions used to conduct a survey at a specific refuge. We typically develop these by adding site-specific instructions to a generalized protocol framework or by modifying a site-specific protocol that was developed for conducting a similar survey at another refuge.

K. Refuge. Any unit of the Refuge System, including refuges, wetland management districts, and associated waterfowl production areas. Refuges do not include coordination areas, which are part of the Refuge System, but are managed by States under cooperative agreements.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

L. Refuge Complex. A group of refuges administered by a common office for management efficiency.

M. ServCat. The Service's document catalog, which is an online repository designed to centralize and preserve Service information. It includes reports, annual narratives, management plans, geospatial data, IMPs, and survey protocols.

N. Survey. A formal effort designed to inventory or monitor natural resources. A survey requires a sampling design, data analysis, and reporting.

O. Survey Coordinator. A Service employee, usually the Refuge Biologist, who oversees the implementation of one or more surveys selected in an IMP. This includes selection of survey protocols that adhere to standards of scientific excellence. The survey coordinator also ensures that survey data are managed, analyzed, and reported, and results are archived in ServCat.

P. Wilderness Character. The combination of biophysical, experiential, and symbolic qualities that distinguishes wilderness from all other lands. Measures chosen by refuges for monitoring fall under the five qualities of wilderness character: natural, undeveloped, untrammelled, solitude, or primitive and unconfined recreation, and other features of value.

2.7 What are the responsibilities of Service personnel for implementing this policy? See Table 2-1.

Table 2-1: Responsibilities for the Service's I&M Initiative	
These employees...	Are responsible for...
A. The Director	Overall policy and priority setting to direct I&M across the Service.
B. Chief, National Wildlife Refuge System	(1) Overseeing policy development and maintenance, and (2) Ensuring that I&M efforts are relevant across the Service.
C. Natural Resource Program Center Chief	(1) Administering and implementing the I&M policy, and (2) Integrating I&M activities across the Service and with partners.
D. Regional Directors	(1) Ensuring policy compliance within their respective Regions, and (2) Ensuring integration across Service programs and among appropriate partners within Regions and other appropriate geographical areas.
E. National I&M Manager	(1) Leading the National I&M Coordination Team; (2) Implementing the I&M policy to ensure national continuity, efficiency and scientific integrity; and (3) Coordinating and reporting I&M progress, needs, and costs.
F. National I&M Coordination Team	(1) Ensuring scientific excellence and relevance for I&M efforts; (2) Integrating national and international I&M priorities with Regional and refuge priorities; and (3) Establishing relationships with partners to conduct surveys.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

Table 2-1: Responsibilities for the Service's I&M Initiative	
These employees...	Are responsible for...
G. Regional Refuge Chiefs	(1) Approving refuge IMPs; (2) Ensuring policy compliance and overall program oversight and direction within their Regions; and (3) Facilitating appropriate integration across Service programs within the Region.
H. Refuge Supervisors	(1) Reviewing refuge IMPs and approving IMP revisions; (2) Ensuring policy compliance and concurrence on IMPs for their respective refuges; and (3) Facilitating appropriate integration and consistency among refuges.
I. Project Leaders (Refuge Managers)	(1) Ensuring policy compliance for refuges under their purview, and (2) Developing, implementing, and revising the refuge IMP.
J. Regional Refuge Biologists (Division Chiefs)	(1) Coordinating and conducting reviews of IMPs with the Regional I&M Coordinator; (2) Identifying coordination opportunities both within and among Regions; (3) Overseeing Regional allocation of I&M funds, and (4) Supervising the Regional I&M Coordinator.
K. Regional I&M Coordinators	(1) Serving on the National I&M Coordination Team to implement the national I&M initiative; (2) Reviewing IMPs to facilitate scientific integrity and efficiency; (3) Coordinating the development and review of protocols; (4) Providing scientific support to refuges within their Regions, and (5) Coordinating I&M needs with the LCCs, JVs, and other partners.
L. I&M Zone Biologists	(1) Assisting refuge staff to prepare IMPs; (2) Participating in protocol assignment and development and amending IMPs as new protocols are adopted; (3) Assisting Refuge System staff with managing and analyzing data and reporting survey results; and (4) Providing scientific support to refuges within their Regions.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

Table 2-1: Responsibilities for the Service's I&M Initiative	
These employees...	Are responsible for...
M. Refuge Biologists	(1) Leading refuge staff in selecting surveys and preparing IMPs; (2) Participating in protocol assignment and development of site-specific survey protocols; (3) Ensuring surveys conducted at a refuge follow approved protocols; and (4) Serving as a survey coordinator, leading surveys and ensuring that survey data are managed, analyzed, reported, and archived.
N. I&M Data Managers	(1) Ensuring scientific integrity by establishing quality assurance standards for data management, (2) Ensuring that I&M data are conserved and archived, (3) Contributing to protocol development, and (4) Assisting Refuge System staff with managing and analyzing data and reporting survey results.

2.8 What is an IMP? An IMP is the description, ranking, selection, and justification of surveys that a refuge intends to conduct using assigned protocols. The IMP includes a signature page documenting review and approval at the Regional level, an introduction linking the refuge's primary purpose to surveys, and a description of the process used to prioritize surveys and assign a status for implementing them. The IMP also includes a narrative for each selected survey that summarizes the refuge management objectives addressed by the survey and justifies why the refuge selected the survey for implementation. A table summarizes characteristics of each survey, including the objectives, required costs, staff time, survey duration, and survey coordinator (see Exhibit 1).

2.9 What is the relationship of an IMP to a CCP and a Habitat Management Plan (HMP)? A CCP is a document that outlines and guides long-term management objectives for a refuge. An IMP reflects the priorities in a CCP (602 FW 4). By specifying objectives that require surveys, an HMP may also contribute to the development of a refuge IMP. An IMP should be revised following approval of a CCP or when survey priorities change at a refuge (see section 2.12B).

2.10 How does the refuge address the National Environmental Policy Act (NEPA) within an IMP?

When developing or revising an IMP, we must comply with NEPA.

A. The Department of the Interior has a categorical exclusion that may cover specific surveys in an IMP if they do not have significant environmental effects (see 43 CFR 46.205 and 40 CFR 1508.4). The appropriate categorical exclusion is 516 DM 8.5B(1).

B. In addition, surveys may be excluded from additional NEPA documentation if they have been identified, addressed, and authorized in an approved CCP or HMP.

C. If the NEPA process is required for an IMP, it may trigger compliance with other laws, such as the National Historic Preservation Act and the Endangered Species Act.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

2.11 How do refuges develop an IMP? Refuges develop an IMP with assistance from I&M staff. A refuge complex administering more than one refuge may complete a single IMP or individual IMPs for each refuge. See Exhibit 1 for details on how to develop an IMP.

A. Identifying needed surveys. After considering refuge management objectives, refuge and I&M staff identify a comprehensive set of proposed surveys, and enter the information describing the proposed surveys in the PRIMR database.

B. Setting priorities for surveys in an IMP. Refuge and I&M staff then prioritize surveys to make objective decisions about which surveys to implement. Proposed surveys are prioritized considering:

(1) Criteria that include relevance to refuge-level objectives as well as contributions to landscape and broader-scale objectives (see Exhibit 1), and

(2) The mission of the Refuge System; refuge purposes; the Alaska National Interest Lands Conservation Act (ANILCA) requirements; maintenance and restoration of biological integrity, diversity, and environmental health (Improvement Act); and refuge, Service, and partner monitoring needs (see the *Handbook on Identifying Refuge Resources of Concern and Management Priorities*).

C. Selecting the surveys to conduct. From the prioritized list of surveys, refuge staff select and the Project Leader submits the surveys that the refuge expects to carry out during the life of the IMP. When selecting surveys, consider survey priority, cost, duration, frequency, and staff time.

D. Assigning protocols to surveys in an IMP. Refuge biologists and I&M staff identify appropriate protocols to implement the surveys selected in the refuge IMP. Staff can select a survey before a protocol is developed. When an approved protocol becomes available, it is documented by adding the protocol citation and status into its ServCat record and linking them to a survey in PRIMR (see section 2.11A and the *Survey Protocol Handbook*).

E. IMP review and approval. After refuge and I&M staff prepare an IMP, the Project Leader sends it to the Region for review to ensure completeness and consistency. The Regional I&M Coordinator, Regional Refuge Biologist, and Refuge Supervisor review the IMP. The final approval comes from the Regional Refuge Chief.

F. Completing an IMP. An IMP is complete when the Regional Refuge Chief approves it (Exhibit 1, Figure 2 shows the signature page). Refuge staff enter the signed IMP into ServCat.

2.12 What is the process for amending or revising an IMP? The Project Leader may change a refuge IMP either by amending or revising it. Amend an IMP when protocols change, and revise it when adding or removing a selected survey. Refuge and I&M staff record changes to the IMP by updating PRIMR and entering the revised version in ServCat.

A. Amending an IMP. After an IMP is approved, the survey coordinator and I&M staff evaluate the assigned protocols and amend the IMP when protocols are changed.

(1) No additional approval is required for an IMP amendment.

(2) An IMP should be amended when:

(a) The status of a survey protocol is changed to “Approved,”

(b) A new version replaces an approved survey protocol, or

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

(c) A more appropriate protocol for a survey is developed or becomes available.

B. Revising an IMP. The Project Leader reviews the refuge capacity and status of surveys in an IMP each year and determines which of the selected surveys will be conducted. The IMP doesn't have to be revised if a selected survey is not conducted in a particular year. However, if staff add or remove a selected survey, then the IMP must be revised. The Project Leader should also consider revising the IMP when a new CCP, HMP, or other plans change resource management objectives.

(1) The Project Leader submits an IMP revision to the Regional I&M Coordinator and the Regional Refuge Biologist/Division Chief for review, and then the Refuge Supervisor for approval (see Exhibit 1).

(2) An IMP should be revised when:

(a) An emerging natural resource problem requires a new survey,

(b) The Project Leader selects a new survey to conduct that was not on the original survey list, or

(c) The Project Leader wants to remove a selected survey from an IMP.

C. Keeping track of the changes. Refuge staff update PRIMR to reflect changes and store the new version in ServCat.

2.13 How does a refuge implement an IMP? Survey implementation entails site-specific survey planning, data collection, data analysis, reporting, and archiving. The Refuge Biologist or other survey coordinator oversees compliance with the associated survey protocols through each of these steps. The survey coordinator also ensures continuity of the survey, including training new staff, establishing safety measures, and addressing logistical needs.

A. Developing site-specific survey protocols and recalculating costs. The Refuge Biologist or other survey coordinator, with assistance from I&M staff, develops a site-specific protocol to document how refuge staff should implement a survey. They can develop a site-specific protocol by incorporating additional details to an existing protocol framework, by using a site-specific protocol developed by another refuge, or by developing a new site-specific protocol from various materials compiled as initial survey instructions (see the *Survey Protocol Handbook*). Site-specific protocols:

(1) Need to include detailed information on sampling location and effort,

(2) Help to refine survey cost and staffing estimates, and

(3) Must be stored in ServCat once a draft is complete and ready for testing or review.

B. Ensuring safe and authorized data collection. The survey coordinator ensures that each person working on the survey is trained on the data collection process according to the survey protocol. The survey coordinator and the Project Leader also must ensure that the necessary equipment and authorizations are obtained to conduct the survey.

(1) Surveys must adhere to established standards for proper animal care and use (see the *Survey Protocol Handbook*).

(2) For surveys requiring a special use permit, the permit holder is responsible for obtaining proper reviews and communicating the animal care and use guidelines to the survey coordinator.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

(3) Some protocols may require specialized safety or operational training.

C. Collecting field samples. The survey coordinator must ensure that staff properly collect, process, label, and store field samples. Certain specimens and samples require permits, such as migratory birds or federally-listed species. Others, such as invasive species and diseased specimens, may require special handling and disposal. General guidance for collecting and handling field samples should be included in the survey protocol framework, with additional details provided in the site-specific protocol.

D. Storing and archiving specimens. Service policy (see 701 FW 5) guides the collection and disposal of fish, wildlife, and plant specimens at refuges. The survey protocol must include a description of the final disposition of specimens, and the survey coordinator must ensure these requirements are met.

E. Managing data. The survey coordinator ensures that data are entered or stored in a timely and accurate manner. Each survey protocol should provide details on data management (see the *Survey Protocol Handbook*). Refuge staff with I&M Data Managers should:

(1) Follow existing Service data standards or develop new data standards in compliance with Establishing Service Data Standards (274 FW 2) to ensure consistency of survey data collection, provide for data sharing, and reduce costs;

(2) Create accurate metadata that describes the purpose and current status of the survey data, and defines data formats, storage locations, and procedures for data collection and data quality;

(3) Annually archive one electronic copy of metadata and associated data sets at the refuge coordinating the survey and one location off the refuge in compliance with 282 FW 4; and

(4) For Regional or national surveys, enter data into an appropriate Service-approved database.

F. Analyzing survey data and reporting results.

(1) Analysis and reporting should reiterate the survey objectives and address the links to management objectives specified in the CCP, HMP, or other pertinent plans.

(2) I&M and refuge staff should rely on appropriate statistical methods as specified in a survey protocol when analyzing data. Analysis of survey data may support conclusions at different scales (e.g., refuge, landscape, Regional, national, or international).

(3) The survey coordinator should ensure compliance with reporting procedures, including appropriate biological and statistical review, as specified in the approved protocol.

(4) A survey is complete when the Refuge Biologist or other survey coordinator, in consultation with an I&M Data Manager, archives the data and puts the final report in ServCat (see section 2.13G).

(5) If a site-specific protocol requires an interim report, the survey coordinator must develop it and send it to the Project Leader before the beginning of the next season's fieldwork. These reports should include:

(a) Results of the interim data analysis,

(b) Interpretation relevant to the survey objectives, and

(c) Any operational reasons that caused deviations from the protocol.

**FISH AND WILDLIFE SERVICE
POPULATION MANAGEMENT**

Population Management

Part 701 Population Management at Field Stations

Chapter 2 Inventory and Monitoring in the National Wildlife Refuge System

701 FW 2

(6) Survey results should be reported in a form that allows widespread dissemination and promotes professional interchange.

G. Storing and archiving protocols and reports. I&M staff ensure that survey protocols are archived. Refuge Biologists or other survey coordinators ensure that field notes and reports are stored in compliance with Service Enterprise Architecture (270 FW 1), Data Resource Management (274 FW 1), and Electronic Records (282 FW 4) policies. Refuge System staff should:

(1) Create accurate metadata that describes the purpose and current status of the survey data, and defines data formats, storage locations, and procedures (including name and version of survey protocol) for data collection and data quality; and

(2) Store data documents, metadata, reports, posters, graphs, maps, and any other documentation of I&M results in ServCat.

/sgd/ Stephen Guertin
DEPUTY DIRECTOR

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Guidance for Developing an Inventory and Monitoring Plan

This exhibit describes how to develop an Inventory and Monitoring Plan (IMP). Figure 1 diagrams the IMP development and approval processes, and the outline following it lists the key elements of a completed IMP. I&M and refuge staff enter the information used to generate an IMP into the Planning and Review of I&M on Refuges (PRIMR) database and store the approved IMP in the Service's document catalog (ServCat).

Overview of the IMP Process

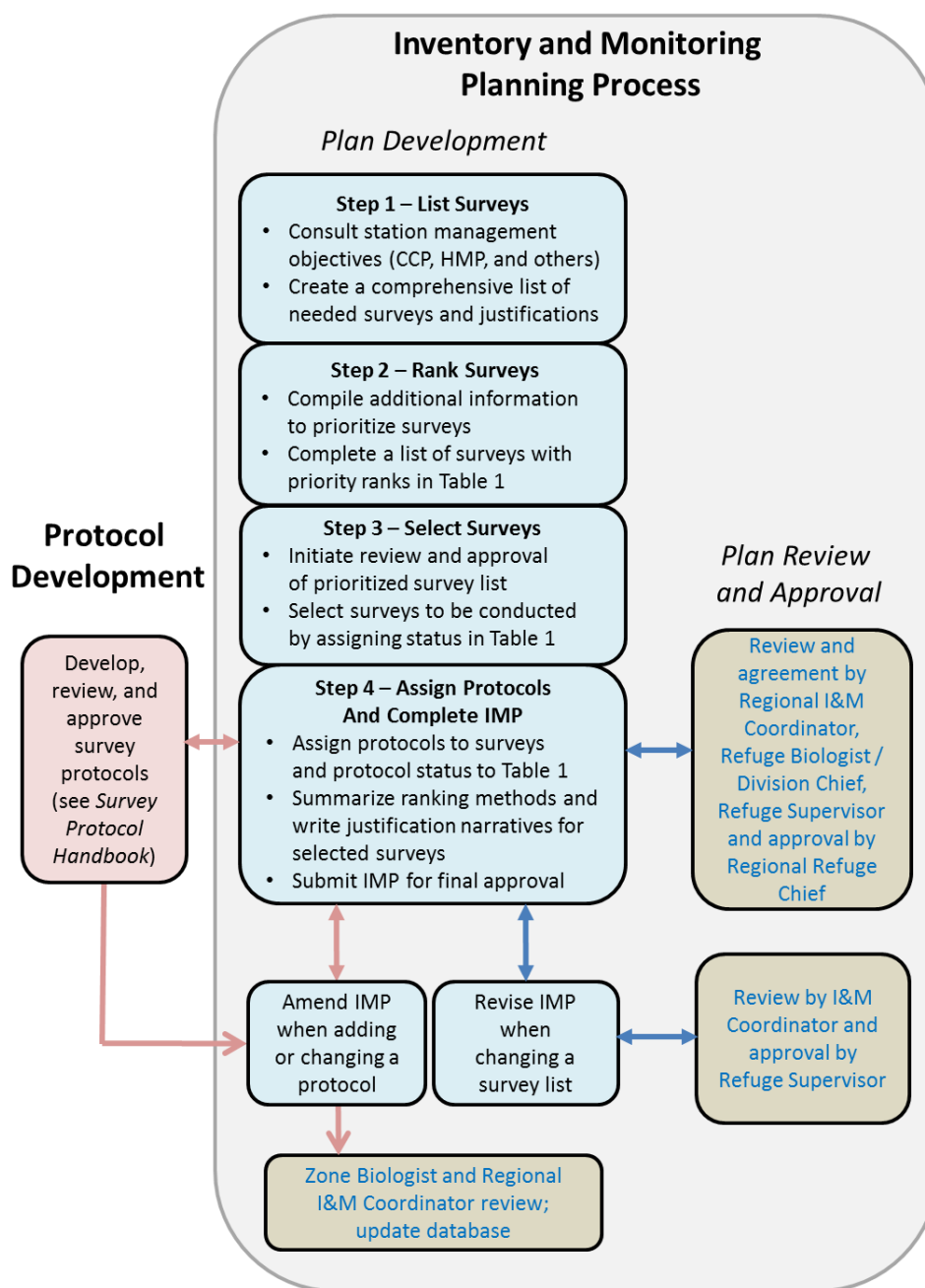


Figure 1. The process of developing an IMP. A refuge IMP entails a series of steps that require review and approval. Development of protocols that guide conduct of surveys (left box in pink) is a separate, continuous process described in the *Survey Protocol Handbook*. Blue arrows indicate review and approval processes facilitated by Refuge System management; pink arrows indicate I&M facilitated processes.

Outline of an IMP

- I. Signature page (Figure 2)
- II. Introduction describing refuge purpose and linking it to surveys
- III. Methods and rationale used to develop the IMP, and to prioritize and select surveys
- IV. Summary of selected surveys (Table 1)
- V. Narratives justifying each survey selected for implementation
- VI. Appendices can include criteria for prioritizing surveys; list of all surveys with prioritization ranks
- VII. Additional signature page if IMP is revised (Figure 3)

1) Developing a comprehensive list of surveys

- A. List all survey-related activities currently conducted on the refuge. These broadly include:
 - (1) Monitoring – A survey repeated through time that is included in the list of surveys.
 - (2) Inventories – A survey that estimates a resource at a particular time that is included in the list.
- B. List prospective surveys considering refuge management objectives and broader conservation goals, including those conducted for other programs or partners.
- C. For every current and prospective survey, designate one of the following types:
 - (1) An inventory when the objective is to document or estimate the presence, abundance, or distribution of species, or the status of habitats, ecological communities, or abiotic resources. We also use inventories to substantiate the absence of a species that historically occurred on the refuge.
 - (2) Baseline monitoring if the objective is to obtain baseline information needed to set refuge objectives or track resource responses to environmental threats or resource changes beyond the control of the refuge (e.g., climate or phenology change).
 - (3) Monitoring to inform management if the objective is to evaluate resource responses to a specific management action. We use this type of monitoring in an adaptive management framework and to determine if a resource response threshold has been reached.
- D. To ensure a complete list, consider the refuge resources that surveys commonly target:
 - (1) Occurrence, abundance, or demographic elements (e.g., rates of birth, death, migration) of plant or wildlife populations;
 - (2) Biological integrity of habitats or ecological communities; or
 - (3) Elements of the abiotic environment.
- E. Enter the revised list of surveys with the key descriptive data into PRIMR to generate Table 1.
- F. Every refuge in a complex should enter its own survey list into PRIMR to generate a table, and multiple tables and refuges can be included in one IMP for a complex.

2) Prioritizing surveys

Survey priorities are derived from the mission of the Refuge System; refuge purposes; ANILCA requirements; maintenance and restoration of biological integrity, diversity, and environmental health

(Improvement Act); as well as partner and landscape-scale priorities. The prioritizing process should produce a rank or score for each survey in the comprehensive list that indicates the degree to which the survey meets the priorities of the refuge, Refuge System, and its partners (see the *Handbook on Identifying Refuge Resources of Concern and Management Priorities*). There are ranking tools to prioritize surveys for the IMP that consider the following questions and criteria:

A. Fundamentally, does the survey:

- (1) Evaluate progress toward achieving objectives in support of refuge purposes?
- (2) Evaluate progress toward addressing legal responsibilities for biological integrity, diversity, restoration, and environmental health?
- (3) Provide baseline inventory information for the refuge, including the occurrence of plants, fish, wildlife, habitats, and abiotic components?
- (4) Assess the compatibility of different refuge uses on natural resources?
- (5) Evaluate the qualities of wilderness character in designated or proposed wilderness?
- (6) Address information needs at a scale beyond the individual refuge? These include:
 - (a) Meeting Service legal mandates to conserve migratory birds, threatened and endangered species, marine mammals, and anadromous fish;
 - (b) Supporting landscape-scale conservation through Landscape Conservation Cooperatives (LCCs), Joint Ventures (JVs) and other partnerships;
 - (c) Understanding impacts of climate change and other environmental stressors on ecological systems and natural resources; and
 - (d) Contributing to survey efforts of other Service programs or other agencies. Examples include the North American Breeding Bird Survey, North American Amphibian Monitoring Program, and the Circumpolar Biodiversity Monitoring Network.

B. Additional circumstances may elevate the priority of a survey in the IMP:

- (1) Emerging threats not addressed in existing planning documents,
- (2) Controversial management decisions or actions (e.g., livestock grazing, predator control),
- (3) Exceptionally high cost or high risk management actions, or
- (4) Management actions that have long-term or irreversible effects (e.g., hydrologic engineering, old growth harvest).

C. Enter each survey priority into PRIMR. Surveys can be ranked numerically or in tiers. Following is an example of the tiered approach to ranking:

- (1) Tier 1. The highest priority surveys that the Project Leader estimates can be conducted with existing staffing and costs.
- (2) Tier 2. Surveys that the Project Leader sees as second priority for the refuge, or high priority surveys that would require an increase in staffing or costs.
- (3) Tier 3. Lower priority surveys that are currently being conducted or are anticipated, but would require the major reallocation of staff or funds.

- D. Describe the prioritization process. Include a summary paragraph in the IMP describing how listed surveys were ranked. You may also include as an appendix to the IMP tables generated from responses to the questions and any ranking tools used.

3) Selecting surveys

From the list of prioritized surveys, the refuge staff chooses the surveys that they intend to conduct during the timespan of the IMP.

- A. Consider the following:
- (1) The capacity to conduct surveys in the near and long term,
 - (2) The contribution of partners to conducting the survey,
 - (3) Whether the survey can produce quality results with the refuge's current capacity, and
 - (4) Whether the survey addresses national priorities.
- B. The IMP should explicitly differentiate selected and non-selected surveys.
- (1) Selected surveys have a status of either Current or Expected (surveys not yet started or those where the refuge depends on additional capacity to conduct them),
 - (2) Non-selected surveys have a status of either Historic or Future.
- C. Indicate the selected surveys by assigning the survey status of Current or Expected in PRIMR. These surveys comprise Table 1 of the IMP.
- D. Indicate the non-selected surveys by assigning the survey status of Historic or Future in PRIMR. These surveys are listed in an appendix of the IMP as part of the comprehensive list.

4) Assigning protocols

After the Regional Refuge Biologist/Division of Natural Resources Chief and Refuge Supervisor review and agree on the prioritization of surveys, refuge and I&M staff should assign a protocol to the selected surveys (see the *Survey Protocol Handbook*).

- A. To find existing survey protocols:
- (1) Search ServCat for existing survey protocols;
 - (2) Search PRIMR to determine the protocols being used for similar surveys at other refuges;
 - (3) Locate protocols that others are using to conduct similar surveys; and
 - (4) Search published literature or contact subject matter experts for unpublished protocols.
- B. Review existing survey protocols to determine:
- (1) Suitability of the planned survey objectives, methods, and refuge environment with the protocol;
 - (2) The level of rigor appropriate for the proposed survey (see the *Survey Protocol Handbook*); and
 - (3) Whether additional peer review is necessary (see the *Survey Protocol Handbook*).

- C. If no appropriate survey protocol is found, then develop one using the *Survey Protocol Handbook*.
- D. To assign a protocol to a selected survey:
 - (1) Ensure that the protocol and its metadata, including the protocol citation and status, are stored in ServCat. The protocol status conveys two types of information:
 - (a) The scale at which the protocol applies (site-specific, regional, or national); and
 - (b) The stage of development (Initial Survey Instructions, Complete Draft, In Review, or Approved).
 - (2) Link the protocol citation and status in ServCat to the selected survey in PRIMR.

5) Completing the IMP Table

- A. Table 1 provides a summary of the planned I&M effort for a refuge. If an IMP is developed for a complex, provide a separate Table 1 for each refuge covered in the IMP. You can generate the completed table as a report from PRIMR. It includes the following information:
 - (1) List of all proposed surveys for the refuge in priority order;
 - (2) Reference to management objectives, area to be surveyed, timing and duration of the survey, and assigned survey coordinator;
 - (3) Estimate of staff time and costs for each survey; and
 - (4) Protocol citation and status for each survey.
- B. Refuge or I&M staff can enter the information into PRIMR and generate Table 1.

6) Writing the IMP Introduction, Methods, and Narrative

An IMP includes an introductory section that describes the types of surveys needed to meet refuge purposes, the procedures used to prioritize surveys, and a justification for each selected survey.

- A. Introduce the IMP by stating the refuge purposes and the general survey needs required to reduce uncertainty and make more informed management decisions.
- B. Briefly describe the methods used to rank surveys, including any decision support tools. Include criteria that may change a selection from a lower priority survey to a higher priority, such as cooperative agreements at the landscape, regional, national, or international levels.
- C. Provide the justification for choosing each selected survey, including the refuge management objectives that they address. **Describe the relationship between the selected survey and the Service mission and Refuge Improvement Act.** The narrative should identify any partners supporting or conducting the survey. Answering the following questions can contribute to the survey narratives:
 - (1) Which refuge management objective does the survey support? Is the objective derived from the CCP, interim objectives, an HMP, or other?

- (2) 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.
- (3) What is the population or attribute of interest, what will be measured, and when?
- (4) Is this a cooperative survey? If so, what partners are involved in the survey?

7) Approving the IMP

Completing the signature page (Figure 2) indicates management concurrence and approval of all components of the IMP. After the refuge and I&M staff prepare the IMP:

- A. The Project Leader submits the IMP for review and approval to the Regional Refuge office.
- B. The Refuge Supervisor and Regional Refuge Biologist/Division Chief review the IMP with the Regional I&M Coordinator for refuge, landscape, and Regional priorities.
- C. The Regional I&M Coordinator also reviews protocol assignments in the IMP.
- D. The IMP is approved when the Regional Refuge Chief signs it.
- E. I&M staff store the approved IMP in ServCat.

8) Amending the IMP

When new survey protocols or new versions of existing protocols are approved and assigned to a survey, the refuge and I&M staff need to amend the refuge IMP. When amending an IMP:

- A. Update protocol citations and status in ServCat and PRIMR.
- B. Update the estimates of survey cost and staff time in PRIMR.
- C. Generate a new Table 1 with the changes to protocol status and citation and upload it into ServCat.
- D. No signatures are required.

9) Revising the IMP

Selecting a new survey or removing a selected survey from an approved IMP triggers a revision. This differs from an amendment in that it changes the survey priorities of a refuge. When revising an IMP:

- A. Reassign the survey priorities in PRIMR.
- B. If a new survey is included, provide a narrative justifying the survey and add required information for Table 1 into PRIMR.
- C. Generate a new Table 1 for review and approval.
- D. Obtain signatures from refuge staff, the Regional I&M Coordinator, and the Refuge Supervisor (Figure 3), but not the Regional Refuge Biologist/Division Chief or Regional Refuge Chief.
- E. Store the revised IMP (including the narrative, revised Table 1, and signature page) in ServCat.

10) Developing site-specific protocols

Site-specific protocols provide all of the instructions needed to complete a survey at a refuge. Survey protocol frameworks generally do not provide sufficient detail (like sampling locations) for conducting a survey at a particular refuge, and must be amended to include site-specific information. Developing a site-specific protocol is the first step of implementing a survey (see the *Survey Protocol Handbook*).

Table 1. Required information for surveys planned on a refuge.

Refuge Name:

SURVEY PRIORITY¹	SURVEY ID NUMBER²	SURVEY NAME/ (TYPE)³	SURVEY STATUS⁴	MGMT. OBJECTIVE ID⁵	SURVEY AREA⁶	STAFF TIME (FTE)⁷	AVG. ANN. COST (OPR)⁸	SURVEY TIMING⁹	SURVEY LENGTH¹⁰	SURVEY COORD.¹¹	PROTOCOL CITATION¹²	PROTOCOL STATUS¹³
1.1	FF03RAGS00-001	Landbird Point Count (BM)	Current	CCP / 2a, 4b, 6	Smith River Unit, High Plains Unit; Playa Lakes JV	FWS 0.12 Other 0.2	\$9,000	MAY-JUN/ Each Odd Calendar Year	2012-2017	Jane Doe, Regional Refuge Biologist	Landbird Monitoring Protocol Framework Knutson et al. 2008 v.2	Regional - Approved
1.2	FF03RAGS00-002	Grassland Vegetation Structure (M)	Expected	HMP / 3	Rolling Hills Unit; Great Plains LCC	FWS 0.02	\$5,000	AUG-SEP/ Annually	2013-2017	John Doe, Refuge Biologist	Rolling Hills Land Survey Site-specific Protocol v.1	Site-specific Complete Draft
2.1	FF03RAGS00-005	Mid-winter Waterfowl Survey (CM)	Current	CCP / 1	Entire; Central Flyway	FWS 0.005	5 hours fixed-wing aircraft. \$2,000	First 2 weeks of JAN/ Annually	2006-2014	Jane Wu, Refuge Biologist	Mid-winter Waterfowl Protocol Framework v.1	National - Approved
3.3	FF03RAGS00-024	Coleoptera Inventory (I)	Expected	LCD / pg. 10	Entire Refuge	FWS 0.10	\$10,500	MAY-OCT/ Once a month	2015-TBD	Joe Snow, I&M Zone Biologist	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 timespan 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.

Figure 2. Signature Page for approving an IMP

Inventory and Monitoring Plan		
For: _____ (Refuge or Complex Name)		
Action	Signature /Printed Name	Date
Prepared By:		
Submitted By:	Refuge Manager/Project Leader	
Reviewed By:	Regional I&M Coordinator	
Reviewed By:	Refuge Supervisor	
Reviewed By:	Regional Refuge Biologist/Division Chief	
Approved By:	Regional Refuge Chief	

Figure 3. Signature Page for approving an IMP revision

IMP Revision		
For: _____ (Refuge or Complex Name)		
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	