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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

Inventory and Monitoring Planning Process

Plan Development

Step 1 – List Surveys
- Consult station management objectives (CCP, HMP, and others)
- Create a comprehensive list of needed surveys and justifications

Step 2 – Rank Surveys
- Compile additional information to prioritize surveys
- Complete a list of surveys with priority ranks in Table 1

Step 3 – Select Surveys
- Initiate review and approval of prioritized survey list
- Select surveys to be conducted by assigning status in Table 1

Protocol Development

Develop, review, and approve survey protocols (see *Survey Protocol Handbook*)

Step 4 – Assign Protocols And Complete IMP
- Assign protocols to surveys and protocol status to Table 1
- Summarize ranking methods and write justification narratives for selected surveys
- Submit IMP for final approval

Plan Review and Approval

Review and agreement by Regional I&M Coordinator, Refuge Biologist / Division Chief, Refuge Supervisor and approval by Regional Refuge Chief

Amend IMP when adding or changing a protocol

Revise IMP when changing a survey list

Review by I&M Coordinator and approval by Refuge Supervisor

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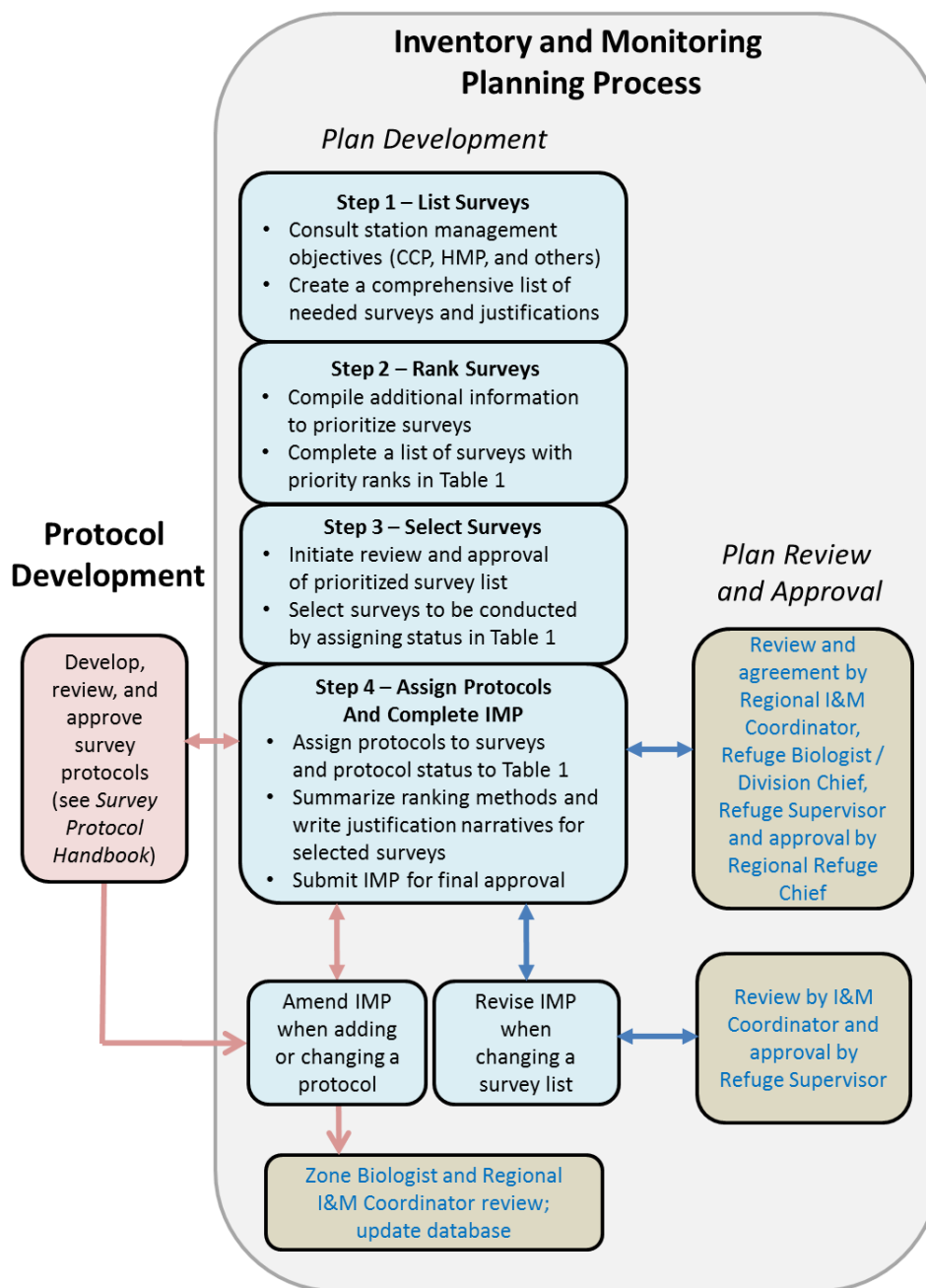
Figure 1. The process of developing an IMP. A refuge IMP entails a series of steps that require review and approval. Development of protocols that guide conduct of surveys (left box in pink) is a separate, continuous process described in the *Survey Protocol Handbook*. Blue arrows indicate review and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

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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.

C. 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.

D. Enter the revised list of surveys with the key descriptive data into PRIMR to generate Table 1.

E. 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

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(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.

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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*).

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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?

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(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.

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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*).

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

Refuge Name:

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]
1.1	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.

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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	

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Figure 3. Signature Page for approving an IMP revision

<table>
<tr><td colspan="3" align="center">**IMP Revision**

For: _____
(Refuge or Complex Name)</td></tr>
<tr><td>*Action*</td><td>*Signature /Printed Name*</td><td>*Date*</td></tr>
<tr><td>Survey list and priority changed:</td><td></td><td></td></tr>
<tr><td>Submitted By:</td><td>Refuge Manager/Project Leader</td><td></td></tr>
<tr><td>Reviewed By:</td><td>Regional I&M Coordinator</td><td></td></tr>
<tr><td>Approved By:</td><td>Refuge Supervisor</td><td></td></tr>
</table>