

# Refuge Inventory and Monitoring, Alaska



## Survey Implementation Plan

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# Introduction

## Problem Statement

The Alaska I&M team needs a transparent, defensible, consistent and detailed process for developing and documenting SMART management objectives for priority Resources of Concern and completing Inventory and Monitoring Plans for each of 9 Alaska refuge complexes by September 2023 that clearly fits into an adaptive management framework.

## Objectives

What are the goals of refuge planning? ... To provide a basis for adaptive management by monitoring progress, evaluating plan implementation, and updating refuge plans accordingly. – 602 FW 1

Below are a list of objectives for the I&M Planning team. Objectives with a (\*) crosswalk with our I&M Strategic Plan.

- Strategic: Improve natural resource management decision-making for Alaska National Wildlife Refuges while building scientific knowledge for future management decision challenges. Decisions include selecting priority resources, setting management objectives, identifying information needs, selecting natural resource surveys and identifying management actions.
- Fundamental: Maximize the transparency of the decision-making process and associated products.
  - Strategy: Use SDM to guide decision making
  - Strategy: Use conceptual models to illustrate complexity
  - Strategy: Inform management decisions with data and evidence
- Fundamental: Maximize the probability that decisions and products will be updated in response to new information.
  - Strategy: Use SHC guidance/adaptive management framework
- Fundamental: Maximize the rigor of natural resource plans (e.g., draft NRMPs, IMPs).\*
  - Means: MakeMaximize use of existing refuge survey data, scientific literature, etc.
    - \* Strategy: Consider species pROC ecology (e.g., habitat needs and drivers)
    - \* Strategy: Create strong connections between survey data and management objectives
  - Means: Maximize use of current our understanding of the impacts of key threats or stressors on refuge species and ecosystems, especially climate change as part of the planning process.\*
- Fundamental: Increase the number of refuges that have documented SMART wildlife and ecosystem management objectives.\*
  - Means: Maximize the efficiency of the decision-making process (i.e., meet Chief's Challenge deadline of IMPs by Sept 2023).
  - Means: Minimize employee time
  - Means: Maximize use of employee resources and expertise
    - \* Strategy: Use technical tools (R-markdown, Shiny apps, etc.)

- Means: Maximize the accessibility of products and data to internal and external audiences.\*
  - \* Strategy: Follow FWS data management best practices

## Selecting a priority resource of concern

Refuge staff will select one priority resource of concern (pROC) to move through the planning process and develop “one-ROC IMPs.” pROCs are defined as a resources of concern, selected by refuge staff during the ROC prioritization process, that have critical information needs and/or require management actions to conserve and are therefore the top candidates for associated survey development. The purpose of selecting one pROC is to increase the efficiency of moving through the planning process, increase scientific rigor of outcomes and, ultimately, increase the feasibility of refuge staff to be able to complete surveys. I&M staff may assist refuges in selecting a pROC by providing guidance. As part of this step, we will also identify team members and roles.





# Define the Problem or Question

**“Extra time to craft a concise yet comprehensive and accurate problem definition pays off...”** - Smart Choices

The desired state of a pROC is a decision framed around our values, and as such, the “problem” with the pROC is actually a decision as well. Since we have already decided that a pROC is important, then there must be underlying reasons for this decision. Why is the pROC important? What is the question about the pROC that needs to be addressed? Fully answering these questions is arguably one of the most important steps in the survey development process because without this information, we can produce a I&M program that does not address the fundamental information need.

This step will involve a focused dialogue (workshop) to clarify and document the importance of resource, the vision of success given perfect information, the geographic scope, who has authority to make decisions that could resolve the issue, constraints (legal, financial, and political), desired information to improve decision-making, and the stakeholders interested in or impacted by the decision.

Things to consider include:

## Importance of the Resource

A priority resource of concern is, by definition, of importance to a refuge. This step involves specifying what makes the pROC important. If a refuge has recently gone through the ROC prioritization process, then there will already be a list of criteria that was used to evaluate its relative importance. These criteria could be used to inform this step.

## Vision of Success

### Scope

How large, broad or complicated is the problem and the decision? What is the geographic scope of interest?

### 0.1 Frequency and Timing {-frequency-timing}

When and how often does a decision need to be made about the pROC?

### Stakeholders

Who are the people that are affected by the problem or can influence the decision?

### Authority

Who is able to make decisions that could address the problem?

## Constraints

Are there any legal, political or financial constraints? Perceived or real?

# State the Goal

Next, Refuge staff, with support from I&M, will draft a goal statement for the pROC. This will be completed in a workshop setting, often combined with Step 2. The goal statement is equivalent to a Fundamental Objective in SDM. It is defined as a “a descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose, but does not define measurable units” (USFWS Goals and Objectives Handbook 2004). It is visionary, not SMART; it’s what we care about “just because” and it captures our values by making clear connections between a refuge’s vision and CCP goals/objectives.



# Develop the Conceptual Model

The team, with support from I&M, will sketch out a conceptual model focused on factors that contribute to achieving the conservation goal of the pROC.

The purpose of a conceptual model is to:

- Identify potential internal (e.g., vital rates) and external (e.g., environmental drivers, threats, and stressors) key components and management actions that might influence the conservation goal and illustrate the links between key components
- Increase transparency and communication
- Build consensus among the team members about how the system operates
- Identify uncertainties, knowledge gaps and competing hypotheses about how the system operates
- Provide a framework for a mathematical model
- Provide a framework for adaptive management (e.g., update the model as new survey data are collected)

First, the team will gather relevant data and information, including literature, existing models, refuge data sources (reports, raw data). Then, the team will develop a conceptual model based on the pROC conservation goal. Model elements will include environmental and population drivers, threats and management actions.



# Develop the Mathematical Model

The team, with support from I&M Technical Team, will translate the conceptual model of the pROC “system” to a mathematical model and parameterize the model with values based on existing data, reported estimates, or solicited professional opinions.

The purpose of the mathematical model is to:

- Represent our current understanding of the ecological functioning of the pROC in a quantifiable form, given its conservation and management context expressed through the fundamental objective
- Organize information for the pROC into a unified, transparent framework that facilitates rapid feedback of new information into management and survey decision making
- Identify key resource attributes and principal external drivers important to achieving the conservation goal for the pROC
- Identify candidate specific and measurable means objectives for key resource attributes necessary to achieve conservation goal
- Determine specific and measurable states or effects of principal external drivers necessary to achieve candidate means objectives
- If applicable, represent alternatives for a variety of decision problems in a quantifiable form that can be used to identify optimal decisions given predetermined constraints





# Write SMART Management Objectives

The team, with support from I&M Technical Team, will develop SMART management objectives based on the parameterized mathematical model of the ROC “system”.

SMART management objectives are considered means objectives in that they are the means by which we achieve our fundamental objective (e.g., Conservation Goal) through management actions. However, management objectives may differ from broader means objectives (see above) that may not be “achievable” or “results oriented” in the typical context of SMART Refuge management objectives.

For example, a means objective may be a minimum adult female survival probability of 0.9 to achieve the fundamental objective of maintaining a stable population (i.e., mean population growth rate = 1) for a particular wildlife species.

If the current knowledge of moose populations shows survival is 0.75 and raising it to the means objective is not achievable, given management time constraints, then setting alternative means objectives that are achievable and have high likelihood of contributing to the broader means objective should be considered.

The purpose of a SMART management objective:

- Specific: identifies a clearly defined resource attribute targeted by a specific management action.
- Measurable: defines the expected outcome of a specific management action with numerical values expressed in a mathematical statement.
- Achievable: communicates a practical management action that is feasible given the fundamental objective, possible other means objectives, and logistical and other decision constraints.
- Results-Oriented: presents clear expectations for the outcomes of proposed management actions contributing to the fundamental objective.
- Time-Limited: specifies start and end dates for initiation, implementation, completion, expected outcomes, and evaluation of management actions.



## Develop Results Chains

For each management action identified, we will develop “results chains” that specify how the action is expected to influence the state of the pROC relative to the conservation goal. It specifies, through a series of cause-and-effect statements, how we think the system will change if action is implemented. Through this process we may identify intermediate outcomes and associated means objectives that will help us determine if our action is effective.



# Identify and Prioritize Surveys

In this step, we will start to develop surveys that address the information needs identified through the management objectives. We will prioritize surveys based on their relative contributions to understanding the state of the conservation goal, identified by analyzing the mathematical model. This information will be recorded as a PRIMR record for each required survey. Specifically, we will identify:

- The attribute(s) of interest
- How the key attribute(s) will be measured and at what scale
- The “object(s)” to be measured
- The sampling frame (survey area)
- The sampling interval and survey timing
- The estimated annual cost and partners



# Document and Archive

The final step will be to archive the data, products, and metadata generated from this effort in ServCat. All data and products will be documented with mdEditor metadata records (JSON files) that follow the regional metadata product profile. The data and products will include:

- A final report (PDF) describing the results of the “Defining the Problem” step, a description and figure of the conceptual model, and tables of management objectives
- A conceptual model that displays factors contributing to conservation goal of the pROC (PDF or XML file)
- A mathematical model that quantifies the relative contributions of the conceptual model’s attributes (e.g., environmental factors, population parameters, and management actions) to the state of the pROC (the conservation goal) (R and/or Jags files)
- PRIMR records that list and describe surveys selected to inform the status of the management objectives for the pROC
- Source datasets for parameterizing the mathematical models (CSV)
- An IMP that includes the survey(s) identified above





# Glossary of Terms

conceptual model:

constraint:

conservation objective:

contributing factor:

fundamental objective:

goal:

means objective:

management objective:

management action:

**PRIMR:**

**priority resource of concern:** A resource of concern that has been selected for survey development.

**pROC:** See priority resource of concern.

results chain:

ServCat:

SMART:

stakeholder:

survey