Refuge Inventory and Monitoring, Alaska

Survey Implementation Plan

Contents

Introduction

"Decisions require the integration of science with values, because in the end any decision is an attempt to achieve some future condition that is desirable to the decision maker" -Runge et al. 2013

This guide describes 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 refuge complexes that clearly fits into an adaptive management framework.

Objectives

The goal of refuge planning is 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 Alaska I&M Planning team.

- 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 their 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 priority resource of concern (pROC) is a decision framed around stakeholder values, and as such, the "problem" with the pROC is actually a decision as well. Since a refuge has 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.

Framing the problem is often a surprisingly difficult step in the process. We recommend a focused dialogue (i.e., workshop) with team members identified in the [Selecting a pROC][select-proc] step to clarify and document the importance of pROC. As the process continues with later steps, the problem statement could evolve.

Specific things to consider include:

0.0.0.0.1 Importance of the Resource

A pROC is, by definition, important to a refuge. In this step, we specify what makes the pROC important. This information might have already been documented if a refuge has recently gone through a ROC prioritization process. If this situation, feel free to use this information (the criteria) to evaluate it's relative importance. Note that the importance of a pROC might be a mixture of quantitative criteria (species status, ecological role) and value judgment (public enjoyment, financial interest).

0.0.0.0.2 Vision of Success

Here we consider what perfect success looks like. Imagine a hypothetical situation where you had a complete understand of the pROC. What does this look like? What is the state of the pROC? What attributes about the pROC did you consider in your vision?

0.0.0.0.3 The Decision

What is the decision to be made? What choice does the decision-maker face?

0.0.0.0.4 Scope

How large, broad or complicated is the problem and the decision? What is the geographic scope of interest? It is important to frame the problem around this scope. If the scope extends beyond refuge boundaries, it could be valuable to add team members to represent the values of the pROC in this region (e.g., state and tribal biologists).

0.0.0.0.5 Frequency

How often does a decision need to be made about the pROC? Is there urgency to the decision?

0.0.0.0.6 Timing

When does a decision need to be made about the pROC? Is it a one-time or reoccurring decision?

Importance

Why is the decision important? What are the consequences of a poor decision? For example, is there a risk of legal action, extinction of a species or population, impacts to native resources, a loss of hunting opportunities, or not achieving an agency mandate or objective?

0.0.0.0.7 Stakeholders

Who are the individuals or groups that have a stake in the outcome of the management decision?

0.0.0.0.8 Authority

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

0.0.0.0.9 Constraints

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

State the Goal

Developing a clear and meaningful goal is a critical step in the decision-making process. Doing so will reduce the likelihood of not addressing all the stakeholders values and overlooking hidden objectives that could later unknowingly influence the process.

In this step, the team will draft a goal statement for the pROC. This will be completed in a workshop setting, often combined with the [Defining the Problem][define-problem] step. The goal statement is equivalent to a Fundamental Objective in Structured Decision-making. 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" (Writing Refuge Management Goals and Objectives: A Handbook). 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

0.0.0.0.10 conceptual model

A diagram that shows the best understanding of key system components, including contributing factors and potential management actions, and their relationship to the fundamental objective.

0.0.0.0.11 conservation objective

0.0.0.0.12 contributing factor

A component in a conceptual model that along with other contributing factors depict what is driving changes in the state of a system and the fundamental objective.

0.0.0.0.13 fundamental objective

Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose, but does not define measurable units. The primary (end) objective that reflects what is most important to the stakeholders and can be achieved through means objectives.

0.0.0.0.14 goal

See fundamental objective.

0.0.0.0.15 means objective

A way of achieving a fundamental objective.

0.0.0.0.16 management objective

A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work.

0.0.0.0.17 management action

An activity intended to help achieve a means objective.

0.0.0.0.18 PRIMR (Planning and Review of I&M activities on Refuges)

A database to store and retrieve information about survey activites occurring on refuge lands.

0.0.0.0.19 priority resource of concern

A refuge resource of concern that has been selected for survey development.

0.0.0.0.20 pROC

See priority resource of concern.

0.0.0.0.21 resource of concern

High priority plant and/or animal species, species groups, or communities at a refuge that have been identified using a prioritization process (e.g., Identifying Refuge Resources of Concern).

0.0.0.0.22 results chain

0.0.0.0.23 ServCat

The **Ser**vice **Cat**alog. A web application that compiles documents and organizes data, such as reports, surveys, databases, geospatial data and images.

0.0.0.0.24 SMART

Specific, **M**easurable, **A**chievable, **R**esults-oriented, and **T**ime-fixed. Defined in "Writing Refuge Management Goals and Objectives".

0.0.0.0.25 stakeholder

Individuals or groups that have a stake in the outcome of the management decision.

0.0.0.0.26 survey

References