[I&M Survey title]

Project RECORD

[Insert Graphic]

Updated [Insert Date]

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# Project Summary

# Current Status

## Current Action Items

(This section is frequently updated by the Project Coordinator)

|  |  |  |  |
| --- | --- | --- | --- |
| What | Who | Where | When |
| List action items |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |

## Projected Timeline:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Fiscal Year | Fall | Winter | Spring | Summer |
| FY20XX | Milestone | Milestone |  |  |
|  |  |  |  |  |

## Long-term Planning

|  |  |  |  |
| --- | --- | --- | --- |
| What | Who | Where | When |
| Long-term action item |  |  |  |
|  |  |  |  |
|  |  |  |  |

# People

[Who are the key cooperators in the project? Who are the project coordinator(s) or principle investigator(s) and what agencies or organizations are they affiliated with? Who does the project report to (supervisory structure)? Add graphics, if they help clarify how the project is organized.]

[First name Last name, Job title, role]

## Communications

[How are communications organized? How often do the cooperators or study leaders meet, either by conference call or in person?]

### Teams, Cooperators and Surveyors

[If the project is very large or complex, with many sub-teams, put these details in the Appendix to keep the body of the Project Record as brief as possible.]

# Problem Description

[What is the problem? What is the geographic and temporal scope of the problem (which refuges, states, regions, LCC’s are affected)? If possible, provide a figure with an influence diagram or conceptual model of the problem. These drawings illustrate the context for the problem. Influence diagrams show how management decisions, chance events and other factors influence the desired outcomes (fundamental objectives). Conceptual models take a wide variety of forms and can show ecological relationships, energy flows, and relationships among stressors and other factors that affect the desired outcomes.]

[Insert Graphic]

# Objectives

[What is the resource or management objective? Is the resource objective derived from a planning document like a Comprehensive Conservation Plan or Habitat Management Plan? What are the fundamental and means objectives that the project is addressing? If the manager was successful in achieving the management objectives, what would success look like? Provide a graphic of the objectives hierarchy that links the fundamental and means objectives to measureable attributes.]

[Insert Objectives Hierarchy]

# Decisions and Alternatives

[Who is (are) the decision maker(s)? What alternative management options does the decision maker have available? If there is a wide variety of management options, how are these options grouped into portfolios of actions?]

# Key Uncertainties

[What are the key uncertainties that need to be resolved to enable the decision maker to select ‘smart’ management decisions?]

# Consequences and Tradeoffs (Models)

[Is there a model or set of competing models that link alternative management decisions with predicted outcomes? What is the nature of the model? The model should capture key relationships shown in the influence diagram, with inputs being management options/alternatives and chance variables and outputs being some measure of the fundamental objectives.]

# Monitoring, protocols

[What is the nature of the monitoring component of the project? Is it most accurately described as an inventory, surveillance monitoring, targeted monitoring under adaptive management, a designed experiment, or analysis of existing information? Revisit the objectives hierarchy. State the management objectives as SMART objectives, with measureable attributes and targets/thresholds specified. What protocols are being used? Where can they be found? For adaptive management projects, provide utility functions for each measureable attribute. What covariates are being measured?]

# Data management & Analysis

[How are the data being managed? What sorts of constraints or requirements are associated with data management? For example, is the database centralized or distributed? How does the database link to the model? How will the data be analyzed or used in a modeling framework? Who is responsible for data analysis and reporting? ]

# Reports and Milestones

[When will annual and final reports be due? How often will the models be updated? How is the data being used to inform management?]

|  |  |  |  |
| --- | --- | --- | --- |
| What | Who | Where | When |
| List reports and other products |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Budget and Funding

## Costs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | [FY20XX] | [FY20XX] | [FY20XX] | [FY20XX] | [FY20XX] |
| Staff |  |  |  |  |  |
| Contracts |  |  |  |  |  |
| Equipment, travel, other |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Total |  |  |  |  |  |

## Revenue

| Source | [FY20XX] | [FY20XX] | [FY20XX] | [FY20XX] | [FY20XX] |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
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|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Total |  |  |  |  |  |

# **Annual Planner**

[Put an ‘X’ in cells associated with the months the work takes place.]

| Activity | Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | | Aug | | Sep | | Oct | | Nov | | Dec | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Revise protocols |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Data collection |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Data analysis |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Report writing |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Revise models |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

# Activity Log

[List conference calls, meetings, workshops, and other project milestones that have been accomplished.]

| What | When | Comments |
| --- | --- | --- |
| [Meeting] | [Date] |  |
| [Conference Call[ | [Date] |  |
| [Workshop] | [Date] |  |
| [Report issued] | [Date] |  |
|  |  |  |
|  |  |  |

# References

[List references.]

# Appendix

[Use the Appendix for longer descriptions of key components of the project.]

## Team Descriptions

[List project sub-teams, if any]

### [Team Name:

[What does this team do?]

#### Names of Team Members

|  |  |  |  |
| --- | --- | --- | --- |
| Who | Role | Agency | Contact info |
|  |  |  |  |
|  |  |  |  |
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## Model Description

[Describe the model or other complex components of the project.]

## Master List of Project Participants or Cooperators

| Year | Name | Agency | Contact info |
| --- | --- | --- | --- |
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# Instructions for Maintaining the Project Record

1. The purpose of the Project Record is to:
   1. Record key information about an ongoing project in a relatively condensed format and keep it updated.
   2. Serve as a ‘living document’ that changes as the project evolves, summarizing key information from project documents such as meeting, workshop, and conference call minutes, protocols, survey designs, fact sheets, lists of participants, survey data, reports, etc. Generally, the project coordinator or principal investigator maintains the Project Record.
   3. Serve as a reference for the project cooperators, helping them recall key decisions, due dates, action items, and information about complex projects.
   4. Serve to orient new staff joining the project. (Staff turnover in management agencies is not uncommon.)
   5. Provide a quick reference when preparing reports and journal papers.
2. Start the Project Record at the beginning of the project. If the project is initiated with a workshop, you will be able to fill the first sections of the Record with information and decisions made at the workshop.
3. Maintain the Project Record with current information as the project progresses.
4. Use graphics, as appropriate, to help illustrate complex relationships.
5. If certain sections of the Project Record don’t apply to your project, delete them or replace them with appropriate section headings.
6. The project or survey coordinator must also maintain and archive all project documents for future reference, such as meeting, workshop, and conference call minutes, protocols, survey designs, fact sheets, lists of participants, survey data, reports, copies of manuscript reviews etc.

**Distinguishing Biological Monitoring from Inventories and   
Designed Science Experiments**

**(from NCTC course: *Designing and Implementing a Biological Monitoring Program*)**

Monitoring, Inventories, and Designed Experiments are three distinct types of study. All three aim to answer questions, but they differ in the type of questions addressed. Understanding these differences can help determine most appropriate procedure for your specific problem. The distinction between the three is not always sharp, but it is nonetheless useful for understanding, upfront, the differences in temporal and spatial scope and the level of long-term commitment required by each.

**Definitions:**

We use the definition of **monitoring** from Elzinga et al. (2001, page 2) *``… the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective”*. Monitoring thus involves *sampling over some extended period of time*; what is meant by an extended time period could be organism specific (see page 1319 of Lindenmeyer and Likens, 2010). Note that while monitoring allows one to detect change (over time), it generally does not provide statistical inference regarding the cause of the change.

An **inventory** is *a survey conducted only once or an accounting of existing resources*, be they plant or animal species. Inventories can serve as the first sample in a monitoring program. They can provide an initial picture of the resource base and are often used to determine exactly what resources to measure in a monitoring program.

A designed science **experiment** is a comparative study with three specific characteristics. (1) Two or more actions or ‘treatments’ are assigned to experimental units using some form of *randomization*. The experimental unit may be a plot of land, an individual animal, a pot of soil in a greenhouse, etc. For example, some plots of land are burned while others are not (treatments are ‘burned’, ‘not burned’). (2) Each action is applied to two or more experimental units; e.g., an experiment requires *replication.* Replication allows one to discern the action’s effect against the background variation in experimental units. (3) *Measurements* are taken on each experimental unit, e.g., estimating total vegetative biomass on each plot. Experiments, properly done, allow one to statistically infer cause-and-effect relationships.

For example, an experiment to compare the effect on survival of two procedures for removing oil from oil-contaminated snow geese randomly split a sample of 20 contaminated geese into two groups of 10 geese (*randomization)*, Procedure A was applied to each goose in one group and Procedure B was applied to each goose in the other group (*replication)*, then 30 days later it was recorded whether each bird was dead or alive (*measurement)*.

**Overlap between designed experiments and monitoring**:

For some designed experiments, measurements on each unit are made repeatedly over time. In these cases a designed experiment in some sense overlaps with monitoring. However, here the ‘monitoring’ is simply the measurement step of the designed experiment. In other words, the experiment is interested in how the units change over time. In statistical jargon such situations are commonly referred to as repeated measurements experiments. The term monitoring might be used with designed experiments if the physical sizes of the units were relatively large. But when repeated sampling on a large scale is done, and two or more treatments have been applied, it would be rare to have more than one replicate of each treatment and thus the conventional definition of a designed experiment would not apply.

Another example of overlap: the effect of prescribed burns on the vegetation growth in a wildlife refuge could be assessed by randomly assigning fixed size plots to be burned or not over a 10 year period, with vegetation biomass during the first week of August measured each year. Often, however, designed science experiments will have a shorter time span than monitoring. The spatial scale of designed science experiments is often smaller, but not necessarily so, than that of monitoring. In short, designed science experiments are typically smaller in temporal and spatial scale and more narrowly focused at causal explanations than monitoring.

**Experiments vs. Monitoring with regard to establishing causation**:

Well-designed experiments can establish a causal relationship between a treatment and the outcome being measured. This usually requires many experimental units in each treatment group and careful planning and development of the experimental units to control for the influence of other factors on the outcome by making the units very similar, or homogenous, in all regards except for differences in the treatments received. In contrast, monitoring, by itself, cannot establish causation but merely evaluate change.

**Adaptive Management**:

The adaptive management (‘AM’) process includes a ‘monitoring’ component (Williams, et al. 2007). Monitoring provides a time series of measurements on the resource which are then used to determine the degree to which the management objective has been achieved. AM may include experiments, such as when a manager is unsure of the relative efficacy of two management actions and so carries out a small scale experiment to establish the superiority, or not, of one action over another before apply the action on a broader scale.

Determine whether monitoring, an inventory, or an experiment is required based on the management question being addressed:

1. We are considering purchasing 20 acres of wetland. What waterfowl are present there?
2. An oil spill has contaminated 10 miles of shoreline. What is going to happen to the beach mouse population over the next five years?
3. When an oil spill has contaminated a shoreline is it better for wildlife to apply solvent to the shoreline or to remove the top 12 inches of soil?
4. Of two alternative wetland water regimes that can be implemented, which regime results in higher waterfowl use? (Only measure water regime and waterfowl response)
5. Of two alternative wetland water regimes that can be implemented, which regime results in higher waterfowl use and why? (Measure water regime, water depth, food availability, vegetation structure, waterfowl response)

Answers:

1. Inventory

2. Monitoring

3. Designed Experiment

4. Adaptive Management

5. Adaptive Management tending toward designed experiment.

**References**

Elzinga, C. L., D. W. Salzer, J. W. Willoughby, and J. P. Gibbs. 2001. Monitoring plant and animal populations. Blackwell Science, Malden, MA.

Lindenmeyer, G. Likens. 2010. The science and application of ecological monitoring. *Biological Conservation* 143, 1317-1328.

Williams, B.K., R.C. Szaro, and C.D. Shapiro. 2007. Adaptive Management: The U.S. Department of Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington D.C.