

## **Monitoring and Evaluation Framework**

### **November 2007 discussion draft**

### **possible guidance for Council's fish and wildlife program amendment process**

#### **I. Background**

Monitoring and evaluation is the foundation for adaptive management, for making sound decisions about fish and wildlife investments over time. Effective monitoring and evaluation is also the key to measuring and reporting progress toward meeting fish and wildlife program goals.

The Council intended the *program* framework the Council adopted in 2000 to be used to organize an appropriate monitoring and evaluation strategy for the program. However, the program provisions specifically related to monitoring and evaluation are not yet sufficient and explicit to guide the program's monitoring and evaluation activities. The Council is interested in receiving recommendations in the program amendment process to address that deficiency. The rest of this paper describes a possible monitoring and evaluation framework for the program based on the overarching program framework. The Council welcomes recommendations and comments that either concur with this approach or that recommend a different approach and why.

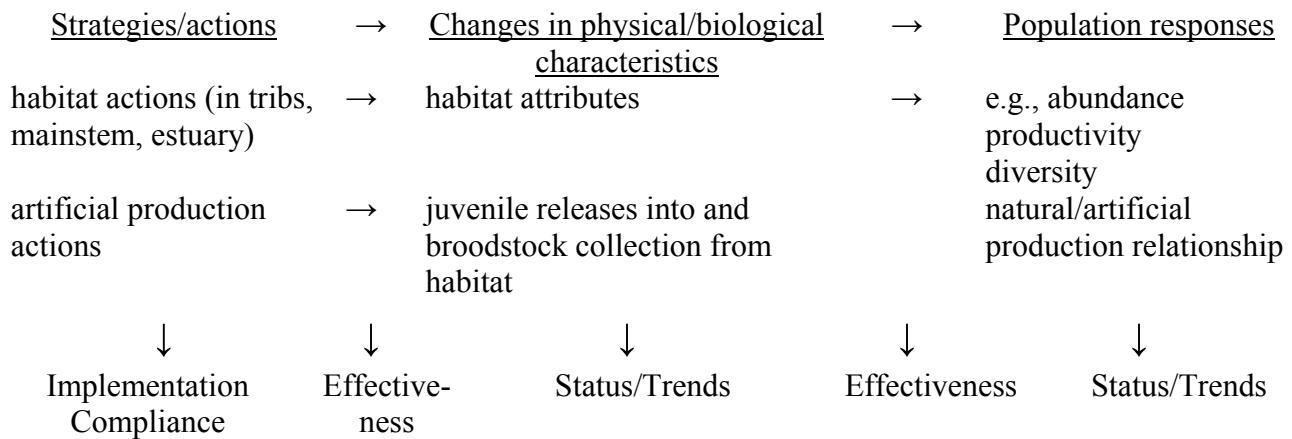
To be simple and clear, the basic purposes for program-level monitoring and evaluation are to:

- measure and report program performance and progress
- provide evaluation feedback to improve planning and management decisions
- identify and help answer critical uncertainties, linking m&e to the research activities of the program

The program already supports a substantial amount of fish and wildlife monitoring. And, the monitoring and evaluation funded under the Council's program is but a small part of the total monitoring and evaluation taking place with regard to fish and wildlife and fish and wildlife habitat in the Columbia basin. But before these monitoring and evaluation activities may truly satisfy the broad purposes stated above, those activities must be understood and organized in a systematic way so as to allow the Council (a) to gather and regularly report the results of the monitoring and evaluation work that is taking place, while also (b) identifying and resolving in an efficient way the key issues about which monitoring and evaluation activities to support. This is the purpose of the monitoring and evaluation framework described below.

## **II. Program Framework Structures the Monitoring and Evaluation Framework**

The figure below shows how a monitoring and evaluation framework logically fits the fish and wildlife program's conceptual framework, a program framework that links strategies or actions to the types of environmental and biological changes desired in five interrelated yet sequential steps. The types of monitoring and evaluation needed to evaluate each framework element are identified, and each of these five steps is then explained in more detail in the following section.



### **III. What is to be monitored, collected, and reported, at least for focal species of anadromous and resident salmonids**

#### **(1) Actions: implementation compliance monitoring**

- Implementation monitoring usually involves assessing whether the project sponsor completed the action called for (e.g., adding large wood to a stream, fencing a riparian zone to exclude livestock, or removing a barrier to fish migration). Was the action completed? Is it being maintained? Is it functioning?
- Data from implementation monitoring can be aggregated to report the program's action accomplishments, such as miles of stream fenced or protected through conservation acquisitions.
- Monitoring of implementation completion should ordinarily be at the project level, with funding for this purpose integrated with the project.
- Monitoring of maintenance will be more ad hoc. Projects with o&m budgets might logically include monitoring of maintenance. In other cases, maintenance might be handled at a subbasin or similar scale, with the monitoring taking place as part of, for example, the revision of a subbasin plan technical assessment. Maintenance monitoring requires identifying and resolving a set of policy questions: E.g., if the action is building a riparian fence, how long do we expect to have the fence in place? How much are we willing to spend to ensure that these fence remains in place and is functioning? Whose responsibility should it be to monitor and report?

#### **(2) Changes in physical/biological characteristics that actions affect: status/trend monitoring**

- **Monitor and report key habitat attributes, such as:**
  - flow
  - temperature
  - turbidity
  - channel structure
  - toxic contaminants
  - spawning areas (e.g., redd counts)
  - food sources -- insects and etc.
  - non-natives that limit the focal species
- Most likely, monitor these at the level of the subbasin or key stream reach (or in the estuary or key mainstem reach).
- Cannot monitor every attribute everywhere. Which attributes should be monitored and reported? Default consideration is to monitor and report an attribute *when* identified in a subbasin assessment as a priority limiting factor toward which priority actions will be directed. Another consideration, at least at first, will be to identify what attributes are already being monitored by someone, and draw on the data from that monitoring for reporting as an interim, while working out the most appropriate set of attributes for reporting.
- Even where a particular attribute is identified as a priority in a subbasin assessment, a decision *might* be made not to monitor *if* (a) a number of subbasins have a relatively similar problem and it is possible to monitor in less than all and extrapolate the results

- with some certainty to the rest; or (b) there is a high degree of certainty as to the efficacy of actions to change the attribute in a desired way
- Consider the ISAB and ISRP's recommendation to develop an extensive census monitoring procedure for large-scale habitat trends based on remote sensing and other appropriate methods, with data layers in a GIS.
- Statistical monitoring (sampling) is often effective in tracking status and trends for parameters for which census data are not available. Properly designed census or statistical monitoring programs can provide relatively low cost, repeatable data collection with enough accuracy and precision to detect change in the face of background noise.
- **Collective measures of habitat quality, such as:**
  - habitat capacity
  - habitat productivity
- If possible, might choose to report these rather than status and trends of particular habitat attributes.
- If so, this is likely more a matter of evaluation/determination based on a collective evaluation of the raw monitoring of the status and trends of individual attributes rather than of direct monitoring -- might even in many cases be a *modeled* parameter (e.g., from EDT).
- Likely level is at the population level in subbasins or key stream reach per focal species.
- **Hydrosystem passage survival attributes:**
  - passage efficiency
  - juvenile survival
  - adult survival
- **Monitoring the direct effects of artificial production:**
  - juvenile releases from production facilities
  - broodstock composition
  - direct results of captive broodstock activities
- The number of locations that need to be fully monitored must be determined as part of an overall Columbia River Basin evaluation of artificial production.

### **(3) Population responses: status/trend monitoring**

The purpose of the program is to effect sustainable changes in the characteristics of key fish and wildlife populations, even if most of the actions taken affect environmental and other conditions that are a step removed from the ultimate goal. The desired population characteristics must also be monitored, such as:

- adult abundance (population level)
- population productivity (e.g., SARs or adults-to-adults-- at population level)
- life history diversity and population structure are key population parameters, but most likely will be evaluated based on trends in other habitat and population parameters and not directly monitored

- relationship of natural/artificial production (e.g., PNI value -- probably at population level)
- monitor indicators for impact of artificial production on natural populations
  - for supplementation programs, performance monitoring is in three areas at a minimum:
    1. target population abundance and productivity, and capacity;
    2. target population long-term fitness, and;
    3. non-target population impacts.

**(4) Effectiveness: Evaluating the causal relationships between the actions and the physical/biological characteristic(s) targeted and between the changes in physical/biological characteristics and the desired changes in the population response parameters targeted**

- Monitoring the habitat and population characteristics that the actions are intended to affect leads to the obvious causal questions represented by the arrows in the diagram: What was the cause of any change detected in these habitat and population characteristics? Did the actions cause the changes in the physical and biological characteristics targeted? Did the changes in the habitat physical characteristics cause any changes monitored in the populations' characteristics? How *effective* are our actions?
- The term “effectiveness *monitoring*” is often used, but it is largely a misnomer. It is rarely possible to “monitor” these relationships. These steps in the framework are really a matter of evaluation, largely based on hypotheses as to how these causal relationships should work. The relationships can be evaluated either by revealing a statistical correlation or by in-depth inquiry into mechanisms of change. In many cases, intensive and even expensive research programs are necessary to gain insight into effectiveness. Determination of the causes of the effects detected by monitoring often requires the development of testable hypotheses and implementation of appropriate experiments in more intensive research.
- Long-term monitoring of the implementation of actions and of the status/trends in the key habitat and populations characteristics should tell you where it is necessary and possible to dive deeper to evaluate the causal relationships.
- Level of inquiry:
  - the level or scale at which this inquiry takes place will depend on circumstances
  - not ordinarily done at the individual project level, with key exceptions
  - population-level monitoring instead is usually essential to gaining a better understanding of restoration effectiveness
  - probably best to study intensively in a few chosen areas to determine the relationships as best possible -- such as intensively monitored watersheds
  - once a study is undertaken, implement the design, and stick with it until the important question(s) are resolved or until data show that the uncontrolled variation is so great that the design is not adequate to resolve the question

#### **IV. Methods and other considerations**

- Draw on existing monitoring and reporting by others as much as possible (e.g., state monitoring and reporting on key habitat and population characteristics). The expectation entering into this m&e framework is that much of this information is already being collected. So, make efficient use of current monitoring programs funded both by and outside the Fish and Wildlife Program.
- This approach puts a premium on getting data management right.
- It helps to think in terms of the annual m&e report. Design an annual report based on this monitoring and evaluation framework and then work to fill in the boxes.
- Individual monitoring projects can best support broad-scale monitoring programs by using common methods. Identify or develop common site selection procedures and common data collection protocols for habitat and population monitoring. Using different site-selection criteria, indicator variables, and data collection methods hampers evaluation of large-scale restoration programs. Settle on what are the minimum level of data collection protocols needed to begin reporting information from the framework and then improve the protocols over time. Fund changes/improvements in monitoring where necessary to meet minimum protocols
- If no one is engaged in monitoring a priority element in the monitoring and evaluation framework, the Council will take the steps necessary to find someone to undertake that monitoring and ensure funding.
- Determining an appropriate level and duration of any particular element of the monitoring framework will depend on the larger context of what the program is trying to accomplish in a particular area.
- The Council, either through a staff person(s) or a contractor, will gather and compile the monitoring information described here, post it on the website, and produce annual report. Link or combine this effort with the Council's annual expenditures report.
- Work on the *effectiveness* evaluation effort over time.
- Have patience -- status/trend monitoring and effectiveness evaluation will pay dividends only over long periods of time. In other words, commit to long-term funding of a multi-level monitoring plan, particularly for an agreed set of physical and biological characteristics.
- Implementing this monitoring and evaluation framework in the right way will require a significant commitment of resources and staff time by the Council.
- The next steps (after adopting this framework) would be to designate the responsible staff/contractor to flesh out the monitoring and evaluation framework in terms of the categories and “boxes” to fill and start beating the bush to fill in the data. Appoint an M&E Advisory Committee to work with that person(s) to guide through the inevitable implementation decision points. Regularly identify and analyze key policy issues in the monitoring and evaluation framework and present them to the Council for resolution.

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