

Agenda Item: “Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance”.

Presentation by: U.S. Department of Commerce National Marine Fisheries Service

Problem/Issue Statement

There has been confusion and concern over how much to monitor and what to monitor for documenting recovery of populations listed under the Endangered Species Act. This document is the first specific guidance from NMFS on this topic. It comes at the same time that the FORUM has released its *Washington State Framework for Monitoring Salmon Populations Listed under the Federal Endangered Species Act and Associated Freshwater Habitats*.

Task/Policy Addressed

Addresses Task 1 by providing a multi-agency venue for coordinating technical and policy issues and actions related to monitoring salmon recovery and watershed health.

Methods/Solutions Proposed

The FORUM will be able to determine whether there are major conflicts in approach between the FORUM “Framework” and the NMFS “Guidance”.

Attachments

Following related material is attached to this Summary or will be presented at the meeting:

Executive Summary of the *Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance*

The entire 66-page document can be found at http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/upload/Adaptive_Mngmnt.pdf

What decision is asked of the Forum?

None

Adaptive Management for ESA-Listed Salmon and Steelhead Recovery: Decision Framework and Monitoring Guidance

EXECUTIVE SUMMARY

Recovery planning for salmon and steelhead listed under the Endangered Species Act (ESA) is a lengthy, complex, and often costly process involving scientific and technical agencies, multiple local jurisdictions, and citizen groups. This guidance document from the National Marine Fisheries Service (NMFS) is intended to help recovery planners and others working on salmon and steelhead recovery in the Pacific Northwest with two crucial tasks: gathering the right information and then using it effectively. The research, monitoring, and evaluation programs associated with recovery planning need to gather the information that will be most useful in tracking progress and assessing the status of the listed species. Planners and managers can then use the information to guide and refine recovery strategies and actions. This document offers conceptual-level guidance, not specific instructions, on these two basic functions.

The objectives of this guidance are the following:

- To present a clear description of the information NMFS needs for its status reviews of ESA-listed salmonid evolutionarily significant units (ESUs).
- To clarify the nature and importance of adaptive management for recovery planning.
- To help recovery planners and managers think about their research, monitoring and evaluation needs in relation to their goals and resources.

Since the guidance is conceptual, its use is expected to generate questions on exactly how implementation, in relation to recovery plan objectives, local biological conditions, and economic realities, will be accomplished. NMFS staff expect to work with local planners and technical professionals to address these questions as they arise. NMFS also expects to clarify and revise the guidance in response to the feedback and questions received, and/or to develop additional guidance.

Recovery Planning and ESU Status Assessment

Section 1, Introduction, begins with a brief background on ESA recovery planning for salmon and steelhead in the Pacific Northwest and summarizes fundamental aspects of the scientific basis for assessing ESU status. To be approved by NMFS, a recovery plan must meet certain requirements as described in the Act:

- ESA section 4(a)(1) lists factors for re-classification or de-listing that are to be addressed in recovery plans:
 - A. The present or threatened destruction, modification, or curtailment of [the species'] habitat or range
 - B. Over-utilization for commercial, recreational, scientific or educational purposes

- C. Disease or predation
 - D. The inadequacy of existing regulatory mechanisms
 - E. Other natural or manmade factors affecting its continued existence
- Further, ESA section 4(f)(1)(B) directs that recovery plans, to the extent practicable, incorporate:
 - (1) a description of such site-specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species
 - (2) objective, measurable criteria which, when met, would result in a determination, in accordance with ESA Section 4, that the species be removed from the list, and
 - (3) estimates of the time required and cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal (ESA Section 4[f]).

Consequently, evaluating a species for potential de-listing requires both an explicit analysis of population or demographic parameters (biological recovery criteria) and also of the physical or biological conditions that affect the species’ continued existence, categorized under the five ESA listing factors (listing factor criteria). Together these make up the “objective, measurable criteria” required under section 4(f)(1)(B).¹

The biological recovery criteria are based on principles described in a NMFS technical memorandum, *Viable Salmonid Populations and the Recovery of Evolutionarily Significant Units* (McElhany et al., 2000). A viable salmonid population is defined as one that has a negligible risk of extinction over 100 years. Viable salmonid populations are described in terms of four parameters: abundance, population productivity or growth rate, spatial structure, and diversity (the VSP parameters). The metrics that are needed to evaluate biological recovery are derived from these parameters. (A metric is something that quantifies a characteristic of a situation or process, e.g. the number of natural-origin salmon returning to spawn to a specific location is a metric for population abundance.) Viable ESUs are defined by some combination of multiple populations, at least some of which meet or exceed “viable” thresholds, and that have appropriate geographic distribution, protection from catastrophic events, and diversity of life histories and other genetic expression.

Listing factor criteria are based on the features that were evaluated under section 4(a)(1) when the initial determination was made to list the species for protection under the ESA, or any significant factors that have subsequently arisen. Recovery plans are required to contain criteria for evaluating the status of those listing factors. Recovery plans describe threats and limiting factors in a manner that clearly corresponds to the section 4(a)(1) listing factors. At the time of a delisting decision, NMFS will determine whether the section 4(a)(1) listing factors have been adequately addressed, i.e. whether the underlying causes of decline have been addressed and mitigated and are not likely to re-emerge.

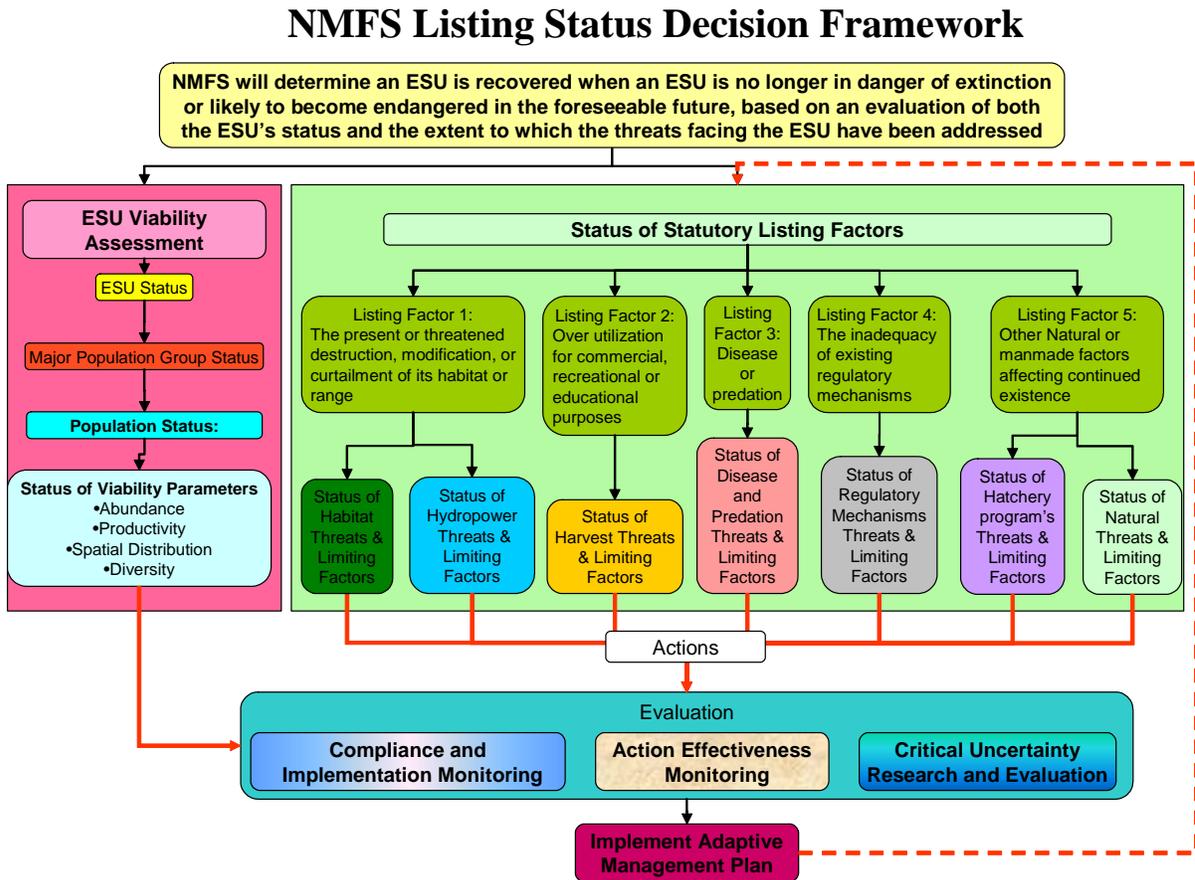
¹ See NMFS 2004 and *Fund for Animals v. Babbitt* 903 F. Supp. 96 (D.D.C. 1995, Appendix B).

NMFS Listing Status Decision Framework

Section 2 presents the NMFS listing status decision framework (decision framework) (Figure ES-1), which illustrates the key questions NMFS will consider in determining ESU status and indicates how the information derived from research, monitoring, and evaluation will be used to answer these questions. The decision framework was developed to help recovery planners design research, monitoring, and evaluation programs that will provide the information NMFS needs for listing and de-listing decisions.

The decision framework is a series of decision-question sets that address the status and change in status of a salmonid ESU, as well as the risks posed by threats to the ESU. The decision-question sets step down from ESU to major population grouping and finally to population scale. The questions at each scale should elicit information needed to make the decision(s) required at that scale.

Figure ES-1. NMFS Listing Status Decision Framework



NMFS ultimately bases a decision to de-list an ESU on a determination that it is no longer in danger of extinction or likely to become endangered in the foreseeable future. This determination must be based on an evaluation of both the ESU's status and the

extent to which the threats facing the ESU have been addressed. The decision framework is designed to elicit the information needed to meet the statutory and regulatory requirements for de-listing (50 CFR § 424.11).

Adaptive Management

Section 3 provides a conceptual overview of adaptive management. Adaptive management is the process of adjusting management actions and/or directions based on new information. To do this, it is essential to incorporate a plan for monitoring, evaluation, and feedback into an overall implementation plan for recovery. The plan should link results (intermediate or final) to feedback on design and implementation of actions. Adaptive management works by coupling the decision-making process with collection of performance data and its evaluation. Most importantly, it works by offering an explicit process through which alternative strategies to achieve the same ends are proposed, prioritized, and implemented when necessary.

An adaptive management plan must include the following elements (Anderson, 2003):

- Management strategies that are revisited regularly;
- The use of conceptual or quantitative models of the system being managed to develop and test hypotheses and to guide strategy and action planning;
- A range of potential management actions that could be used to meet the strategy;
- Monitoring and evaluation to track progress;
- Mechanisms for incorporating learning from monitoring and evaluation into decisions on actions and strategies; and
- A collaborative structure for stakeholder participation in adjusting management strategies and actions.

Adaptive management is crucial for salmonid recovery programs because of the length and complexity of the salmonid life cycle and the uncertainties involved in improving salmonid survival and status. The key is to build explicit links between management actions, monitoring data, and biological and physical responses.

Several types of monitoring are needed to support adaptive management:

- Implementation and compliance monitoring, used to evaluate whether the recovery plan is being implemented.
- Status and trend monitoring, which assesses changes in the status of an ESU and its component populations, and changes in status or significance of the threats to the ESU.
- Effectiveness monitoring, which tests hypotheses on cause-and-effect relationships and determines (via research) if an action is effective and should be continued.

It is also important to explicitly address the many unknowns in salmon recovery – the “critical uncertainties” that make management decisions much harder. Critical

uncertainty research may seem expensive or unnecessary in light of basic information needs; however, in the long run, it will reduce monitoring and implementation costs.

Monitoring and Evaluation for Adaptive Management

Sections 4, 5, and 6 discuss monitoring and evaluation for adaptive management in more detail. Section 4 describes guiding principles for the development of two types of monitoring: *status and trends monitoring* and *effectiveness monitoring*. While status and trends monitoring can produce data on population status and on the status of the potentially limiting factors, without some modeling (quantitative, qualitative, heuristic), supported by effectiveness monitoring data, it is impossible to translate between these two data sets or types, i.e. to make cause-and-effect statements. It is essential to build effectiveness monitoring into the implementation plan at the outset, because it requires explicitly coupling the monitoring design and implementation with the action design and implementation in order to detect an effect. *Recovery plan implementation should consist of action strategies that include the demonstration of effect.*

Section 5 discusses, at a conceptual level, the issues related to prioritizing monitoring in the face of resource constraints. Although Sections 2 through 4 lay out the full scope of information that would be desirable to assess the status of salmon and steelhead, the reality is that monitoring programs are developed in a world of finite resources. Local conditions may raise specific questions about how to develop a monitoring program consistent with this guidance. Many of these questions will need to be answered on a case-by-case basis.

The design of monitoring programs should begin with the data needs of management and policy decision making; these processes will determine the effort required. Management questions or decisions should also be used to determine spatial, temporal, and precision scales for all monitoring data collection. Critical uncertainties in recovery planning – the current suite of unanswered questions – can also motivate monitoring, though not by way of defining sampling effort. There is real and necessary value to data collection programs that address the critical uncertainties confounding our ability to make effective management decisions. This research-based monitoring is also driven by management questions, in a less direct, but equally important, manner. This section presents some basic design principles to guide the development of efficient and effective monitoring programs; the list is neither exhaustive nor complete, but provides some general rules and thinking for practical monitoring program design.

Section 6 illustrates how monitoring program design can affect the level of certainty that can be attained in evaluating ESU status. Decisions often must be made with incomplete information. Three hypothetical examples show how ESU-scale, ESA status assessments may play out under a range of data and information quality and quantity. Different types of incomplete information pose corresponding types of risks for de-listing decisions. The scenarios described are meant to help planners consider how their implementation and monitoring decisions may affect NMFS' assessment of ESU status, and how to balance monitoring investments.

As local recovery planners begin to design monitoring programs for salmon recovery, they will need to address the issues that are discussed conceptually throughout this document, including:

- Clarifying the questions that need to be answered for management decision making.
- Identifying which populations and associated limiting factors to monitor.
- Addressing questions of metrics and indicators – frequency, distribution, and intensity of monitoring – and the tradeoffs and consequences of these choices.
- Assessing the degree to which existing monitoring programs are consistent with this guidance document and identifying needed adjustments in those programs as well as additional monitoring needs and a strategy for filling them.
- Developing a data management plan (see Appendix B).
- Prioritizing research needs to address critical uncertainties, test assumptions, and provide other information to support decision making.

This guidance document is meant to help local planners as they frame and evaluate these questions. Again, the guidance is conceptual and does not provide specific answers to specific questions. To anticipate the range and scope of all questions that might arise as planners consider this guidance would have been impossible because of the range of local conditions and the complexities of designing monitoring programs for species as complicated as salmon. NMFS expects to work closely with recovery plan developers to contribute to the process of developing, proposing, prioritizing, and assessing alternative strategies for inclusion in adaptive management plans and recovery plan implementation.