Northwest Power and Conservation Council

September 8, 2010

MEMORANDUM

TO: Council Members

FROM: Peter Paquet, Manager Wildlife & Resident Fish

SUBJECT: Presentation by NOAA on Hatcheries

BACKGROUND:

Staff from NOAA's Northwest Science Center and the Northwest Regional Office will brief the Council on emerging science on hatcheries and the Draft Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs. An executive summary of the DEIS is attached.

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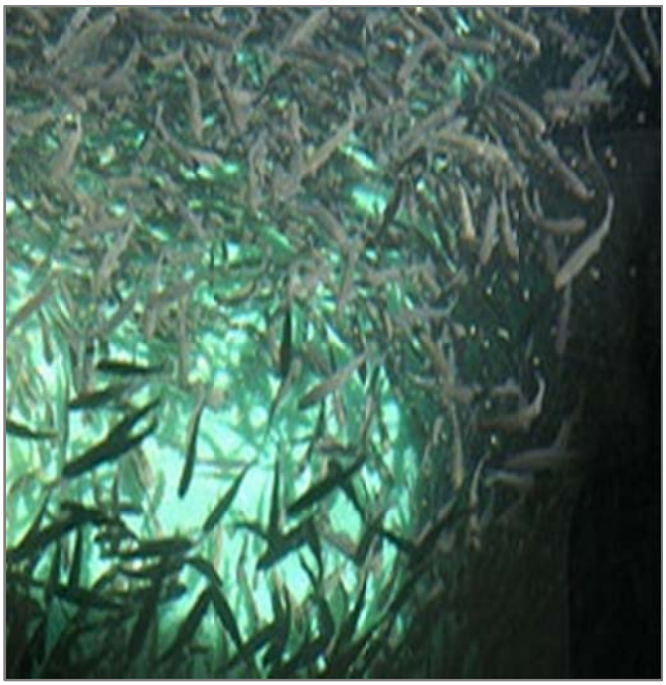
Executive Summary

Draft Environmental Impact Statement to Inform Columbia River Basin Hatchery Operations & the Funding of Mitchell Act Hatchery Programs



Introduction

Congress enacted the Mitchell Act (16 United States Code [USC]755 757) in 1938 for the conservation of anadromous (salmon and steelhead) fishery resources in the Columbia River basin (defined as all tributaries of the Columbia River in the United States [U.S.] and the Snake River basin). It authorized the establishment, operation, and maintenance of one or more hatchery facilities in the states of Oregon, Washington, and Idaho, scientific investigations to facilitate the conservation of the fishery resource, and "all other activities necessary for the conservation of fish in the Columbia River basin in accordance with law." While the Mitchell Act provided the authority for the conservation of fishery resources in the Columbia River, Congress must appropriate funds to implement it.

Since 1946, Congress has continued to appropriate Mitchell Act funds on an annual basis. These funds have been used to support research, improve fish passage, install screens on water diversions, and build and operate more than 20 salmon and steelhead hatchery facilities (referred to in this EIS as Mitchell Act hatchery facilities). Each year, Congress allocates a specific portion of the money appropriated for the Mitchell Act to hatchery operations. For each of the past 10 years, hatchery operation funding has been between $11 and $16 million dollars. The National Marine Fisheries Service (NMFS), part of the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce, currently distributes these appropriations to the operators of 62 hatchery programs that annually produce more than 71 million fish. Historically, production levels have been as high as 128.6 million juvenile fish annually, but these levels have been substantially reduced as inflation, maintenance, and other costs have eroded the amount of funding available for fish production.

Table S-1. ESA Status of Columbia River Basin Salmon and Steelhead

Species	ESU/DPS	Current Endangered Species Act Listing Status
Sockeye salmon (Oncorhynchus nerka)	Snake River	Endangered (70 Fed. Reg. 37160, June 28, 2005)
Chinook salmon (O. tshawytscha)	Upper Columbia River Spring-run	Endangered (70 Fed. Reg. 37160, June 28, 2005)
	Snake River Spring/Summer-run	Threatened (70 Fed. Reg. 37160, June 28, 2005)
	Snake River Fall-run	Threatened (70 Fed. Reg. 37160, June 28, 2005)
	Lower Columbia River	Threatened (70 Fed. Reg. 37160, June 28, 2005)
	Upper Willamette	Threatened (70 Fed. Reg. 37160, June 28, 2005)
Coho salmon (O. kisutch)	Lower Columbia River	Threatened (70 Fed. Reg. 37160, June 28, 2005)
Chum salmon (O. keta)	Columbia River	Threatened (70 Fed. Reg. 37160, June 28, 2005)
Steelhead (O. mykiss)	Upper Columbia River	Threatened (71 Fed. Reg. 834, January 5, 2006)
	Snake River basin	Threatened (71 Fed. Reg. 834, January 5, 2006)
	Middle Columbia River	Threatened (71 Fed. Reg. 834, January 5, 2006)
	Upper Willamette River	Threatened (71 Fed. Reg. 834, January 5, 2006)
	Lower Columbia River	Threatened (71 Fed. Reg. 834, January 5, 2006)

Source: NMFS

What is an ESU? What is a DPS?

Under the ESA, NMFS lists salmon as threatened or endangered according to the status of the "evolutionarily significant unit" (ESU). An ESU is a population or a group of populations that 1) is substantially reproductively isolated from other groups of populations of the same species and 2) represents an important component of the evolutionary legacy of the species. See http://www.nwfsc.noaa.gov/trt/glossary.cfm#E for formal definitions of ESA related terms used by NMFS.

In contrast to salmon, NMFS lists steelhead runs under the joint NMFS-U.S. Fish and Wildlife Service (USFWS) policy for recognizing distinct population segments (DPSs) under the ESA (61 Fed. Reg. 4722, February 7, 1996). This policy adopts criteria similar to those in the ESU policy, but applies them to a broader range of animals that includes all vertebrates. For determining when a group of vertebrates constitutes a DPS, the group must be discrete from other populations, and it must be significant to its animal group, or taxon. A group is discrete if it is "markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, and behavioral factors" (61 Fed. Reg. 4722, February 7, 1996). NMFS lists steelhead according to the status of their DPS.

During the same time that production levels were reduced at hatchery facilities funded under the Mitchell Act, NMFS listed eight evolutionarily significant units (ESUs) of salmon and five distinct population segments (DPSs) of steelhead in the Columbia River basin under the ESA (i.e., 13 ESUs/DPSs total) (Table S-1).

When listing both salmon and steelhead under the ESA, NMFS cited the adverse effects of hatchery operations as one of the factors for the decline of most of these listed ESUs/DPSs. Under the ESA, NMFS must make ongoing determinations about how hatchery operations affect ESUs and DPSs listed as threatened or endangered. Determination of these effects is complex because the effects of any one hatchery program can only be fully understood through a comprehensive analysis that considers the interrelationship of the many natural-origin and hatchery-origin populations in the basin. Management determinations are better informed when made with an understanding of this inter relationship. The combination of funding pressures under the Mitchell Act, the listing of 13 ESUs/DPSs of salmon and steelhead under the ESA in the Columbia River basin, and the benefits of a comprehensive review of hatchery programs form the basis for NMFS' proposed action.

The proposed action is to develop a NMFS policy direction that will 1) guide NMFS' distribution of Mitchell Act hatchery funds and 2) inform NMFS' future review of individual Columbia River basin hatchery programs under the ESA.

What is NMFS' Proposed Action?

The proposed action is to develop a NMFS policy direction that will 1) guide NMFS' distribution of Mitchell Act hatchery funds and 2) inform NMFS' future review of individual Columbia River basin hatchery programs under the ESA.

What is a policy direction?

A policy direction is the overarching theme that will guide and shape decisions NMFS makes related to hatchery production in the Columbia River basin. It is defined by a series of goals and/or principles.

Although this environmental impact statement (EIS) itself will not determine whether any specific alternative meets ESA requirements, the analyses within the EIS will inform NMFS, hatchery operators, and the public about the current and anticipated cumulative environmental effects of operating the Columbia River basin hatchery programs under a full range of alternatives. The alternatives are designed to reduce or minimize adverse effects of hatchery operations on natural-origin salmon and steelhead populations, while hatchery operators continue to pursue not only the conservation or harvest goals that currently apply to each hatchery program, but also different or additional conservation and harvest goals as identified within the alternatives. NMFS anticipates that the alternative it pursues after completion of this EIS will be applicable for 10 years.

How should reviewers approach this EIS?

NMFS encourages reviewers to perform the following activities:

1. Review the draft EIS to gain an understanding of how it is organized and how the alternatives are framed and analyzed.
2. Formulate a notion of what the hatchery programs should accomplish; that is, formulate a notion of the policy direction they think should guide NMFS decisions on hatchery production in the Columbia River basin.
3. Carefully consider the information provided in Chapters 4 and 5, Environmental Consequences and Cumulative Effects, respectively.
4. After considering the effects, comment on how NMFS should formulate a preferred alternative for publication in the final EIS and ROD.

Project Area

This project area covered in this EIS includes rivers, streams, and hatchery facilities where hatchery-origin salmon and steelhead occur or are anticipated to occur in the Columbia River basin, including the Snake River and all other tributaries of the Columbia River in the United States (Figure S-1). The project area also includes the Columbia River estuary and plume. The project area comprises two salmon recovery domains (the Willamette/Lower Columbia and the Interior Columbia) as established by NMFS under its ESA recovery planning responsibilities. The project area also contains seven ecological provinces and more than 37 subbasins (i.e., tributaries to the Columbia or Snake Rivers). There are 178 salmon and steelhead hatchery programs in the Columbia River basin. These hatchery programs originate from 80 hatchery facilities and produced over 143 million salmon and steelhead in 2007 (Table S-2).

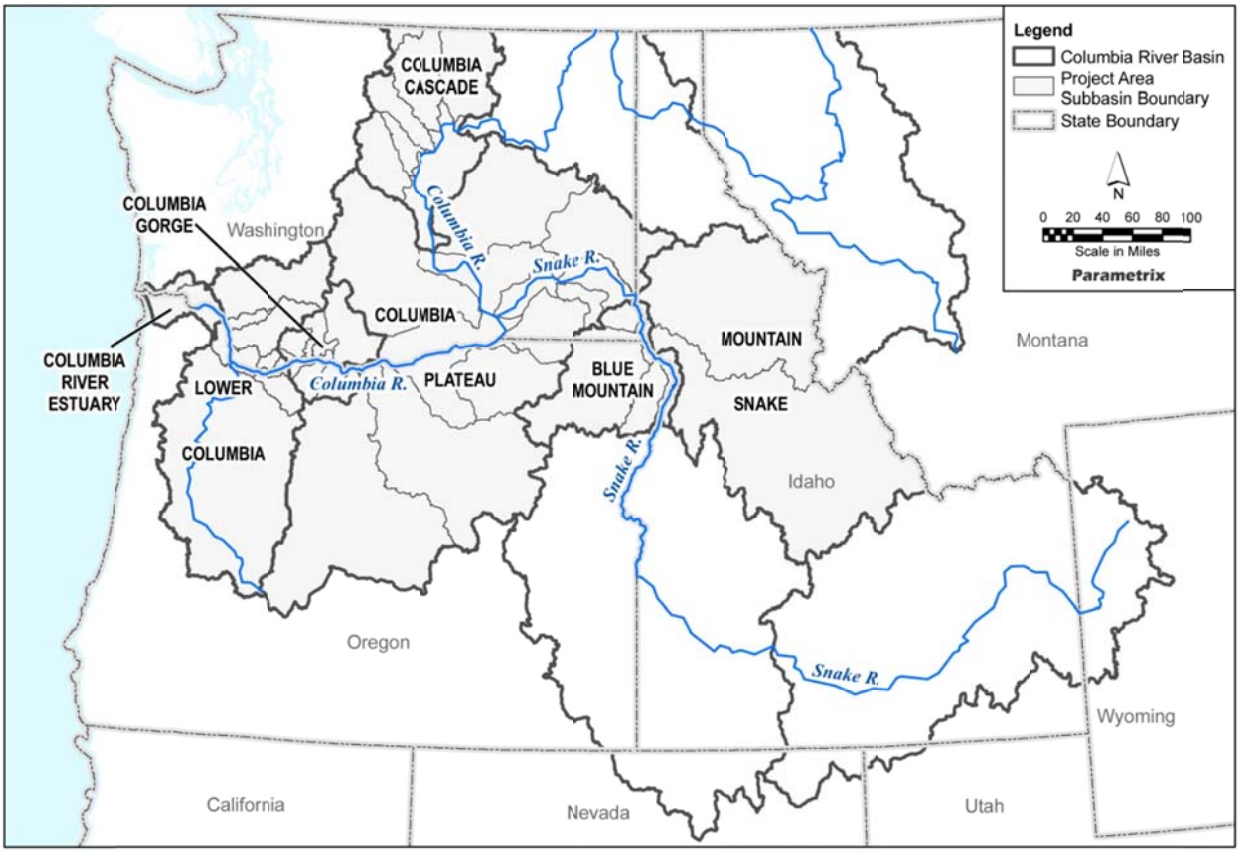


Figure S-1. Project Area by Ecological Province

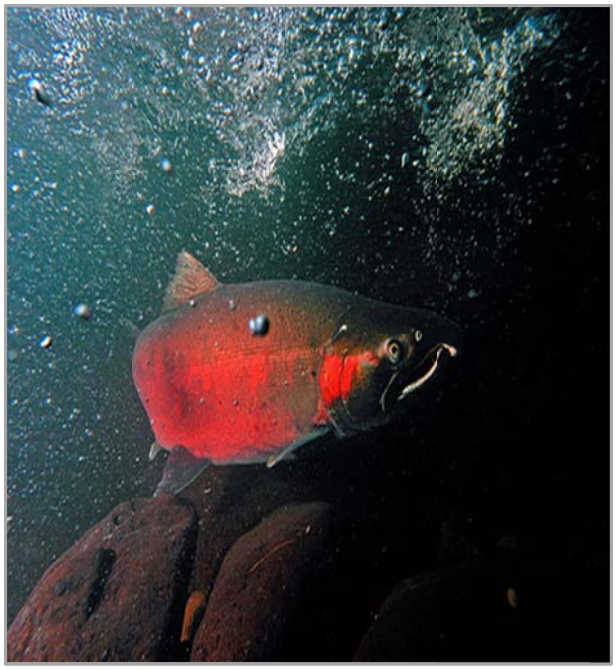
Table S-2. Total Hatchery-Origin Salmon and Steelhead Production within the Columbia River Basin (X 1,000)

Recovery Domain	Fall Chinook Salmon	Spring Chinook Salmon	Summer Chinook Salmon	Coho Salmon	Winter Steelhead	Summer Steelhead	Chum Salmon	Sockeye Salmon	Total
Willamette / Lower Columbia	46,968	12,480	0	16,985	1,992	1,968	300	0	80,693
Interior Columbia	22,976	20,019	3,733	4,787	20	10,986	0	363	62,884
Total	69,944	32,499	3,733	21,772	2,012	12,954	300	363	143,577

Source: Appendix C through Appendix F. Numbers are based on production levels in 2007.

Purpose and Need

The combination of funding pressures under the Mitchell Act, the 13 ESA listings for salmon and steelhead in the Columbia River basin (Table S-1), and the value of a comprehensive review of hatchery programs to inform decision makers have resulted in the need for NMFS' proposed action. NMFS' purpose for the action is to develop a policy direction related to Columbia River basin hatchery production that will 1) guide its decisions about the distribution of funds for hatchery production under the Mitchell Act; and 2) inform its future review of individual Columbia River hatchery programs under the ESA. The future reviews will be informed through this EIS's analysis of the effects of hatchery programs on the environment, including natural-origin salmon and steelhead populations. The review of hatchery programs is comprehensive in the sense that information on the effects of all Columbia River basin hatchery programs throughout the basin and across a full range of alternatives is exposed in the EIS. Each alternative identifies a different policy direction that would be used to guide NMFS decisions on Columbia River basin hatchery production.



What is the relationship between NMFS and hatchery operators who receive Mitchell Act funding?

Under the authority of the Mitchell Act, NMFS provides the USFWS, states, and tribes with funds Congress appropriates to manage and operate hatchery programs. NMFS has broad discretion in using these funds either to prescribe narrowly way the production programs will be operated or to allow hatchery operator discretion. Historically, NMFS has provided wide latitude in the use of these hatchery funds.

NMFS plans to continue to provide flexibility to hatchery operators with regard to the operation of Mitchell Act funded hatchery programs but will offer an overarching vision of how the Mitchell Act funded programs can best operate as one component of the Columbia River basin hatchery system. NMFS understands that hatchery operators must make good management decisions on a case-by-case basis after considering specific data relevant to their hatchery programs. There are no "one-size-fits-all" solutions. As a result of this environmental review, NMFS anticipates adopting a policy direction that identifies general goals for NMFS to pursue with regard to Columbia River basin hatchery production and a series of recommendations for hatchery operators to consider and adapt when developing plans for their individual hatchery programs.

Activities that are not considered to be within a reasonable range of potential funding or operational opportunities and that are not, therefore, envisioned within the alternatives in this draft EIS, include the following:

- **Construction of New Hatchery Facilities with Mitchell Act Funds.** Current and reasonably foreseeable appropriations under the Mitchell Act for hatchery production would preclude this option. All reasonably foreseeable decisions for the use of Mitchell Act funding at anticipated levels also would preclude this option.
- **Fish Screens and Fishways.** The Mitchell Act Screens and Fishways Program is a separate program with separate congressionally appropriated funding.
- **Habitat Restoration.** While Congress clearly has the discretion to direct Mitchell Act funds toward habitat restoration, it has not done so. Congress consistently and specifically has directed funds to hatchery production (and related monitoring, evaluation, and reform) and to screens and fishways. This EIS is directed at the use of the funds Congress specifically directs towards hatcheries. Through 2009, NMFS has funded habitat restoration through the Pacific Coastal Salmon Recovery Fund, created by Congress in 2000, to address the need to protect, restore, and conserve salmon, steelhead, and their habitat.
- **Hatchery Practices that Increase Adverse Effects.** While not all salmon ESUs or steelhead DPSs in the Columbia River basin are listed under the ESA, there is at least one salmon or steelhead population that is a member of a listed ESU or DPS in each of the major subbasins within the project area. Hatchery practices have been identified as a factor for the decline of most listed salmon and steelhead. Because of these factors, the purpose and need for this action is to establish a policy direction that, among other things, includes information on performance

standards that reduce adverse effects on natural-origin fish. Implementation of hatchery practices that would increase adverse effects on listed species when compared to existing practices is not considered in this draft EIS.

It is not the purpose of this EIS to determine whether specific actions or hatchery programs meet the requirements of the ESA. These ESA decisions will be made in separate processes consistent with applicable regulations as required by the ESA

What is the relationship between the ESA and the National Environmental Policy Act (NEPA)?

The relationship between the ESA and NEPA is complex, in part because both laws address environmental values related to the impacts of a proposed action. However, each law has a distinct purpose, and the scope of review and standards of review under each statute are different. This EIS analysis under NEPA should not be viewed as contributing to a conclusion about whether an alternative meets or does not meet ESA requirements.

The purpose of an EIS under NEPA is to promote disclosure, analysis, and consideration of the broad range of environmental issues surrounding a proposed major Federal action by considering a full range of reasonable alternatives, including a no-action alternative. Public involvement promotes this purpose.

The purpose of the ESA is to conserve listed species and the ecosystems upon which they depend. Determinations about whether Mitchell Act hatchery programs meet ESA requirements will be made under section 4(d), section 7, or section 10 of the ESA. Each of these ESA sections has its own substantive requirements, and the documents that reflect the analysis and decisions are different than those related to a NEPA analysis.

It is not the purpose of this EIS to suggest to the reader any conclusions relative to the ESA. While the Record of Decision (ROD) identifies the selected NEPA alternative, the ROD does not determine whether that alternative complies with the ESA.

NMFS acknowledges that the analyses of environmental effects on listed species under the ESA and under NEPA are similar and can lead to confusion; however the analyses under these separate statues are not functionally equivalent. Language in this draft EIS has been chosen in an effort to minimize the confusion between a NEPA analysis and an ESA analysis. For instance, “jeopardize,” “endanger,” “recover,” and similar terms are commonly used to describe the effect of actions under an ESA analysis. This EIS avoids using these terms, using in their place terms and phrases such as performance goals and performance metrics.

Alternatives Analyzed in Detail

Alternative 1 (No Action)

Under Alternative 1, there would not be a defined policy direction, and Columbia River basin hatchery production would continue baseline conditions. Based on NMFS' observations, the following describe the baseline conditions:

- Hatchery programs are used primarily to contribute to harvest, although some hatchery programs are designed to help conserve natural-origin salmon and steelhead populations.
- Most hatchery programs cannot control the number of hatchery fish on the spawning grounds. In most cases, the number of hatchery-origin fish on the spawning ground is higher than what current research suggests is desirable.
- Many hatchery programs are used to meet mitigation agreements. Most mitigation occurs to reduce the effects from hydropower on the fisheries.
- Monitoring, evaluation, and reform (MER) occurs, but it is neither prioritized nor guided by a comprehensive basin-wide plan. Fish managers use available funds to meet fish production goals first; if any money remains, MER occurs.
- There is no defined policy on the use of weirs to control the number of hatchery-origin fish on the spawning grounds.
- Conservation hatchery programs, although viewed as a temporary solution to reduce extinction risk, typically are developed and operated with no explicit sizing or termination criteria.
- Best management practices (BMPs) are widely applied, but their application is not universal. In many cases, application is based on available funding and/or whether the BMP is a regulatory requirement.
- The amount of Mitchell Act hatchery funds can vary annually. Hatchery operators generally receive a similar proportion each year.

Alternative 2 (No Mitchell Act Funding)

Under Alternative 2, the policy direction would be defined by the following goals and/or principles:

- Mitchell Act hatchery funding would be eliminated, and all Mitchell Act-funded hatchery programs would be closed.
- Substantially fewer fish would be produced to support fisheries than under Alternative 1.

- The intermediate performance goal would be applied to non-Mitchell Act-funded hatchery programs that affect primary and contributing salmon and steelhead populations (Table S-3). Application of the intermediate performance goal would, in most cases, reduce negative effects of hatchery programs on natural-origin salmon and steelhead populations.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- Production levels would be reduced from levels under Alternative 1 in hatchery programs designed to meet mitigation requirements only when those production levels conflicted with the ability of a hatchery program to meet performance goals.
- Conservation hatchery programs would be operated at a level determined by conservation need, with hatchery-origin production diminishing as natural-origin production increased.
- BMPs would be applied in all hatchery programs.
- No new hatchery programs would be initiated.
- No new weirs would be installed to help control the number of hatchery-origin fish on the spawning grounds.
- MER would be guided by a comprehensive basin-wide plan.

Alternative 3 (All Hatchery Programs Meet Intermediate Performance Goal)

Under Alternative 3, the policy direction would be defined by the following goals and/or principles:

- The intermediate performance goal would be applied to all Columbia River basin hatchery programs that affect primary and contributing salmon and steelhead populations (Table S-3). Application of the intermediate performance goal would, in most cases, reduce negative effects of hatchery programs on natural-origin salmon and steelhead populations.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- Production levels would be reduced from levels under Alternative 1 in hatchery programs designed to meet mitigation requirements only when those production levels conflicted with the ability of a hatchery program to meet performance goals.
- Conservation hatchery programs would be operated at a level determined by conservation need, with hatchery-origin production diminishing as natural-origin production increases.

- BMPs would be applied in all hatchery programs.
- No new hatchery programs would be initiated.
- New temporary (i.e., seasonal) weirs would be installed to help control the number of hatchery-origin fish on the spawning grounds.
- MER would be guided by a comprehensive basin-wide plan.
- Mitchell Act funds would be disbursed in support of the above goals and/or principles.

Alternative 4 (Willamette/Lower Columbia River Hatchery Programs Meet Stronger Performance Goal)

Under Alternative 4, the policy direction would be defined by the following goals and/or principles:

- The intermediate performance goal would be applied to all Columbia River basin hatchery programs that affect primary and contributing salmon and steelhead populations in the Interior Columbia River recovery domain (Table S-3). Application of the intermediate performance goal would, in most cases, reduce negative effects of hatchery programs on natural-origin salmon and steelhead populations.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- The stronger performance goal would be applied to all Columbia River basin hatchery programs that affect primary and contributing salmon and steelhead populations in the Willamette/Lower Columbia River recovery domain. Application of the stronger performance goal would reduce negative impacts of hatchery programs on natural-origin salmon and steelhead populations even more than the intermediate performance goal.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- Production levels would be reduced from levels under Alternative 1 in hatchery programs designed to meet mitigation requirements only when those production levels conflicted with the ability of a hatchery program to meet performance goals.
- Conservation hatchery programs would be operated at a level determined by conservation need, with hatchery-origin production diminishing as natural-origin production increases.
- BMPs would be applied in all hatchery programs.

- New conservation hatchery programs would be initiated in the Willamette/Lower Columbia River recovery domain, if appropriate, using existing hatchery capacity. New conservation hatchery programs would be initiated only for populations deemed at high risk of extinction.
- New harvest hatchery programs would be initiated and/or existing hatchery programs would be changed to better support harvest opportunities below Bonneville Dam, including ocean fisheries, using any hatchery capacity that remains after appropriate conservation hatchery programs are initiated.
- New temporary (i.e., seasonal) and permanent weirs would be installed to help control the number of hatchery-origin fish on the spawning grounds.
- MER would be guided by a comprehensive basin-wide plan.
- Mitchell Act funds would be disbursed in support of the above goals and/or principles.

Alternative 5 (Interior Columbia River Hatchery Programs Meet Stronger Performance Goal)

Under Alternative 5, the policy direction would be defined by the following goals and/or principles:

- The intermediate performance goal would be applied to all Columbia River basin hatchery programs that affect primary and contributing salmon and steelhead populations in the Willamette/Lower Columbia River recovery domain (Table S-3). Application of the intermediate performance goals would, in most cases, reduce negative effects of hatchery programs on natural-origin salmon and steelhead populations.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- The stronger performance goal would be applied to all Columbia River basin hatchery programs that affect primary and contributing salmon and steelhead populations in the Interior Columbia River recovery domain. These stronger performance goals would reduce negative impacts of hatchery programs on natural-origin salmon and steelhead populations even more than the intermediate performance goal.
    - Integrated hatchery programs would be better integrated than under Alternative 1.
    - Segregated hatchery programs would be better segregated than under Alternative 1.
- Production levels would be reduced from levels under Alternative 1 in hatchery programs designed to meet mitigation requirements only when those production levels conflicted with the ability of a hatchery program to meet performance goals.

- Conservation hatchery programs would be operated at a level determined by conservation need, with hatchery-origin production diminishing as natural-origin production increased.
- BMPs would be applied in all hatchery programs.
- New conservation hatchery programs would be initiated in the Interior Columbia River recovery domain, if appropriate, using existing hatchery capacity. New conservation hatchery programs would be initiated only for populations deemed at high risk of extinction.
- New harvest hatchery programs would be initiated, and/or existing hatchery programs would be changed to better support harvest opportunities above Bonneville Dam, including treaty Indian commercial fisheries, using any hatchery capacity that remains after appropriate conservation hatchery programs are initiated.
- New temporary (i.e., seasonal) and permanent weirs would be installed to help control the number of hatchery-origin fish on the spawning grounds.
- MER would be guided by a comprehensive basin-wide plan.
- Mitchell Act funds would be disbursed in support of the above goals and/or principles.

Table S-3. Hatchery Performance Goals Indentified Under Each Alternative's Policy Direction

Recovery Domain	Population Type*	Funding Entity	- - Hatchery Performance Goals by Alternative - -				
			Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Willamette / Lower Columbia	Primary	Mitchell Act	Baseline conditions	N/A**	Intermediate	Stronger	Intermediate
		Other	Baseline conditions	Intermediate	Intermediate	Stronger	Intermediate
	Contributing	Mitchell Act	Baseline conditions	N/A	Intermediate	Stronger	Intermediate
		Other	Baseline conditions	Intermediate	Intermediate	Stronger	Intermediate
	Stabilizing	Mitchell Act	Baseline conditions	N/A	Baseline conditions	Baseline conditions	Baseline conditions
		Other	Baseline conditions	Baseline conditions	Baseline conditions	Baseline conditions	Baseline conditions
Interior Columbia	Primary	Mitchell Act	Baseline conditions	N/A	Intermediate	Intermediate	Stronger
		Other	Baseline conditions	Intermediate	Intermediate	Intermediate	Stronger
	Contributing	Mitchell Act	Baseline conditions	N/A	Intermediate	Intermediate	Stronger
		Other	Baseline conditions	Intermediate	Intermediate	Intermediate	Stronger
	Stabilizing	Mitchell Act	Baseline conditions	N/A	Baseline conditions	Baseline conditions	Baseline conditions
		Other	Baseline conditions	Baseline conditions	Baseline conditions	Baseline conditions	Baseline conditions

Each population's role in recovery was designated as primary, contributing, or stabilizing. These designations were used by the LCRFRB in the development of the Lower Columbia Fish Recovery Plan (LCFRB 2004). The HSRG adapted them throughout the basin after discussions with the hatchery operators, and they are applied in this EIS (Appendix C through Appendix F).

N/A means not applicable since hatchery programs would be terminated.

Is there a preferred alternative for this draft EIS?

As noted in Chapter 1, Purpose of and Need for the Proposed Action, and explained in further detail in Chapter 2, Alternatives, this draft EIS does not contain a preferred alternative. Rather, it establishes several distinct policy directions as alternatives that would 1) guide the NMFS' decisions on distribution of Mitchell Act funds for hatchery production in the Columbia River basin, and 2) inform NMFS' future review of individual hatchery programs under the ESA. NMFS anticipates identifying the preferred alternative in the final EIS after considering the comments received on this document. The preferred alternative likely will be a blend of more than one of the alternatives evaluated in this EIS. The environmental effects of the preferred alternative will be explained in the final EIS and summarized in the ROD.

Reviewers are not constrained to comment solely on the specific alternatives in this EIS but may comment or recommend a preferred alternative that combines elements of several alternatives presented in this draft EIS.

Identifying an Implementation Scenario

The policy directions that are associated with each of the action alternatives are goal oriented and do not identify specific actions that would be taken under each alternative. This is because NMFS believes that specific hatchery actions should be determined on a hatchery-program-by-hatchery-program basis. To analyze, illustrate and compare the potential environmental effects of each alternative, however, an implementation scenario was developed for each alternative's policy direction. Each implementation scenario is one plausible example of how each hatchery program could be operated to meet the policy direction of the alternative. There are, however, multiple implementation scenarios that could be applied consistent with each policy direction.

NMFS does not advocate any of the implementation scenarios evaluated in this EIS, and the Chapter 4 analyses may show that implementing some components of a scenario would be unreasonable. For example, some components of these implementation scenarios may or may not be viewed as consistent with commitments in the U.S. v Oregon Management Agreement. The intent of the EIS analyses is not to make a determination that an alternative or its implementation scenario is or is not consistent with the U.S. v. Oregon Management Agreement, and no such assertion is made. Rather, NMFS anticipates that the affected parties will ensure that their hatchery plans (e.g., hatchery genetic and management plans) are consistent with the most current Management Agreement.

To identify implementation scenarios, specific performance metrics (i.e., measurements of performance) were identified for each performance goal (Table S-4). The performance metrics include two measurements:

- The proportionate natural influence (PNI) in a population, which is a measure of the hatchery influence on a population and is a function of both the percent hatchery-origin spawners (pHOS) in the natural escapement and the percent of natural-origin broodstock (pNOB) incorporated into the hatchery program
- The pHOS that join natural-origin adults on the stream's spawning ground

The following performance metrics were applied for each hatchery performance goal:

- For the stronger performance goal, integrated populations that are affected by hatchery programs would have a PNI of 0.67 or higher, and segregated, natural-origin populations would maintain pHOS less than or equal to 0.05 (Table S-4).
- For the intermediate performance goal, integrated populations that are affected by hatchery programs would have a PNI of 0.50 or higher, and segregated, natural-origin populations would maintain pHOS of less than or equal to 0.10 (Table S-4).

What is the difference between a hatchery performance goal and a performance metric?

In this EIS, performance goals are identified within each alternative. These goals apply to hatchery programs. There are two performance goals: stronger and intermediate. Both performance goals would likely reduce negative effects of hatchery programs on salmon and steelhead populations compared to the baseline conditions.

Performance metrics are identified for each performance goal so that an implementation scenario can be identified. Performance metrics apply to the populations that are being affected by the hatchery programs. Performance metrics include two measurements: PNI and pHOS.

Although NMFS uses these performance metrics in this EIS, no determination has been made on their adequacy under the ESA. NMFS is not advocating their use by hatchery managers. Reviewers are encouraged to understand the dynamics of the population that affect its PNI and pHOS values, particularly in an integrated population. In some cases, the favorable values of an integrated population may disguise underlying risks. For example, if the naturally spawning component of the integrated population is small, then it may be necessary to maintain a high number of natural-origin fish in the hatchery broodstock to maintain a high overall PNI value. This mining of the natural-origin population could maintain its PNI, but increase genetic and demographic risks to the population as a whole.

Table S-4. Performance Metrics applied for each hatchery performance goal

Hatchery Performance Goal	Performance metrics for affected populations
Intermediate Performance Goal	Integrated populations maintain a PNI greater than or equal to 0.50. Segregated, natural-origin populations maintain pHOS less than or equal to 0.10.
Stronger Performance Goal	Integrated populations maintain a PNI greater than or equal to 0.67. Segregated, natural-origin populations maintain pHOS less than or equal to 0.05.

Summary of Resource Effects

Table S-5 summarizes predicted effects from implementation of the No-action Alternative (Alternative 1) and action alternatives (Alternative 2 through Alternative 5). The summary reflects the detailed resource discussions in Chapter 4, Environmental Consequences. No preferred alternative has been selected for the Draft EIS.

Table S-5. Summary of Environmental Consequences for EIS Alternatives by Resource.

Resource	Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Fish	Number of salmon and steelhead hatchery programs	178	106	161	174	171
	Number of hatchery-origin salmon and steelhead produced annually	143,577,000	51,896,000	106,928,000	118,362,000	110,630,000
	Percent (%) of primary and contributing salmon and steelhead populations that meet stronger metrics	50	71	63	71	71
	Percent (%) of primary and contributing salmon and steelhead populations that meet intermediate metrics or stronger metrics	58	91	89	90	88
	Number of weirs installed to control pHOS	0	0	13	16	17

Resource	Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Socio-economics	Annual cost of Columbia River basin hatchery production (millions of 2007 U.S. dollars [$])	79.5	51.9	76.9	79.4	81.5
	Number of Columbia River basin salmon and steelhead harvested in all fisheries	602,368	309,465	482,509	535,529	497,085
	Net economic value (2007 U.S. dollars [$]) of commercial fisheries (tribal and non-tribal) in the Columbia River basin	2,115,979	1,145,205	1,793,706	2,016,671	2,025,634
	Net economic value (2007 U.S. dollars [$]) of commercial fisheries (tribal and non-tribal) in the Pacific Ocean and Puget Sound to which Columbia River basin fish contribute	13,474,389	12,537,078	13,262,657	13,408,620	13,280,994
	Commercial ex-vessel value (2007 U.S. dollars [$]) in Columbia River basin	6,188,673	3,735,500	5,436,555	6,169,064	6,155,051
	Commercial ex-vessel value (2007 U.S. dollars [$]) in the Pacific Ocean and Puget Sound	36,594,962	34,379,075	36,169,953	36,561,643	36,228,773
	Net economic value (2007 U.S. dollars [$]) of recreational fisheries in the Columbia River basin	35,791,853	21,065,837	28,841,018	31,415,967	30,567,085
	Net economic value (2007 U.S. dollars [$]) of recreational fisheries in the Pacific Ocean and Puget Sound to which Columbia River basin fish contribute	22,380,896	18,975,560	20,728,811	20,838,677	20,744,041
	Total (direct and indirect) economic impacts on income (2007 U.S. dollars [$]) in the Columbia River basin	103,988,544	64,595,934	90,800,063	99,052,073	99,939,014

Resource	Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Socio-economics (continued)	Total (direct and indirect) economic impacts on income (2007 U.S. dollars [$]) in the Pacific Ocean and Puget Sound	115,961,205	106,837,236	113,052,011	113,967,297	113,205,357
	Total (direct and indirect) economic impacts on jobs in the Columbia River basin	2,540.6	1,584.7	2,201.0	2,385.0	2,417.4
	Total (direct and indirect) economic impacts on jobs in the Pacific Ocean and Puget Sound	2,264.5	2,035.6	2,179.6	2,194.5	2,182.3
	Recreational expenditures (2007 U.S. dollars [$]) in the Columbia River basin	47,476,271	27,942,878	38,256,303	41,671,856	40,545,853
	Recreational expenditures (2007 U.S. dollars [$]) in the Pacific Ocean and Puget Sound	56,516,450	51,174,142	54,382,756	54,807,054	54,452,342
Environmental Justice	Total tribal fish harvests (commercial, ceremonial, and subsistence) by number of fish in the Columbia River basin	79,328	36,519	63,702	63,494	73,619
	Tribal fishing revenue (2007 U.S. dollars [$]) in the Columbia River basin	3,484,670	2,355,731	3,352,910	3,346,917	4,048,727
Wildlife	Caspian terns and bald eagles	Populations increasing	Potential reductions in abundance, distribution, and fitness relative to Alternative 1	Same as Alternative 2	Same as Alternative 1	Same as Alternative 2
	Southern resident killer whale (listed)	89 individuals are currently in Southern Resident stock; populations fluctuate from decreasing to increasing	Potential reductions in abundance relative to Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1

Resource	Indicator	Alternative 1 (No Action)	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Wildlife (continued)	California sea lions	Populations increasing	Abundance in Columbia River would probably decline relative to Alternative 1	Abundance may be affected relative to Alternative 1	Same as Alternative 1	Same as Alternative 3
	Stellar sea lions (listed)	Populations increasing	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
Water Quality & Quantity	NPDES permit compliance and water use	NPDES permits current	Potential improvements in water quality and reduction in water use	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2
Human Health	Hatchery chemical safety and use	Chemicals and antibiotics would be used consistent with Federal and state guidelines; potential pathogen exposure.	Potential decrease in use of chemicals and antibiotics; no change in exposure to pathogens	Same as Alternative 2	Same as Alternative 2	Same as Alternative 2

Primary and contributing populations are terms that were used by the Lower Columbia Fish Recovery Board (LCFRB) in the development of the Lower Columbia River Salmon Recovery and Fish and Wildlife Subbasin Plan (LCFRB 2004), adapted throughout the basin by the HSRG after discussions with the Columbia River fish managers, and they are applied in this draft EIS (Section 2.4, Alternative Development).

Socioeconomic values for the Pacific Ocean and Puget Sound are based on the total number of salmon and steelhead harvested in those areas, not just those from the Columbia River basin.