

## DRAFT ENVIRONMENTAL IMPACT STATEMENT

Draft Environmental Impact Statement (DEIS) to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed Approval of the Continued Operation of 10 Hatchery Facilities for Trout, Salmon, and Steelhead Along the Oregon Coast, as Described in Oregon Department of Fish and Wildlife Hatchery and Genetic Management Plans Pursuant to Section 4(d) of the Endangered Species Act



Prepared by the  
National Marine Fisheries Service, West Coast Region



**NOAA FISHERIES**

August 2016

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UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
West Coast Region  
7600 Sand Point Way NE  
SEATTLE, WA 98115

August 12, 2016

Dear Reviewer:

In accordance with provisions of the National Environmental Policy Act (NEPA), the *Draft Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed Approval of the Continued Operation of 10 Hatchery Facilities for Trout, Salmon, and Steelhead Along the Oregon Coast, as Described in Oregon Department of Fish and Wildlife Hatchery and Genetic Management Plans Pursuant to Section 4(d) of the Endangered Species Act* is enclosed for your review.

This Draft Environmental Impact Statement (DEIS) assesses environmental impacts associated with the National Marine Fisheries Service's (NMFS) review and approval of hatchery and genetic management plans (HGMPs) submitted by the Oregon Department of Fish and Wildlife for hatchery programs along the Oregon Coast. The HGMPs have been submitted for approval under Limit 5 of the Endangered Species Act 4(d) rules for listed salmon and steelhead. Additional copies of the DEIS may be obtained at the NMFS office in Roseburg, Oregon, as identified below. The DEIS is also accessible electronically through the NMFS West Coast Region's website at:

[http://www.westcoast.fisheries.noaa.gov/hatcheries/salmon\\_and\\_steelhead\\_hatcheries.html](http://www.westcoast.fisheries.noaa.gov/hatcheries/salmon_and_steelhead_hatcheries.html)

Written comments may be submitted during the agency's 60-day public comment period. Please submit written comments via mail, facsimile (fax), or email to:

NMFS, Oregon Coast Hatchery DEIS  
2900 NW Stewart Parkway  
Roseburg, Oregon 97471  
Fax: (541) 957-3386  
Email: [OregonCoastHatcheryEIS.wcr@noaa.gov](mailto:OregonCoastHatcheryEIS.wcr@noaa.gov)

Sincerely,

William W. Stelle, Jr.  
Regional Administrator

Enclosure



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## **Cover Sheet**

### **Draft Environmental Impact Statement (DEIS)**

**Title of Environmental Review:** Draft Environmental Impact Statement to Analyze Impacts of NOAA's National Marine Fisheries Service Proposed Approval of the Continued Operation of 10 Hatchery Facilities for Trout, Salmon, and Steelhead along the Oregon Coast, as Described in Oregon Department of Fish and Wildlife Hatchery and Genetic Management Plans, Pursuant to Section 4(d) of the Endangered Species Act

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Phone: (541) 957-3381

**Location of Proposed Activities:** Oregon Coast

**Proposed Action:** NMFS would review and evaluate the continued operation of 10 hatchery facilities and associated hatchery programs under Limit 5 of 4(d) rules for listed coho salmon.

**Abstract:** The Oregon Department of Fish and Wildlife submitted hatchery and genetic management plans for hatchery programs along the Oregon Coast. These plans describe each hatchery program in detail, including fish life stages produced and potential measures to minimize risks of negative impacts that may affect listed coho salmon. The analysis within the draft environmental impact statement (DEIS) informs NMFS, hatchery operators, and the public about the current and anticipated direct, indirect, and cumulative environmental effects of operating the hatchery programs under the full range of alternatives.

**Public Comments:** Comments on this DEIS must be received no later than Tuesday, October 25, 2016 (60 days after publication of the Federal Register Notice).

Email comments to: [OregonCoastHatcheryEIS.wcr@noaa.gov](mailto:OregonCoastHatcheryEIS.wcr@noaa.gov) or mail comments to contact address above.

More information is available at:  
[http://www.westcoast.fisheries.noaa.gov/hatcheries/orcoast/orcoast\\_deis\\_comment.html](http://www.westcoast.fisheries.noaa.gov/hatcheries/orcoast/orcoast_deis_comment.html)

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## **SUMMARY**

### **Background**

The Oregon Department of Fish and Wildlife (ODFW) has submitted Hatchery and Genetic Management Plans (HGMPs) for all hatchery programs along the Oregon Coast to the National Marine Fisheries Service (NMFS), pursuant to Limit 5 of the 4(d) Rule for salmon and steelhead promulgated under the Endangered Species Act (ESA) (65 FR 42422, July 10, 2000). Before a decision is made by NMFS on these HGMPs under the ESA, the National Environmental Policy Act (NEPA) requires Federal agencies to conduct environmental analyses of proposed actions to fully consider their effects on the human environment. NMFS's action of issuing ODFW's HGMPs under Limit 5 of the 4(d) Rule is a major Federal action subject to environmental review under NEPA. Therefore, NMFS has prepared this draft Environmental Impact Statement (DEIS).

### **Proposed Action**

ODFW has submitted 42 HGMPs for the continued operation of hatchery programs associated with the 10 hatchery facilities (and associated ancillary facilities) for approval by NMFS under the ESA Limit 5 of the 4(d) Rule for ESA-listed coho salmon along the Oregon Coast. Under the Proposed Action, NMFS would make a determination that ODFW's submitted HGMPs meet the requirements of Limit 5 under the 4(d) Rule of the ESA. The HGMPs for Oregon Coast hatcheries would be approved under the ESA and continue to be implemented by ODFW.

### **Purpose and Need**

The purpose and need of the Proposed Action is two-fold: (1) for NMFS to ensure the HGMPs and associated hatchery facilities comply with requirements of the ESA, and (2) for ODFW to provide hatchery-origin fish for recreational and commercial fisheries in Oregon coastal streams and near-shore marine waters.

### **Project Area and Analysis Area**

The project area is the geographic area where the Proposed Action would take place. In this case, it is the geographical area for hatchery salmon, steelhead, and trout and associated hatchery facilities used to collect, propagate, rear, and release hatchery-origin fish in specified rivers, streams, and lakes in the Oregon Coast Region (inclusive of all watersheds that drain directly into the Pacific Ocean along the Oregon Coast, with the exception of the Columbia River). The hatchery facilities are Cole Rivers Hatchery, Indian Hatchery, Elk Hatchery, Bandon Hatchery, Rock Hatchery, Alsea Hatchery, Salmon Hatchery, Cedar Hatchery, Trask Hatchery, Nehalem Hatchery, and associated satellite facilities. Hatchery fish are released into the following waterbodies: Chetco, Rogue, Elk, Coquille, Coos Umpqua, Siuslaw, Alsea, Yaquina, Siletz, Salmon, Nestucca, Trask, Wilson, and Nehalem Rivers, Tenmile Creek, and various coastal lakes.

The “analysis area” is the geographic extent that is being evaluated for a particular resource. For some resources, the analysis area may be larger than the project area, since some of the effects of the alternatives may occur outside the project area. For example, some socioeconomic effects of the hatchery programs are evaluated at the project area level (the streams and rivers where hatchery fish are released), but others are evaluated within a larger geographic scope (fisheries occurring in the ocean off the Oregon Coast where hatchery fish are also caught). The analysis area for each resource is described in Chapter 3, Affected Environment. Direct and indirect effects on various resources within the project and analysis areas are analyzed in Chapter 4, Environmental Consequences.

In addition, a larger analysis area was defined to consider actions with effects that are potentially cumulative with the Proposed Action and thus, require evaluation of effects outside the Oregon Coast watersheds. The evaluation of this larger analysis area for cumulative effects is described in Chapter 5, Cumulative Effects.

### **Relationship between the ESA and 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.

The purpose of an DEIS 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 hatchery programs along the Oregon Coast meet ESA requirements are made under section 4(d) or section 7 of the ESA. Each of these ESA sections has its own substantive requirements, and the documents that reflect the analyses and decisions are different than those related to a NEPA analysis.

It is not the purpose of this DEIS to suggest to the reader any conclusions relative to the ESA analysis for this action.

### **Alternatives Including the Proposed Action**

This DEIS analyzes four alternatives in detail:

#### ***Alternative 1 (No-action)***

Under this alternative, NMFS would not approve the HGMPs under 4(d) Rule, limit 5, and the hatchery programs would not be exempted from ESA section 9 take prohibitions. For purposes of this analysis, NMFS has defined the No-action Alternative as the choice by ODFW to continue to operate the existing hatchery programs without ESA authorization. All of the activities associated with the proposed salmon hatchery programs would continue: hatchery

salmon and steelhead would be released, broodstock would be collected at proposed locations, the hatchery facilities would use water for operation, and the hatcheries would discharge hatchery water effluent. NMFS's No-action Alternative represents NMFS's best estimate of what would happen in the absence of the proposed Federal action.

*Alternative 2 (Proposed Action/Preferred Alternative)*

Under this alternative, NMFS would approve the existing hatchery programs (described in the submitted HGMPs) by issuing an approval letter to ODFW under Limit 5 of the 4(d) Rule. All of the hatchery reforms that have been enacted since the ESA listing of coho salmon along the Oregon Coast would continue to be implemented. ODFW has recently completed their Coastal Multi-Species Conservation and Management Plan for the Oregon Coast Region. This entailed an elaborate review of the management of the hatchery programs considering a range of conservation and societal issues and included substantial stakeholder involvement. The current hatchery programs reflect the decisions under this management plan. The Best Management Practices (BMPs) used by ODFW for hatchery management would also continue as described in the submitted HGMPs.

*Alternative 3 (Terminate Hatchery Programs on the Oregon Coast)*

Under this alternative, NMFS would determine that the hatchery programs in the Oregon Coast Region do not meet the criteria under Limit 5 of the 4(d) rule, and, therefore, would not receive ESA approval. Because the hatchery plans would not be approved, the hatchery actions proposed by ODFW would not be exempt from section 9 take prohibitions. With this lack of approval, the hatchery actions proposed by ODFW would not be implemented, and the programs would be terminated. All of the activities associated with the hatchery programs would be terminated: no hatchery salmon would be released, no broodstock would be collected at trapping locations, trapping facilities would be removed, no returning hatchery fish would be removed from various locations, the hatchery facilities would not use water for operation, and the hatcheries would not discharge hatchery water effluent.

This alternative would not be expected to meet the purpose and need for action because termination of the proposed hatchery actions would not produce juvenile hatchery fish of each species that would return as adult fish to meet commercial and recreational fishery needs. However, NMFS supports its analysis to assist with a full understanding of potential effects on the human environment under various management scenarios.

*Alternative 4 (Reduced Hatchery Production)*

Under this alternative, ODFW would reduce the number of fish released from each of the proposed hatchery programs by 50 percent. All of the hatchery facilities would rear 50 percent less hatchery fish. This alternative represents a mid-point between the Proposed Action (Alternative 2) and Alternative 3 (Terminate Hatchery Programs on the Oregon Coast). Revised HGMPs would be submitted by ODFW reflecting these 50 percent reduced production levels,

and NMFS would make a determination that the revised HGMPs meet the requirements of the 4(d) Rule.

NMFS's 4(d) regulations do not provide NMFS with the authority to order changes of this magnitude as a condition of approval of the HGMPs. NMFS's 4(d) regulations require NMFS to make a determination that the HGMPs, as submitted by the operator, either meet or do not meet the standards prescribed in the rule. Nonetheless, NMFS supports analysis of this alternative to assist with a full understanding of potential effects on the human environment under various hatchery management scenarios.

### **Affected Environment**

Along the Oregon Coast, seven resources are described in the affected environment of the Oregon Coast by the implementation of the four alternatives:

- Water quantity
- Water quality
- Salmon and Steelhead and Their Habitats
- Other Fish and Their Habitats
- Wildlife
- Socioeconomics
- Environmental justice

No other resources were identified during internal scoping that would potentially be impacted by the Proposed Action or alternatives. Current conditions include effects of the past operation of Oregon Coast hatchery programs.

### **Environmental Consequences**

This DEIS is a comprehensive evaluation of all hatchery programs along the entire Oregon Coast. The genetic, ecological, and social effects of hatchery fish are evaluated at multiple local and regional scales for the Oregon Coast. The four alternatives evaluate a wide range of impacts associated with the identified resources for the four alternatives. The relative magnitude and direction of impacts is described using the following terms:

- Undetectable: The impact would not be detectable.
- Negligible: The impact would be at the lower levels of detection.
- Low: The impact would be slight, but detectable.
- Medium: The impact would be readily apparent.
- High: The impact would be severe or greatly beneficial.

Table S-1 below provides a summary of the predicted resource effects under each of the four alternatives. The summary reflects the detailed resource discussions in Chapter 4, Environmental Consequences.

Table S-1. Summary of environmental consequences for DEIS alternatives for each resource.

<b>Resource</b>	<b>Alternative 1 (No-action)</b>	<b>Alternative 2 (Proposed Action/Preferred Alternative)</b>	<b>Alternative 3 (Terminate Hatchery Programs on the Oregon Coast)</b>	<b>Alternative 4 (Reduced Hatchery Production)</b>
Water Quantity	Low to medium impacts at the hatchery facilities from water diversion and effluent discharge in affected reaches. Low overall on a watershed scale. Most populations no effect because no hatchery facilities exist in population area.	Overall same as Alternative 1.	Low to medium benefits at the hatchery facilities from water diversion and effluent discharge in affected reaches. Low overall on a watershed scale. Most populations no effect.	Low impacts at the hatchery facilities from water diversion and effluent discharge. Expected impact is 50 percent less compared to the No-action Alternative.
Water Quality	Negligible impacts from the hatchery facilities downstream. Most populations no effect because no facilities exist in population area.	Overall, same as Alternative 1.	Negligible benefits from the hatchery facilities downstream. Most populations no effect.	Negligible impacts from the hatchery facilities downstream compared to the No-action alternative.
Salmon and Steelhead and Their Habitats	Depending upon the specific population and species, low to medium impacts related to hatchery genetic and ecological risks. However, many salmon and steelhead populations not affected at all by hatchery programs. Greatest genetic impacts occur for winter steelhead. Greatest ecological impacts occur in the mainstem rivers and estuaries where hatchery fish are released and the greatest overlap with natural-origin salmon and steelhead.	Overall, same as Alternative 1.	Depending upon the specific population and species, benefits range from low to medium related to the elimination of hatchery genetic and ecological effects. Low impact from elimination on hatchery nutrient enhancement. Possibility of increased harvest of natural-origin salmon and steelhead in fisheries from absence of hatchery fish.	Depending upon the specific population and species, impacts range from negligible to low related to hatchery genetic and ecological risks. Reduced benefits to hatchery carcass nutrient enhancement. Low impacts on recreational and commercial fisheries in the ocean and freshwater.

Table S-4. Summary of environmental consequences for EIS alternatives for each resource. (continued)

<b>Resource</b>	<b>Alternative 1 (No-action)</b>	<b>Alternative 2 (Proposed Action/Preferred Alternative)</b>	<b>Alternative 3 (Terminate Hatchery Programs on the Oregon Coast)</b>	<b>Alternative 4 (Reduced Hatchery Production)</b>
	Benefits to carcass nutrient enhancement and recreational and commercial fisheries in ocean and freshwater.			

<b>Resource</b>	<b>Alternative 1 (No-action)</b>	<b>Alternative 2 (Proposed Action/Preferred Alternative)</b>	<b>Alternative 3 (Terminate Hatchery Programs on the Oregon Coast)</b>	<b>Alternative 4 (Reduced Hatchery Production)</b>
Other Fish and Their Habitats	Mix of risks and benefits from the hatchery programs. Salmon, steelhead, and trout can compete and prey upon these fish species. Hatchery carcasses provide valuable ecosystem nutrients. Overall low impact.	Overall, same as Alternative 1.	Mix of risks and benefits from termination of the hatchery programs. Low impact from loss of hatchery nutrient enhancement. Predation and competition by hatchery fish on native fishes would decrease. Hatchery fish as a prey source will be eliminated for many species.	Mix of risks and benefits from the hatchery programs depending upon the species. Reduced levels of competition and predation expected between natural and hatchery fish compared to the No-action alternative. Reduced level of nutrient enhancement from hatchery fish.
Wildlife	Mix of risks and benefits from the hatchery programs. Salmon, steelhead, and trout can compete and prey upon these fish species. Hatchery carcasses provide valuable ecosystem nutrients. Overall low impact.	Overall, same as Alternative 1.	Mix of risks and benefits from the termination of the hatchery programs. Hatchery fish as a prey source for many species would be eliminated. Hatchery nutrient enhancement would be eliminated.	Mix of risks and benefits from the reduced hatchery production. Hatchery fish as a prey source for certain species will be reduced compared to the No-action Alternative.

Table S-4. Summary of environmental consequences for EIS alternatives for each resource. (continued)

<b>Resource</b>	<b>Alternative 1 (No-action)</b>	<b>Alternative 2 (Proposed Action/Preferred Alternative)</b>	<b>Alternative 3 (Terminate Hatchery Programs on the Oregon Coast)</b>	<b>Alternative 4 (Reduced Hatchery Production)</b>
Socioeconomics	Depending upon the specific fishery, low to medium economic benefits of the hatchery programs and facilities from employment, goods and services, fisheries, and tourism. The hatchery programs that have the highest harvest rates on hatchery fish typically exhibit the greatest economic contributions.	Overall, same as Alternative 1.	Depending upon the specific fishery, low to medium impact on socioeconomics from termination of the hatchery programs compared to the No-action Alternative.	Depending upon the specific fishery, a 50 percent decrease in economic benefits compared to the No-action Alternative.
Environmental Justice	Undetectable to negligible impacts on low income and minority groups in the local communities.	Overall, same as Alternative 1.	Undetectable to negligible impacts on low income and minority groups in the local communities compared to the No-action Alternative.	Undetectable to negligible impacts on low income and minority groups in the local communities compared to the No-action Alternative.

## How should reviewers approach this DEIS?

NMFS encourages reviewers to:

1. Review the DEIS to gain an understanding of how it is organized and how the alternatives are framed and analyzed.
2. Carefully consider the information provided in Chapter 4, Environmental Consequences.
3. After considering the above, provide your written comments to NMFS. The most helpful comments are the ones where you identify your issue of concern and/or problem and offer a suggested solution that resolves the issue/problem from your perspective.
4. Please send comments via email to: *OregonCoastHatcheryEIS.wcr@noaa.gov* or mail to: Lance Kruzic, NMFS- Hatchery DEIS, 2900 NW Stewart Parkway, Roseburg, OR 97471.
5. More information is available at the following website:

[http://www.westcoast.fisheries.noaa.gov/hatcheries/orcoast/orcoast\\_deis\\_comment.html](http://www.westcoast.fisheries.noaa.gov/hatcheries/orcoast/orcoast_deis_comment.html)

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## ACRONYMS AND ABBREVIATIONS

BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFS	Cubic feet per second
DPS	Distinct population segment
EA	Environmental assessment
EFH	Essential Fish Habitat
EIS	Environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily significant unit
FONSI	Finding of No Significant Impact
FTE	Full-time equivalent
HGMP	Hatchery and genetic management plan
HSRG	Hatchery Scientific Review Group
IHOT	Integrated Hatchery Operations Team
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NEPA	National Environmental Policy Act
NFCP	Native Fish Conservation Policy
NMFS	National Marine Fisheries Service (also called NOAA Fisheries Service)
NPDES	National Pollutant Discharge Elimination System
ODFW	Oregon Department of Fish and Wildlife
pHOS	Proportion of hatchery-origin spawners
RM	River mile
ROD	Record of Decision
SONCC	Southern Oregon/Northern California Coast
TRT	Technical Recovery Team
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service

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## GLOSSARY OF KEY TERMS

**Abundance:** Generally, the number of fish in a defined area or unit. It is also one of four parameters used to describe the viability of natural-origin fish populations (McElhany et al. 2000).

**Adaptive management:** A deliberate process of using research, monitoring, and scientific evaluation in making decisions in the face of uncertainty.

**Acclimation pond:** A concrete or earthen pond or a temporary structure used for rearing and imprinting juvenile fish in the water of a particular stream before their release into that stream.

**Adipose fin:** A small fleshy fin with no rays, located between the dorsal and caudal fins of salmon and steelhead. The adipose fin is often “clipped” on hatchery-origin fish so they can be differentiated from natural-origin fish.

**Anadromous:** A term used to describe fish that hatch and rear in fresh water, migrate to the ocean to grow and mature, and return to freshwater to spawn.

**Analysis area:** Within this Environmental Impact Statement (EIS), the analysis area is the geographic extent that is being evaluated for each resource. For some resources (e.g., socioeconomics and environmental justice), the analysis area is larger than the project area. See also **Project area**.

**Best management practice (BMP):** A policy, practice, procedure, or structure implemented to mitigate adverse environmental effects.

**Broodstock:** A group of sexually mature individuals of a species that is used for breeding purposes as the source for a subsequent generation.

**Co-managers:** Oregon Department of Fish and Wildlife. U.S. Corps of Engineers for the Rogue River hatchery programs. These agencies responsible for managing hatchery programs along the Oregon Coast.

**Commercial harvest:** The activity of catching fish for commercial profit.

**Conservation:** Used generally in the EIS as the act or instance of conserving or keeping fish resources from change, loss, or injury, and leading to their protection and preservation. This contrasts with the definition under the United States Endangered Species Act (ESA), which refers to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the ESA are no longer necessary.

**Critical habitat:** A specific term and designation within the ESA, referring to habitat area essential to the conservation of a listed species, though the area need not actually be occupied by the species at the time it is designated.

**Dewatering:** Typically, the immediate downstream habitat effects associated with a water withdrawal action that diverts the entire flow of a stream or river to another location

**Distinct Population Segment (DPS):** Under the ESA, the term “species” includes any subspecies of fish or wildlife or plants, and any “Distinct Population Segment” of any species or vertebrate fish or wildlife that interbreeds when mature. The ESA thus considers a DPS of vertebrates to be a “species.” The ESA does not however establish how distinctness should be determined. Under NMFS policy for Pacific salmon, a population or group of populations will be considered a DPS if it represents an Evolutionarily Significant Unit (ESU) of the biological species. In contrast to salmon, NMFS lists steelhead runs under the joint NMFS-U.S. Fish and Wildlife Service (USFWS) Policy for recognizing DPSs (DPS Policy: 61 Fed. Reg. 4722, February 7, 1996). This policy adopts criteria similar to those in the ESU policy, but applies to a broader range of animals to include all vertebrates.

**Diversity:** Variation at the level of individual genes (polymorphism); provides a mechanism for populations to adapt to their ever-changing environment. It is also one of the four parameters used to describe the viability of natural-origin fish populations (McElhany et al. 2000).

**Domestication:** See **Hatchery-influenced selection**.

**Emigration:** The downstream migration of salmon and steelhead toward the ocean.

**Endangered species:** As defined in the ESA, any species that is in danger of extinction throughout all or a significant portion of its range.

**Endangered Species Act (ESA):** A United States law that provides for the conservation of endangered and threatened species of fish, wildlife, and plants.

**Environmental justice:** The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

**Escapement:** Adult salmon and steelhead that survive fisheries and natural mortality, and return to spawn.

**Estuary:** The area where fresh water of a river meets and mixes with the salt water of the ocean.

**Evolutionarily Significant Unit (ESU):** A concept NMFS uses to identify Distinct Population Segments of Pacific salmon (but not steelhead) under the ESA. An ESU is a population or group of populations of Pacific salmon that 1) is substantially reproductively isolated from other populations, and 2) contributes substantially to the evolutionary legacy of the biological species. See also **Distinct Population Segment** (pertaining to steelhead).

**Federal Register:** The United States government's daily publication of Federal agency regulations and documents, including executive orders and documents that must be published per acts of Congress.

**Fingerling:** A juvenile fish.

**Fishery:** Harvest by a specific gear type in a specific geographical area during a specific period of time.

**Fitness:** As used in this EIS, the propensity of a group of fish (e.g., populations) to survive and reproduce.

**Forage fish:** Small fish that breed prolifically and serve as food for predatory fish.

**Fry:** Juvenile salmon and steelhead that are usually less than one year old and have absorbed their egg sac.

**Habitat:** The physical, biological, and chemical characteristics of a specific unit of the environment occupied by a specific plant or animal; the place where an organism naturally lives.

**Hatchery and genetic management plan (HGMP):** Technical documents that describe the composition and operation of individual hatchery programs. Under Limit 5 of the 4(d) rule, NMFS uses information in HGMPs to evaluate impacts on salmon and steelhead listed under the ESA.

**Hatchery facility:** A facility (e.g., hatchery, rearing pond, net pen) that supports one or more hatchery programs.

**Hatchery-influenced selection:** The process whereby genetic characteristics of hatchery populations become different from their source populations as a result of selection in hatchery environments (also referred to as domestication).

**Hatchery operator:** A Federal agency, state agency, or Native American tribe that operates a hatchery program.

**Hatchery-origin fish:** A fish that originated from a hatchery facility.

**Hatchery-origin spawner:** A hatchery-origin fish that spawns naturally.

**Hatchery program:** A program that artificially propagates fish. Most hatchery programs for salmon and steelhead spawn adults in captivity, raise the resulting progeny for a few months or longer, and then release the fish into the natural environment where they will mature.

**Incidental:** Unintentional, but not unexpected.

**Incidental fishing effects:** Fish, marine birds, or mammals unintentionally captured during fisheries using any of a variety of gear types.

**Integrated hatchery program:** A hatchery program that intends for the natural environment to drive the adaptation and fitness of a composite population of fish that spawns both in a hatchery and in the natural environment. Differences between hatchery-origin and natural-origin fish are minimized, and hatchery-origin fish are integrated with the local populations included in an ESU or DPS.

**Isolated hatchery program:** A hatchery program that intends for the hatchery-origin population to be reproductively segregated from the natural-origin population. These programs produce fish that are different from local populations. They do not contribute to conservation or recovery of populations included in an ESU or DPS.

**Limit 5:** Under section 4(d) of the ESA (see **Section 4(d) Rule**), a limit on “take” prohibitions that applies to Hatchery and Genetics Management Plans developed by a state and/or federal agency.

**Limiting factor:** A physical, chemical, or biological feature that impedes species and their independent populations from reaching a viable status.

**National Environmental Policy Act (NEPA):** A United States environmental law that established national policy promoting the enhancement of the environment and established the President’s Council on Environmental Quality (CEQ).

**National Marine Fisheries Service (NMFS):** A United States agency within the National Oceanic and Atmospheric Administration and under the Department of Commerce charged with the stewardship of living marine resources through science-based conservation and management, and the promotion of healthy ecosystems.

**National Pollutant Discharge Elimination System (NPDES):** A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the Environmental Protection Agency, a state, or, where delegated, a tribal government on an Indian reservation.

**Native fish:** Fish that are endemic to or limited to a specific region.

**Natural-origin:** A term used to describe fish that are offspring of parents that spawned in the natural environment rather than the hatchery environment, unless specifically explained otherwise in the text. “Naturally spawning” and similar terms refer to fish spawning in the natural environment.

**Oregon Coast:** the entire geographic area from which streams and rivers drain directly into the Pacific Ocean between the California/Oregon border north to the Washington/Oregon border.

**Oregon Coast Region:** See Oregon Coast.

**Pathogen:** An infectious microorganism that can cause disease (e.g., virus, bacteria, fungus) in its host.

**Population:** A group of fish of the same species that spawns in a particular locality at a particular season and does not interbreed substantially with fish from any other group.

**Preferred alternative:** The alternative selected or developed from an evaluation of alternatives. Under NEPA, the preferred alternative is the alternative an agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical, and other factors.

**Productivity:** The rate at which a population is able to produce reproductive offspring. It is one of the four parameters used to describe the viability of natural-origin fish populations (McElhany et al. 2000).

**Project area:** Geographic area where the Proposed Action will take place. See also **Proposed Action**.

**Proportion of hatchery-origin spawners (pHOS):** The proportion of naturally spawning salmon or steelhead that are hatchery-origin fish.

**Proposed Action:** NMFS's review and approval under Limit 5 of the 4(d) rules of the hatchery and genetic management plans (and operation of the hatchery facilities) submitted by the Oregon Department of Fish and Wildlife for the Oregon Coast Region.

**Record of Decision (ROD):** The formal NEPA decision document that is recorded for the public. It is announced in a Notice of Availability in the Federal Register.

**Recovery:** Defined in the ESA as the process by which the decline of an endangered or threatened species is stopped or reversed, or threats to its survival neutralized so that its long-term survival in the wild can be ensured, and it can be removed from the list of threatened and endangered species.

**Recovery plan:** Under the ESA, a formal plan from NMFS (for listed salmon and steelhead) outlining the goals and objectives, management actions, likely costs, and estimated timeline to recover the listed species.

**Recreational harvest:** The activity of catching fish for non-commercial reasons (e.g., sport or recreation).

**Redd:** The spawning site or "nest" in stream and river gravels in which salmon and steelhead lay their eggs.

**Residuals:** Hatchery-origin fish that out-migrate slowly, if at all, after they are released. Residualism occurs when such fish residualize rather than out-migrate as most of their counterparts do.

**Run:** The migration of salmon or steelhead from the ocean to fresh water to spawn. Defined by the season they return as adults to the mouths of their home rivers.

**Run size:** The number of adult salmon or steelhead (i.e., harvest plus escapement) returning to their natal areas.

**Salmonid:** A fish of the taxonomic family Salmonidae, which includes salmon, steelhead, and trout.

**Scoping:** In NEPA, an early and open process for determining the extent and variety of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).

**Section 4(d) Rule:** A special regulation developed by NMFS under authority of section 4(d) of the ESA, modifying the normal protective regulations for a particular threatened species when it is determined that such a rule is necessary and advisable to provide for the conservation of that species.

**Section 7 consultation:** Federal agency consultation with NMFS or USFWS (dependent on agency jurisdiction) on any actions that may affect listed species, as required under section 7 of the ESA.

**Section 10 permit:** A permit for direct take of listed species for scientific purposes or to enhance the propagation or survival of listed species, or for incidental take of listed species during otherwise lawful activities. Issued by NMFS or USFWS (dependent on agency jurisdiction) as authorized under section 10(a)(1) of the ESA.

**Smolts:** Juvenile salmon and steelhead that have left their natal streams, are out-migrating downstream, and are physiologically adapting to live in salt water.

**Spatial structure:** The spatial structure of a population refers both to the spatial distributions of individuals in the population and the processes that generate that distribution. It is one of the four parameters used to describe the viability of natural-origin fish populations (McElhany et al. 2000).

**Stock:** A group of fish of the same species that spawns in a particular lake or stream (or portion thereof) at a particular season and which, to a substantial degree, does not interbreed with fish from any other group spawning in a different place or in the same place in a different season.

**Straying (of hatchery-origin fish):** A term used to describe when hatchery-origin fish return to and/or spawn in areas where they are not intended to return/spawn.

**Supplementation:** Release of fish into the natural environment to increase the abundance of naturally reproducing fish populations.

**Take:** Under the ESA, the term “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Take for hatchery activities includes, for example, the collection of listed fish (adults and juveniles) for hatchery broodstock, the collection of listed hatchery-origin fish to prevent them from spawning naturally, and the collection of listed fish (juvenile and adult fish) for scientific purposes.

**Threat:** A human action or natural event that causes or contributes to limiting factors; threats may be caused by past, present, or future actions or events.

**Threatened species:** As defined by section 4 of the ESA, any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

**Tributary:** A stream or river that flows into a larger stream or river.

**Viability:** As used in this EIS, a measure of the status of listed salmon and steelhead that uses four criteria: abundance, productivity, spatial distribution, and diversity.

**Viable salmonid population (VSP):** An independent population of salmon or steelhead that has a negligible risk of extinction over a 100-year timeframe (McElhany et al. 2000).

**Water intake screen:** A screen used to prevent entrainment of salmonids into a water diversion or intake. See also **Diversion screen**.

**Watershed:** An area of land where all of the water that is under it or drains off of it goes into the same place, e.g. Rogue River watershed or Umpqua River watershed.

**Weir:** An adjustable dam placed across a river to regulate the flow of water downstream; a fence placed across a river to catch fish.

**Yearling:** Juvenile salmon or steelhead that has reared at least one year in the hatchery.

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1 **1. PURPOSE OF AND NEED FOR THE PROPOSED ACTION**

2 **1.1. Background**

3 NOAA’s National Marine Fisheries Service (NMFS) is the lead agency responsible for administering the  
4 Endangered Species Act (ESA) as it relates to listed salmon, steelhead, green sturgeon, and eulachon. In  
5 the project area for this proposed action (see Subsection 1.4 Project Area), two species of coho salmon are  
6 listed as threatened under the ESA (see Subsection 3.4)(70 FR 37160, June 28, 2005; 76 FR 35755, June  
7 20, 2011). Green sturgeon and eulachon are also listed as threatened and may occur in the estuaries and  
8 some freshwater habitats along the Oregon Coast (76 FR 65324, October 20, 2011; 74 FR 52300, October  
9 9, 2009). Because the Oregon Department of Fish and Wildlife (ODFW) is proposing to operate hatchery  
10 programs in areas containing ESA-listed species (see Subsection 3.4, Salmon and Steelhead and Their  
11 Habitats), NMFS is reviewing this action.

12  
13 Actions that may affect listed species are reviewed by NMFS under section 7 or section 10 of the ESA or  
14 under section 4(d), which can be used to limit the application of take prohibitions described in section 9.  
15 NMFS issued a final rule pursuant to ESA section 4(d) (4(d) Rule) adopting regulations necessary and  
16 advisable to conserve threatened species (50 CFR 223.203). The 4(d) Rule applies the take prohibitions  
17 in section 9(a)(1) of the ESA to salmon and steelhead listed as threatened, and also sets forth specific  
18 circumstances when the prohibitions will not apply, known as 4(d) limits. With regard to hatchery  
19 programs described in Hatchery and Genetic Management Plans (HGMPs), NMFS declared under limit 5  
20 of the 4(d) Rule that section 9 take prohibitions would not apply to activities carried out under an HGMP  
21 when NMFS approves the HGMP, after having determined that the HGMP meets the requirements of  
22 limit 5 (50 CFR 223.203(b)(5)).

23  
24 On November 14, 2012, NMFS determined the HGMPs submitted by the ODFW for the Oregon Coast  
25 Region (from California to Washington borders) were sufficient to proceed with evaluation under limit 5  
26 of the 4(d) Rule. The ODFW provided updated plans after their completion of the Coastal Multi-Species  
27 Conservation and Management Plan in June 2014. There were some hatchery program changes in these  
28 updated plans. All of the 10 hatchery facilities within the Oregon Coast Region are still being used in the  
29 updated plans. The updates were related to production numbers of hatchery salmon and steelhead in the  
30 various populations along the Oregon Coast. NMFS has a responsibility to consider, through National  
31 Environmental Policy Act (NEPA) analysis, how its pending actions may affect the natural and physical  
32 environment and the relationship of people with that environment. The NEPA analysis provides an  
33 opportunity to consider, for example, how the action may affect conservation of non-listed species and

1 socioeconomic objectives that seek to balance conservation with wise use of affected resources and other  
2 legal and policy mandates.

3

4 NMFS will evaluate the HGMPs associated with the 10 hatchery facilities collectively here in one draft  
5 environmental impact statement (DEIS) because the facilities all occur along the Oregon Coast, all of the  
6 HGMPs propagate fish in the same manner, and all of the HGMPs are implemented by the ODFW.

7

## 8 **1.2. Description of the Proposed Action**

9 ODFW has submitted HGMPs for all hatchery programs associated with the 10 hatchery facilities (and  
10 satellite facilities) for approval under the ESA limit 5 of the 4(d) Rule for ESA-listed coho salmon along  
11 the Oregon Coast. Table 1 of Appendix A lists of the HGMPs associated with the hatchery facilities  
12 within the Oregon Coast Region. All of the hatchery facilities are currently in operation. No new  
13 facilities or changes to current management would occur in the recently submitted HGMPs. The existing  
14 hatchery facilities are considered part of current conditions existing in the environment at this point in  
15 time because the hatchery facilities have been operating for many decades (Table 1). Under the Proposed  
16 Action, NMFS would issue a letter to ODFW approving the implementation of the submitted HGMPs  
17 under limit 5 of the 4(d) Rule. NMFS approval of the HGMPs would authorize the following programs  
18 and activities at the hatchery facilities along the Oregon Coast:

19

- 20 • Collection of spring and fall Chinook salmon, coho salmon, and summer and winter steelhead for  
21 broodstock at the specific hatchery collection facilities
- 22 • Holding of adult broodstock fish at the specific hatchery facilities if appropriate
- 23 • Spawning, incubation, and juvenile rearing at the specific 10 hatchery facilities
- 24 • Release of approximately seven million juvenile hatchery fish from the various hatchery release  
25 facilities along the Oregon Coast
- 26 • Research, monitoring, and evaluation activities associated with the hatchery programs

27

28 All of the HGMPs are funded, operated, and managed by ODFW for fishery enhancement. Funding is  
29 provided almost entirely by the state of Oregon (no Federal funding). The one exception is in the Rogue

*Section 1 – Purpose of and Need for the Proposed Action*

1 River, where four programs are partially funded by the U.S. Army Corps of Engineers to mitigate for the  
2 impacts of two Federal dams projects in the Rogue River Basin (Lost Creek and Applegate Dams).

3

4 All recreational and commercial fisheries that may harvest hatchery fish in the ocean and freshwater have  
5 current ESA authorizations (section 7 consultations, 4(d) limit 4 authorizations) in effect (NMFS 1999;  
6 NMFS 2003; NMFS 2009).

1  
2  
3

Table 1. Operations of the 10 hatchery facilities (and associated HGMP activities) along the Oregon Coast.

<b>Activity</b>	<b>Facility</b>	<b>Location</b>	<b>Does Facility Exist under Current Conditions?</b>	<b>Is Facility Operated under Current Conditions?</b>
Broodstock collection, spawning, incubation, and rearing	Cole Rivers Hatchery	RM 157 Rogue River	Yes	Yes
	Indian Hatchery	RM 1 Rogue River	Yes	Yes
	Elk Hatchery	RM 14 Elk River	Yes	Yes
	Bandon Hatchery	RM 1 Ferry Creek, Coquille	Yes	Yes
	Rock Hatchery	RM 36 NF Umpqua River	Yes	Yes
	Alsea Hatchery	RM 48.5 NF Alsea River	Yes	Yes
	Salmon Hatchery	RM 5.1 Salmon River	Yes	Yes
	Cedar Hatchery	RM 2.25 Three Rivers, Nestucca	Yes	Yes
	Trask Hatchery	RM 10 Trask River	Yes	Yes
	Nehalem Hatchery	RM 10.3 NF Nehalem River	Yes	Yes
	Other opportunistic trapping sites to fulfill broodstock needs	Chetco, Rogue, Coos, Tenmile, Umpqua, Siuslaw, Siletz	Yes	Yes
Juvenile release	Cole Rivers Hatchery	RM 157 Rogue River	Yes	Yes
	Indian Hatchery	RM 1 Rogue River	Yes	Yes
	Elk Hatchery	RM 14 Elk River	Yes	Yes
	Bandon Hatchery	RM 1 Ferry Creek, Coquille	Yes	Yes
	Rock Hatchery	RM 36 NF Umpqua River	Yes	Yes
	Alsea Hatchery	RM 48.5 NF Alsea River	Yes	Yes
	Salmon Hatchery	RM 5.1 Salmon River	Yes	Yes

Activity	Facility	Location	Does Facility Exist under Current Conditions?	Is Facility Operated under Current Conditions?
	Cedar Hatchery	RM 2.25 Three Rivers, Nestucca	Yes	Yes
	Trask Hatchery	RM 10 Trask River	Yes	Yes
	Nehalem Hatchery	RM 10.3 NF Nehalem River	Yes	Yes
	Other direct release and short term acclimation locations where no hatchery facility exists	Chetco, Rogue, Coos, Tenmile, Umpqua, Siuslaw, Siletz	Yes	Yes
Research, Monitoring, and Evaluation	Oregon Hatchery Research Center	RM 3 Fall Creek, Alsea	Yes	Yes
	RME specified in HGMPs	varies	Yes	Yes
	Watershed areas accessible to natural salmon and steelhead migration, spawning, and rearing		N/A	N/A

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**1.3. Purpose of and Need for the Action**

The purpose and need of the Proposed Action is two-fold: (1) for NMFS to ensure the HGMPs and associated hatchery facilities comply with requirements of the ESA, and (2) for ODFW to provide hatchery-origin fish for recreational and commercial fisheries in Oregon coastal streams and near-shore marine waters.

1 **1.4. Project Area and Analysis Area**

2 The project area is the geographic area where the Proposed Action would take place. The project area  
3 consists of the geographic areas where the hatchery facilities are located and the stream and river reaches  
4 downstream of the facilities where hatchery fish are present as they emigrate to the ocean. The project  
5 area specifically includes hatchery areas where fish are spawned, incubated, reared, acclimated, released,  
6 or harvested. Within the project area, 10 hatcheries are used to propagate the hatchery fish: Nehalem  
7 Trask, Salmon, Cedar Creek, Alsea, Rock Creek, Bandon, Cole Rivers, Indian, and Elk Hatcheries (Table  
8 1; Figure 1). Additional traps are used to collect broodstock in the Chetco, Rogue, Elk, Coos, Umpqua,  
9 Siletz, and Siuslaw Basins. Some programs have additional juvenile fish rearing and acclimation satellite  
10 facilities at the location where hatchery fish are released. Only one hatchery program collects ESA-listed  
11 fish (Umpqua River coho salmon program). All of the other programs use entirely non-listed fish.

12  
13 Coho salmon and eulachon are the only federally-listed fish species occupying the Oregon Coast Region  
14 under NMFS' jurisdiction (see Subsection 3.5, Other Fish and Their Habitats). For coho salmon, two  
15 Evolutionarily Significant Units (ESUs) occur within the Oregon Coast Region. The boundary between  
16 the Oregon Coast Coho Salmon ESU and the Southern Oregon Northern California Coast (SONCC) Coho  
17 Salmon ESU is Cape Blanco (near Elk River Hatchery in Figure 3). Other ESA-listed fish species,  
18 particularly green sturgeon, may inhabit the coastal estuaries during periods of their life, but spawn in  
19 other distinct population areas such as the Sacramento River. No other ESA-listed fish species occur in  
20 the project area. Other listed terrestrial animal species found within the Oregon Coast Region include  
21 marbled murrelet, northern spotted owl, and snowy plover. In the ocean, ESA-listed marine mammals  
22 may be present within the Oregon Coast Region, including Steller sea lion, humpback whale, killer whale,  
23 sei whale, and right whale (Table 8).



1  
2 Figure 1. Location of the 10 hatchery facilities along the Oregon Coast.

3  
4 The “analysis area” is the geographic extent that is being evaluated for a particular resource. For some  
5 resources, the analysis area may be larger than the project area, since some of the effects of the  
6 alternatives may occur outside the project area. For example, some socioeconomic effects of the hatchery  
7 programs are evaluated at the project area level (the streams and rivers where hatchery fish are released),  
8 but others are evaluated within a larger geographic scope (fisheries occurring in the ocean off the Oregon  
9 Coast where hatchery fish are also caught). The analysis area for each resource is described in Chapter 3,

1 Affected Environment. Direct and indirect effects on various resources within the project and analysis  
2 areas are analyzed in Chapter 4, Environmental Consequences.

3 In addition, a larger analysis area was defined to consider actions with effects that are potentially  
4 cumulative with the Proposed Action and thus, require evaluation of effects throughout the entire Oregon  
5 Coast Region (including areas where no hatchery facilities exist and no hatchery fish are released). The  
6 evaluation of this larger analysis area for cumulative effects is described in Chapter 5, Cumulative  
7 Effects.

8

## 9 **1.5. Decisions to be Made**

10 NMFS must decide on the following before the Proposed Action can be implemented:

- 11 • The preferred alternative following an analysis of all alternatives in this DEIS and review of  
12 public comment on the DEIS
- 13 • Whether the Proposed Action complies with ESA criteria under the section 4(d) Rule

14

### 15 **1.5.1. Record of Decision**

16 This NEPA process will culminate in a Record of Decision (ROD) that will record the selected  
17 alternative. The ROD will identify the environmentally preferred alternative; describe the preferred  
18 alternative and the selected alternative; and summarize the impacts expected to result from  
19 implementation of the selected alternative. As for the preferred alternative in the final EIS, the selected  
20 alternative in the ROD could be the preferred alternative or could comprise components of alternatives  
21 evaluated in the final EIS. The ROD will also consider comments on the final EIS. The ROD will be  
22 completed after public review and comment on the final EIS, and after the ESA determinations and  
23 associated public review processes are completed.

24

### 25 **1.5.2. NMFS's Determination as to Compliance with the 4(d) Rule**

26 Discussions between the co-managers and NMFS during development of the HGMPs are conducted with  
27 the knowledge and understanding that the specific criteria under Limit 5 of the 4(d) Rule must be met  
28 before take coverage under the ESA can be issued. HGMPs submitted under Limit 5 (Artificial  
29 Propagation) must meet the following criteria:

- 30 1. Specify the goals and objectives for the hatchery program.

- 1           2. Specify the donor population’s critical and viable threshold levels.
- 2           3. Prioritize broodstock collection programs to benefit listed fish.
- 3           4. Specify the protocols that will be used for spawning and raising the hatchery-origin fish.
- 4           5. Determine the genetic and ecological effects arising from the hatchery program.
- 5           6. Describe how the hatchery operation relates to fishery management.
- 6           7. Ensure that the hatchery facility can adequately accommodate listed fish if collected for the
- 7           program.
- 8           8. Monitor and evaluate the management plan to ensure that it accomplishes its objective.
- 9           9. Be consistent with tribal trust obligations (65 Fed. Reg. 42422, July 10, 2000).

10 NMFS has a limited role (i.e., approve or deny) under Limit 5 of the 4(d) Rule. The decision as to  
11 whether the ESA 4(d) Rule Limit 5 have been met will be documented in NMFS’s ESA decision  
12 documents at the end of the ESA evaluation process. Included with the ESA decision documents will be  
13 responses to comments on the HGMPs received during public review as required by the 4(d) Rule.

14

### 15 **1.5.3. Biological Opinion on NMFS’s Determination as to Compliance with the 4(d) Rule**

16 ESA section 7(a)(2) provides that any action authorized, funded, or carried out by a Federal agency shall  
17 not jeopardize the continued existence of any endangered or threatened species or result in the adverse  
18 modification or destruction of designated critical habitat. NMFS’s actions under section 4(d) are Federal  
19 actions, and NMFS must comply with section 7(a)(2). NMFS’s consultations under section 7 on those  
20 actions may be informed by this NEPA analysis. The results of these consultations are documented in the  
21 Biological Opinion developed by NMFS for the species under their jurisdiction. Biological Opinions are  
22 produced near the end of the ESA evaluation and determination process, providing the NMFS conclusions  
23 regarding the likelihood that the proposed hatchery actions will jeopardize the continued existence of any  
24 listed species or adversely modify designated critical habitat for any listed species.

### 25 **1.6. Scoping and Relevant Issues**

26 The first step in preparing a DEIS is to conduct scoping of the issues that may be associated with the  
27 Proposed Action. This occurs through internal agency and public scoping processes. The purpose of that  
28 scoping is to identify the relevant human environmental issues, to eliminate insignificant issues from

1 detailed study, and to identify the alternatives to be analyzed in the DEIS. Scoping can also help  
2 determine the level of analysis and the types of data required for analysis.

### 3 **1.6.1. Scoping Process**

4 This DEIS involved activities that included both internal, Tribal, and public scoping that are described in  
5 the following paragraphs.

### 6 **1.6.2. Internal Scoping**

7 NMFS initially conducted internal project scoping on hatchery programs within the Oregon Coast Region  
8 in 2014, and convened later, internal-only, meetings for the process of developing this DEIS. Internal  
9 scoping for this DEIS was informed by public comments on previous NEPA analyses throughout Oregon  
10 and Washington (e.g., Sandy River EA, Puget Sound Hatcheries DEIS (NMFS 2014a) and the Puget  
11 Sound Early Winter Steelhead Hatcheries DEA (NMFS 2015a)).

### 12 **1.6.3. Tribal Government Scoping**

13 In March, 2013, NMFS sent letters to the following Tribal Governments located along the Oregon Coast:

- 14 • Coquille Indian Tribe
- 15 • The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians
- 16 • Cow Creek Band of Umpqua Tribe of Indians
- 17 • The Confederated Tribes of Grand Ronde
- 18 • Confederated Tribes of Siletz Indians

19 The purpose of the letters was to inform the Tribes of NMFS' review of the HGMPs under the ESA and  
20 NEPA and to identify any specific interests and/or issues from the Tribe's perspectives. A conference  
21 call with a few Tribal representatives occurred on April 4, 2013 to further describe NMFS' anticipated  
22 actions with this project. No specific issues were identified by the Tribes pertaining to this NEPA  
23 analyses.

### 24 **1.6.4. Notices of Public Scoping**

25 Public scoping for this DEIS commenced with publication of a Notice of Intent in the Federal Register on  
26 January 15, 2016 (81 FR 2197). The comment period was open for 60 days to gather information on the  
27 scope of the issues and the range of alternatives to be analyzed in the DEIS (81 FR 8685, February 22,  
28 2016).

1 At the same time, all of the HGMPs were available for public review and comment for 60 days (Table 2).  
2 The HGMPs provided information to help inform the public of the upcoming DEIS. Public review of the  
3 HGMPs is also required under limit 5 of the ESA 4(d) Rule.

4 NMFS developed a website for the DEIS at:

5 [http://www.westcoast.fisheries.noaa.gov/hatcheries/salmon\\_and\\_steelhead\\_hatcheries.html](http://www.westcoast.fisheries.noaa.gov/hatcheries/salmon_and_steelhead_hatcheries.html).

6 The website was available during the scoping period and will be updated and available throughout the  
7 project duration.

#### 8 **1.6.5. Written Comments**

9 Written comments received on this DEIS during the public scoping process included:

- 10 • 1 from a governmental agency
- 11 • 4 from non-governmental organizations
- 12 • 3 from individual citizens

13

#### 14 **1.6.6. Issues Identified During Scoping**

15 Based on all input received during the scoping process and the purpose and need for the Proposed Action,  
16 input relevant to development of DEIS alternatives include:

- 17 • Modify hatchery programs to reduce hatchery impacts on natural salmon and steelhead.
- 18 • Assess and report the impacts of hatchery programs on salmon and steelhead.
- 19 • Maintain existing fishing opportunities on salmon and steelhead that are important to anglers  
20 and local economies.

21 Comments from public scoping were also received on resources to be analyzed, the importance of  
22 evaluating the genetic and ecological effects on coho salmon, and new information. Scoping identified  
23 water quantity, salmon and steelhead, Southern Resident killer whales, socioeconomics, and  
24 environmental justice as the resources to be analyzed, along with cumulative effects.

#### 25 **1.6.7. Future Public Review and Comment**

26 Under NEPA, this DEIS has been issued for a 60-day public review period via notification in the Federal  
27 Register. A minimum of 45 days is required for public review. Following this public review period,  
28 responses to public comments will be prepared and included in the final EIS (Table 2). Responses will  
29 identify any changes to the DEIS resulting from public comments, as warranted. Following a 30-day

1 public review period for the final EIS, the ROD (Subsection 1.5.2, Record of Decision) will be signed and  
 2 made publicly available.

3 To the extent that HGMPs reviewed in this DEIS substantively change over time in response to new  
 4 information or proposed actions, additional NEPA and ESA compliance may be warranted. The nature  
 5 and extent of changes to plans or new information will determine the type of additional NEPA and ESA  
 6 compliance that may be needed. Subsequent public review opportunities may be warranted as part of  
 7 these additional NEPA and ESA reviews.

8

9 Table 2. NMFS documents and decisions required under the ESA and NEPA regarding Oregon  
 10 Coast HGMPs, public notices, and comment opportunities.

<b>Determination</b>	<b>Public Review, Scoping, and Comment</b>	<b>Public Review and Comment EIS</b>	<b>Availability and Public Access/Review</b>	<b>Decision Document</b>
<b>ESA</b>				
Limit 5 of the NMFS 4(d) Rule	Public review and comment on all HGMPs for 60 days (81 FR 2197 and 81 FR 8685)			Evaluation and Recommendation Determination <sup>1</sup>
NMFS BiOp <sup>2</sup>				Signed BiOp
<b>NEPA</b>				
EIS <sup>3</sup>	60 day public scoping on Notice of Intent to prepare EIS (81 FR 2197 and 81 FR 8685)	Draft EIS (60-day comment period)	Final EIS (30-day “cooling off” period)	Record of Decision
<b>Progression of Steps for Each Determination</b>	Start  End			

11 <sup>1</sup> Notification of decision published in Federal Register.

12 <sup>2</sup> BiOp = Biological Opinion under section 7 of the ESA.

13 <sup>3</sup> FEIS = Final Environmental Impact Statement

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**1.7. Relationship to Other Plans and Policies**

In addition to NEPA and ESA, other plans and policies also affect hatchery management along the Oregon Coast. They are summarized below to provide additional context for Oregon Coast hatchery programs.

**1.7.1. Oregon Plan for Salmon and Watersheds**

The Oregon Plan for Salmon and Watersheds began in the mid-1990s to address the conservation crisis of Oregon Coast coho salmon (OCSRI 1997). This state-initiated conservation plan specified the new management strategies for hatchery programs and fishery harvest affecting coho salmon. Substantial reform actions for hatcheries and fishery harvest were enacted and implemented over the last 15 years to help recover coho salmon. The HGMPs under evaluation reflect the management direction established in the Oregon Plan for Salmon and Watersheds. Most of the hatchery coho programs were terminated along the Oregon Coast during this period to help recover wild coho salmon.

**1.7.2. Native Fish Conservation Policy**

Oregon’s Native Fish Conservation Policy helps guide the management of hatcheries and fishery harvest as it relates to conserving and recovering wild fish species (ODFW 2002). This policy was enacted in 2002 and replaced the former Wild Fish Policy. One of the requirements of this policy is to develop and implement conservation plans for fish species. In areas where ESA listed salmon and steelhead occur, a federal recovery plan meets this need. For other non-listed salmonids, Oregon develops the state conservation plan (see below). The HGMPs under evaluation reflect decisions made by ODFW under this policy.

1 **1.7.2.1. Coastal Multi-Species Conservation and Management Plan**

2 In June of 2014, ODFW finalized a new conservation and management plan for spring and fall Chinook  
3 salmon, summer and winter steelhead, chum salmon, and cutthroat along most of the Oregon Coast  
4 Region (Elk River north to Necanicum River)(ODFW 2014a) under Oregon’s Native Fish Conservation  
5 Policy. This plan resulted in many changes to hatchery management along the Oregon Coast that: (1)  
6 reduce or minimize impacts on natural-origin populations, and (2) provide greater fishery opportunities on  
7 hatchery-origin salmon and steelhead. Some hatchery programs were eliminated entirely. Other hatchery  
8 programs increased in production. The hatchery programs (and associated HGMPs) included here in this  
9 evaluation are the result of these new hatchery management changes adopted under this new Coastal  
10 Multi-Species Conservation and Management Plan.

11  
12 **1.7.3. Recovery Plans for Oregon Coast Salmon**

13 Federal recovery plans are required for the ESA-listed Oregon Coast coho salmon and SONCC coho  
14 salmon. The SONCC coho salmon recovery plan was finalized in 2014 (NMFS 2014). A public draft of  
15 the Oregon Coast coho salmon recovery plan was released in October, 2015 (NMFS 2015). These  
16 recovery plans include the actions needed to achieve the conservation and recovery goals for each  
17 watershed within the geographic boundaries of the two listed ESUs. The recovery plans do not assure  
18 that the recommended actions will occur; implementation is left to resource managers and other interested  
19 parties.

20  
21 In the SONCC coho salmon recovery plan (NMFS 2014), hatcheries were determined to be a low threat in  
22 the Chetco and Elk Rivers and a medium threat for all of the Rogue River populations (no other coho  
23 salmon populations in the Oregon portion of the SONCC have hatchery fish released). The risks are  
24 related to genetic interbreeding between hatchery and natural coho salmon in the Upper Rogue  
25 population, and competition/predation/disease impacts on coho salmon from releases of hatchery Chinook  
26 salmon and steelhead in the Elk, Rogue, and Chetco Rivers. The only specific action identified in the  
27 recovery plan for Oregon populations related to hatcheries was to develop HGMPs that address the  
28 concerns specified above (genetic and ecological impacts of hatchery fish). All HGMPs have been  
29 developed and submitted to NMFS. This DEIS describes and evaluates the impacts of the hatchery  
30 programs on the identified resources.

31  
32 In the draft Oregon Coast coho salmon recovery plan (NMFS 2015), two recovery actions were specified  
33 for hatchery management: 1) maintain current low levels of hatchery production in order to minimize

1 genetic risks of hatchery fish interbreeding with natural-origin coho salmon, and 2) maintain current low  
2 levels of hatchery production in order to minimize competition and predation risks with wild fish in  
3 tributaries and estuaries. The HGMPs submitted by ODFW within the Oregon Coast coho salmon ESU  
4 reflect the management reforms that have been implemented since ESA listing of coho salmon. Coho  
5 salmon hatchery production continues to be at very low levels ESU-wide, with only three coho salmon  
6 production programs (Umpqua, Trask, Nehalem) and one STEP program (Siuslaw)(recovery action 1).  
7 For the other HGMPs that propagate other species besides coho salmon, total production of these  
8 programs has not increased over the last decade (recovery action 2). Due to the reforms implemented to  
9 date, hatchery program impacts have not been identified as a primary or secondary limiting factor/threat  
10 for any coho salmon population along the Oregon Coast. Therefore, other factors and threats are  
11 currently impeding the recovery of coho salmon along the Oregon Coast.

#### 13 **1.7.4. Clean Water Act**

14 The Clean Water Act (33 USC 1251, 1977, as amended in 1987), administered by the U.S. Environmental  
15 Protection Agency and state water quality agencies, is the principal Federal legislation directed at  
16 protecting water quality. Each state implements and carries forth Federal provisions, as well as approving  
17 and reviewing National Pollutant Discharge Elimination System (NPDES) applications, and establishing  
18 total maximum daily loads for rivers, lakes, and streams. The states are responsible for setting the water  
19 quality standards needed to support all beneficial uses, including protection of public health, recreational  
20 activities, aquatic life, and water supplies.

21  
22 The Oregon Department of Environmental Quality is the agency responsible for carrying out the  
23 provisions of the Federal Clean Water Act within Oregon. The agency is responsible for establishing  
24 water quality standards, making and enforcing water quality rules, and operating waste discharge permit  
25 programs. Hatchery operations are required to comply with the Clean Water Act and governed by  
26 NPDES permits.

#### 28 **1.7.5. Bald Eagle and Golden Eagle Protection Act**

29 The Bald and Golden Eagle Protection Act (16 USC. 668-668c), enacted in 1940 and amended several  
30 times since then, prohibits the taking of bald eagles, including their parts, nests, or eggs. The act defines  
31 “take” as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The U.S.  
32 Fish and Wildlife Service, who is responsible for carrying out provisions of this Act, define “disturb” to  
33 include a “decrease in its productivity, by substantially interfering with normal breeding, feeding, or

1 sheltering behavior, or nest abandonment, by substantially interfering with normal breeding, feeding, or  
2 sheltering behavior.” Changes in hatchery production have the potential to affect eagle productivity  
3 through changes in its prey source (salmon and steelhead).  
4

#### 5 **1.7.6. Marine Mammal Protection Act**

6 The Marine Mammal Protection Act of 1972 (16 USC 1361), as amended, establishes a national policy  
7 designated to protect and conserve wild marine mammals and their habitats. This policy was established  
8 so as not to diminish such species or populations beyond the point at which they cease to be a key  
9 functioning element in the ecosystem, nor to diminish such species below their optimum sustainable  
10 population. All marine mammals are protected under the Marine Mammal Protection Act.  
11

12 The Marine Mammal Protection Act prohibits, with certain exceptions, the take of marine mammals in  
13 United States waters and by United States citizens on the high seas, and the importation of marine  
14 mammals and marine mammal products into the United States. The term “take,” as defined by the  
15 Marine Mammal Protection Act, means to “harass, hunt, capture, or kill, or attempt to harass, hunt,  
16 capture, or kill any marine mammal.” The Marine Mammal Protection Act further defines harassment as  
17 “any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or  
18 marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal  
19 stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration,  
20 breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a  
21 marine mammal or marine mammal stock in the wild.”  
22

23 NMFS is responsible for reviewing Federal actions for compliance with the Marine Mammal Protection  
24 Act. Changes in fish production can indirectly affect marine mammals by altering the number of available  
25 prey (salmon and steelhead).  
26

#### 27 **1.7.7. Executive Order 12898**

28 In 1994, the President issued Executive Order 12898, *Federal Actions to Address Environmental Justice*  
29 *in Minority and Low-income Populations*. The objectives of the Executive Order include developing  
30 Federal agency implementation strategies, identifying minority and low-income populations where  
31 proposed Federal actions could have disproportionately high and adverse human health and  
32 environmental effects, and encouraging the participation of minority and low-income populations in the

1 NEPA process. Changes in hatchery production have the potential to affect the extent of harvest available  
2 for minority and low-income populations.

3  
4 **1.7.8. Secretarial Order 3206**

5 Secretarial Order 3206 (*American Indian Tribal Rights, Federal-Tribal Trust Responsibilities and the*  
6 *ESA*) issued by the Secretaries of the Departments of Interior and Commerce, clarifies the responsibilities  
7 of the agencies, bureaus, and offices of the departments when actions taken under the ESA and its  
8 implementing regulations affect, or may affect, Indian lands, tribal trust resources, or the exercise of  
9 American Indian tribal rights as they are defined in the order. Secretarial Order 3206 acknowledges the  
10 trust responsibility and treaty obligations of the United States toward tribes and tribal members, as well as  
11 its government-to-government relationship when corresponding with tribes. Under the order, NMFS and  
12 the U.S. Fish and Wildlife Service (Services) “will carry out their responsibilities under the [ESA] in a  
13 manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions  
14 of the [Services], and that strives to ensure that Indian tribes do not bear a disproportionate burden for the  
15 conservation of listed species, so as to avoid or minimize the potential for conflict and confrontation.”

16

17 More specifically, the Services shall, among other things, do the following:

18

- 19 • Work directly with Indian tribes on a government-to-government basis to promote healthy  
20 ecosystems (Section 5, Principle 1)
- 21 • Recognize that Indian lands are not subject to the same controls as Federal public lands (Section  
22 5, Principle 2)
- 23 • Assist Indian tribes in developing and expanding tribal programs so that healthy ecosystems are  
24 promoted and conservation restrictions are unnecessary (Section 5, Principle 3)
- 25 • Be sensitive to Indian culture, religion, and spirituality (Section 5, Principle 4)

26

27 **1.7.9. The Federal Trust Responsibility**

28 The United States government has a trust or special relationship with Indian tribes. The unique and  
29 distinctive political relationship between the United States and Indian Tribes is defined by statutes,  
30 executive orders, judicial decisions, and agreements and differentiates tribes from other entities that deal  
31 with, or are affected by the Federal government. Executive Order 13175, *Consultation and Coordination*  
32 *with Indian Tribal Governments*, states that the United States has recognized Indian tribes as domestic  
33 dependent nations under its protection. The Federal government has enacted numerous statutes and

1 promulgated numerous regulations that establish and define a trust relationship with Indian tribes. The  
2 relationship has been compared to one existing under common law trust, with the United States as trustee,  
3 the Indian tribes or individuals as beneficiaries, and the property and natural resources of the United  
4 States as the trust corpus (Cohen 2005). The trust responsibility has been interpreted to require Federal  
5 agencies to carry out their activities in a manner that is protective of Indian treaty rights. This policy is  
6 also reflected in the March 30, 1995, document, Department of Commerce - American Indian and Alaska  
7 Native Policy (U. S. Department of Commerce 1995).

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1    **2.       ALTERNATIVES INCLUDING THE PROPOSED ACTION**

2    Four alternatives are evaluated in this environmental impact statement: (1) NMFS would not approve the  
3    HGMPs under limit 5 of the 4(d) Rule, (2) NMFS would approve the HGMPs under limit 5 of the 4(d)  
4    Rule, (3) all of the salmon and steelhead hatchery programs described in the HGMPs would be terminated  
5    along the Oregon Coast, and (4) hatchery production would be reduced by approximately 50 percent from  
6    Alternative 1. No other alternatives that would meet the purpose and need were identified that would be  
7    appreciably different from the four alternatives described below (see Subsection 2.5, Alternatives  
8    Considered But Not Analyzed in Detail, for further description of alternatives considered but not  
9    analyzed in detail).

10  
11   **2.1.    Alternative 1 (No-action): Do Not Approve ODFW’s HGMPs for Operation of Hatchery**  
12   **Programs on the Oregon Coast**

13  
14    Under this alternative, NMFS would not approve the HGMPs under 4(d) Rule, limit 5, and the hatchery  
15    programs would not be exempted from ESA section 9 take prohibitions. If the programs are not  
16    authorized under the No-action Alternative, several possible outcomes could occur:

- 17  
18       •    ODFW could pursue obtaining an ESA section 10(a)(1)(B) incidental take permit to exempt the  
19       hatchery programs from take prohibitions.  
20       •    ODFW could choose to continue to operate the existing hatchery programs without ESA  
21       authorization and be liable for ESA take violations.  
22       •    ODFW could choose to terminate all of the hatchery programs because they would not have ESA  
23       authorization.

24  
25    For purposes of this analysis, NMFS has defined the No-action Alternative as the choice by ODFW to  
26    continue to operate the existing hatchery programs without ESA authorization. All of the activities  
27    associated with the proposed salmon hatchery programs would continue: hatchery salmon and steelhead  
28    would be released, broodstock would be collected at proposed locations, the hatchery facilities would use  
29    water for operation, and the hatcheries would discharge hatchery water effluent.

30  
31    NMFS’s No-action Alternative represents NMFS’s best estimate of what would happen in the absence of  
32    the proposed Federal action.

1     **2.2. Alternative 2 (Proposed Action/Preferred Alternative): Approve ODFW’s HGMPs for**  
2     **Operation of Hatchery Programs on the Oregon Coast**  
3

4 Under this alternative, NMFS would approve the existing hatchery programs (described in the submitted  
5 HGMPs) by issuing an approval letter to ODFW under limit 5 of the 4(d) Rule. All of the hatchery  
6 reforms that have been enacted since the ESA listing of coho salmon along the Oregon Coast would  
7 continue to be implemented. ODFW has recently completed their Coastal Multi-Species Conservation  
8 and Management Plan for the Oregon Coast Region. This entailed an elaborate review of the  
9 management of the hatchery programs considering a range of conservation and societal issues and  
10 included substantial stakeholder involvement. The current hatchery programs reflect the decisions under  
11 this management plan. The Best Management Practices (BMPs) used by ODFW for hatchery  
12 management would also continue as described in the submitted HGMPs.

13  
14 BMPs are protocols for the operation of hatchery facilities and hatchery programs to appropriately meet  
15 the objectives of the hatchery program, including minimizing impacts on ESA-listed fish (IHOT 1995;  
16 HSRG 2004; Mobrand et al. 2005; Jones and Stokes 2009). The BMPs in these HGMPs include:

- 17  
18         (1) providing specific-pathogen free water source for adult and juvenile fish holding  
19         (2) ensuring adequate alarm systems are in operation to protect rearing fish from flow disruptions  
20         (3) ensuring that water supplies have back-up power generation in case of an electrical outage to  
21         protect rearing fish  
22         (4) requiring appropriate disinfection procedures to prevent pathogen transmission between  
23         stocks of fish onsite  
24         (5) providing the correct amount and type of food to achieve desired growth rates  
25         (6) adequately screening hatchery intake water supplies to prevent fish loss  
26         (7) ensuring that the hatchery is operated in compliance with its NPDES permit  
27         (8) documenting the survival and production of hatchery fish at each life stage while in the  
28         hatchery.  
29         (9) outplanting surplus carcasses from the hatchery for nutrient enhancement in the ecosystem, if  
30         appropriate according to pathology guidelines.

31  
32 For the purpose of this analysis, NMFS treats the Proposed Action Alternative as implementing the  
33 hatchery production of salmon and steelhead as proposed in the HGMPs provided in 2014. All of the  
34 following activities would occur: broodstock collection; spawning, rearing, and release of hatchery fish;  
35 and facility operation including water intake and discharge.

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**2.3. Alternative 3: Terminate Hatchery Programs on the Oregon Coast**

Under this alternative, NMFS would determine that the hatchery programs in the Oregon Coast Region do not meet the criteria under limit 5 of the 4(d) rule, and, therefore, would not receive ESA approval. Because the hatchery plans would not be approved, the hatchery actions proposed by ODFW would not be exempt from section 9 take prohibitions. With this lack of approval, the hatchery actions proposed by ODFW would not be implemented, and the programs would be terminated. All of the activities associated with the hatchery programs would be terminated: no hatchery salmon would be released, no broodstock would be collected at trapping locations, trapping facilities would be removed, no returning hatchery fish would be removed from various locations, the hatchery facilities would not use water for operation, and the hatcheries would not discharge hatchery water effluent. All salmon and steelhead currently being raised in hatchery facilities would be released or killed, and no additional broodstock would be collected.

This alternative would not be expected to meet the purpose and need for action because termination of the proposed hatchery actions would not produce juvenile hatchery fish of each species that would return as adult fish to meet commercial and recreational fishery needs. However, NMFS supports its analysis to assist with a full understanding of potential effects on the human environment under various management scenarios.

**2.4. Alternative 4: Reduced Hatchery Production**

Under this alternative, ODFW would reduce the number of fish released from each of the proposed hatchery programs by 50 percent. All of the hatchery facilities would rear 50 percent less hatchery fish. This alternative represents a mid-point between the Proposed Action (Alternative 2) and Alternative 3 (Terminate Hatchery Programs on the Oregon Coast). Revised HGMPs would be submitted by ODFW reflecting these 50 percent reduced production levels, and NMFS would make a determination that the revised HGMPs meet the requirements of the 4(d) Rule.

NMFS’s 4(d) regulations do not provide NMFS with the authority to order changes of this magnitude as a condition of approval of the HGMPs. NMFS’s 4(d) regulations require NMFS to make a determination that the HGMPs, as submitted by the operator, either meet or do not meet the standards prescribed in the rule. Nonetheless, NMFS supports analysis of this alternative to assist with a full understanding of potential effects on the human environment under various hatchery management scenarios.

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**2.5. Alternatives Considered But Not Analyzed in Detail**

The following alternatives will not be evaluated in detail. These alternatives are eliminated because (1) they do not meet the purpose and need for the action, and/or (2) they are not meaningfully different from the Proposed Action or No-action Alternatives described above and would not supply additional information that would inform the decision-making process.

**2.5.1. Eliminate all hatchery coho salmon programs and the largest hatchery Chinook salmon program**

Under this possible alternative, consideration was given to eliminating the four hatchery coho salmon programs (Rogue, Umpqua, Trask, and Nehalem) and the largest hatchery program in the project area (fall Chinook salmon in Coos Bay). These possible hatchery program changes were considered because they could possibly represent the largest genetic and ecological impacts on the only ESA-listed fish species, coho salmon, and, therefore, their elimination would provide the largest reductions in those impacts. These changes would reduce production levels by approximately 35 percent from the Proposed Action Alternative, reductions accruing to coho and fall Chinook salmon.

If these five hatchery programs were eliminated, none of the hatchery facilities would be closed because other hatchery fish are raised at these facilities. All of the hatchery facilities would still use water for operations. Water intakes would still require compliance with ESA standards, and hatchery effluent would require compliance with the Clean Water Act. The effects of the remaining programs would be the same as evaluated under the Proposed Action Alternative and Reduced Hatchery Production Alternative. This alternative would result in reductions in socioeconomics, in that harvest capability would be reduced and the income generated by that harvest would be reduced; the likely effects on both harvest and financial benefits would likely be similar to the effects of Alternative 4, Reduced Hatchery Production.

Alternative 4, Reduced Hatchery Production, is analyzed in the DEIS and represents a 50 percent reduction in hatchery production for all of the hatchery facilities. This Alternative 4 was deemed to be adequate in addressing a mid-point range of impacts between the Proposed Action (Alternative 1) and terminating all hatchery programs on the Oregon Coast (Alternative 3). Therefore, consideration of the elimination of the hatchery coho salmon and the largest hatchery salmon programs does not provide additional insight on impacts compared to Alternative 4, and was eliminated from further analysis.

1 **2.5.2. Terminate operation of Cole Rivers Hatchery and all associated hatchery programs for**  
2 **coho salmon, spring Chinook salmon, fall Chinook salmon, winter steelhead, and summer**  
3 **steelhead**  
4

5 Under this possible alternative, consideration was given to closing down the operation of Cole Rivers  
6 Hatchery in the Rogue River. Within the Oregon Coast Region, this facility produces the most hatchery  
7 fish and uses the most water for hatchery operations. A total of 2.86 million hatchery fish would be  
8 eliminated under this potential alternative, which equates to a reduction of 40 percent of the total releases  
9 within the Oregon Coast Region compared to the Proposed Action Alternative. No hatchery fish would  
10 be released in the Rogue River and the fall Chinook salmon programs in the Coquille and Coos Rivers  
11 would be substantially decreased. Cole Rivers Hatchery would not operate the trap, collect hatchery fish,  
12 use water for hatchery purposes, or discharge any effluent into the Rogue River.  
13

14 This alternative was eliminated from further analysis because it did not meet the purpose and need of the  
15 action for the following reasons:

- 16 • The elimination of 2.86 million hatchery fish releases would have little to no beneficial effect on  
17 ESA-listed salmon species, and this effect has already been evaluated in Alternative 3. The only  
18 ESA-listed salmon species in the Rogue River is coho salmon. NMFS approved the HGMP for  
19 the hatchery coho salmon program in 1999, and there are no new issues that need to be evaluated  
20 with this program. Therefore, this potential alternative would not address any further ESA issues  
21 compared to the Proposed Action Alternative, and is not a necessary step to achieve the  
22 conservation portion of the Purpose and Need.
- 23 • The elimination of 2.86 million hatchery fish releases would result in a keen reduction in harvest  
24 opportunity, and therefore would not meet that portion of the Purpose and Need.
- 25 • Cole Rivers Hatchery was instituted and is currently operated to provide fish for harvest purposes  
26 due to the construction and operation of Lost Creek and Applegate dams; funding is obligated for  
27 this Federal hatchery mitigation.
- 28 • At the local scale of the Rogue River Basin, this possible alternative is the same as analyzed  
29 under Alternative 3 (terminate hatchery programs along the Oregon Coast), and therefore does  
30 not provide any new information already considered under Alternative 3.

31  
32 **2.5.3. Approve Greater Levels of Hatchery Production than those Proposed**

33 Under this possible alternative, NMFS would make a determination that revised HGMPs with increased  
34 production levels meet the requirements of limit 5 of the 4(d) Rule. This alternative will not be analyzed  
35 in detail because substantially higher production levels would exceed fish rearing density limits for the

1 hatchery facilities and result in increasingly adverse fish health and survival effects on the hatchery-origin  
2 fish. Constructing additional hatchery facilities to accommodate substantially increased production would  
3 not meet the purpose and need for action, which includes using existing hatchery facilities to propagate  
4 the hatchery fish in the specified HGMPs.

#### 5 6 **2.5.4. Change Locations of the Hatchery Programs and/or Releases**

7 Under this possible alternative, changes to the locations where hatchery fish are currently being released  
8 would be implemented. Such a modification might be considered in an attempt to focus harvest  
9 opportunities in fewer areas with similar overall fishery effort, possibly to create more areas of little or no  
10 hatchery influence. Overall hatchery production levels would remain similar to the Proposed Action  
11 using the existing hatchery facilities at full capacity. However, release locations would be changed  
12 throughout the Oregon Coast Region, while maintaining a similar number of hatchery and wild fish  
13 management areas. Since hatchery production under this possible alternative would still occur using the  
14 existing facilities at full capacity, with only the specific release locations changing within the Oregon  
15 Coast Region, for NEPA evaluations this possible alternative is not substantially different from the  
16 Proposed Action.

17  
18 The proposed release locations were defined considering many other policy directives, like Oregon's  
19 Native Fish Conservation Policy (NFCP) and the Oregon Plan for Salmon and Watersheds. In 2014,  
20 ODFW adopted the Coastal Multi-Species Conservation and Management Plan under the NFCP. This  
21 management plan assessed a wide range of potential changes to the hatchery programs and included  
22 stakeholder involvement. This plan sets forth the locations of releases into the foreseeable future.  
23 Changes to release locations as developed through the prior planning process would not be an  
24 improvement in achieving the conservation portion of the Purpose and Need, and would potentially  
25 reduce the effectiveness of the harvest opportunity component of the Purpose and Need, and, therefore,  
26 this alternative is not further analyzed.

#### 27 28 **2.5.5. Attaining Hatchery Program Goals by Alternative Actions and Reforms**

29 In each of the HGMP's, section 1.16 describes alternative actions and reforms that were considered by  
30 ODFW that could be implemented to meet hatchery program goals and objectives. These alternative  
31 actions would change hatchery fish release locations, modify adult collection techniques and  
32 infrastructure, and/or make necessary improvements to the hatchery facilities if funding was available,  
33 while still meeting the original goals and objectives of the hatchery program. These identified alternative

1 actions in the HGMPs were not further considered because the actions were not meaningfully different  
2 than the proposed actions in the HGMPs and do not provide additional information on the scale of effects  
3 to further inform decision-making along the Oregon Coast Region.  
4

5 **2.5.6. Reinstate Hatchery Production that Existed Prior to the ESA Listing of Coho Salmon Along**  
6 **the Oregon Coast**  
7

8 Under this possible alternative, the previous hatchery production levels that occurred prior to the ESA  
9 listing of coho salmon along the Oregon Coast would be reinstated. Since the current hatchery production  
10 levels are substantially different from pre-ESA listing of coho salmon, many hatchery facilities (private  
11 and government) would have to be funded, repaired, and put back into operation for this alternative to be  
12 implemented. Hatchery production would be increased 100 percent to 500 percent above proposed levels.  
13 Because hatchery production was reduced on the Oregon Coast in the 1990s to reduce impacts on ESA-  
14 listed coho salmon, increasing hatchery production to pre-reform levels would exceed impact levels  
15 consistent with the ESA, and so would not meet the purpose and need for action. Specifically, this  
16 possible alternative would not comply with the requirements of the ESA and the mandates established in  
17 the Oregon Plan for Salmon and Watersheds and the Native Fish Conservation Policy's Coho  
18 Conservation Plan (OCSRI 1997; ODFW 2007).  
19

20 **2.5.7. Evaluate the HGMPs under Section 10(a)(1)(b) of the ESA, instead of Limit 5 of the 4(d)**  
21 **Rule**  
22

23 Under this possible alternative, NMFS would determine that the hatchery programs, as described in the  
24 HGMPs, meet the requirements for a section 10(a)(1)(B) incidental take permit. Under this possible  
25 alternative, beyond the elimination from consideration of two programs<sup>1</sup>, the only change from the  
26 Proposed Action would be a difference in which process mechanism would be used to address ESA  
27 compliance for these hatchery programs. Consequently, this potential alternative would not be  
28 meaningfully different from the Proposed Action and will not be analyzed in detail.

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<sup>1</sup> The Umpqua River coho salmon program, as proposed, would incorporate natural-origin ESA-listed fish into its broodstock and would, therefore, be a direct-take program, which would not qualify for an incidental take permit. Individual projects at the Oregon Hatchery Research Center might include deliberate handling or monitoring of natural-origin ESA-listed fish, and potentially would not qualify for an incidental take permit for the same reason. Both of these programs would need to be evaluated under separate processes, with likely the same consideration and effect as under the Proposed Action, but potentially losing some specificity in the cumulative nature of the analysis.



1 **3. AFFECTED ENVIRONMENT**

2 **3.1. Introduction**

3 Chapter 3, Affected Environment, describes current conditions for seven resources that may be affected  
4 by implementation of the alternatives:

5

- 6 • Water quantity (Subsection 3.2)
- 7 • Water quality (Subsection 3.3)
- 8 • Salmon and Steelhead and Their Habitats (Subsection 3.4)
- 9 • Other Fish and Their Habitats (Subsection 3.5)
- 10 • Wildlife (Subsection 3.6)
- 11 • Socioeconomics (Subsection 3.7)
- 12 • Environmental justice (Subsection 3.8)

13

14 No other resources were identified during internal scoping that would potentially be impacted by the  
15 Proposed Action or alternatives. Current conditions include effects of the past operation of Oregon Coast  
16 hatchery programs.

17

18 The project area is the geographic area where the Proposed Action would take place. It includes the  
19 watersheds where fish would be spawned, incubated, reared, acclimated, released, or harvested under the  
20 proposed hatchery programs (Subsection 1.4, Project Area). Each resource’s analysis area includes the  
21 project area as a minimum area, but may include locations beyond the project area if effects would be  
22 expected to occur outside the project area (Subsection 1.4, Project Area).

23

24 **3.2. Water Quantity**

25 Hatchery programs can affect water quantity when they take water from a well (groundwater) or a  
26 neighboring tributary streams (surface water) to use in the hatchery facility for broodstock holding, egg  
27 incubation, juvenile rearing, and juvenile acclimation. All water, minus evaporation, that is diverted from  
28 a river or taken from a well is discharged to the adjacent river from which the water was appropriated  
29 after it circulates through the hatchery facility (non-consumptive use) (Table 3). When hatchery  
30 programs use groundwater, they may reduce the amount of water for other users in the same aquifer.  
31 When hatchery programs use surface water, they may lead to dewatering of the stream between the water  
32 intake and discharge structures, which may impact fish and wildlife if migration is impeded or dewatering

1 leads to reduced habitat areas and/or increased water temperatures. Generally, water intake and discharge  
2 structures are located as close together as possible to minimize the area of the stream that may be  
3 impacted by a water withdrawal for the hatchery facility.

4  
5 A water right permit is required for all groundwater withdrawal except those supporting single-family  
6 homes. All hatchery wells used by hatchery facilities supporting Oregon Coast hatchery programs are  
7 permitted by the Oregon Department of Water Resources (OWRD 2013). No Oregon Coast hatchery  
8 facilities are located in areas designated by Oregon as Critical Groundwater Areas (OWRD 2013). For  
9 surface water use, each hatchery facility has a designated water right (Table 2) issued by the State of  
10 Oregon.

11  
12 Streamflows within the watersheds where the hatchery facilities are located is driven predominantly by  
13 rain (Lawson et al. 2007). Most of the Oregon Coast Region drains the westslope of the Coast Range and  
14 has little snowpack because of the relatively low elevation. The two exceptions within the region are the  
15 Upper Umpqua and Upper Rogue Basins, which drain the west side of the Cascade Mountain Range  
16 (which is higher in elevation and provides more streamflow from snow-melt (Lawson et al. 2007)). The  
17 quantity of water within the streams and rivers along the Oregon Coast is typically greatest in December  
18 and January and tapers off to the lowest streamflow conditions in August through October. The streams  
19 and rivers of the Oregon Coast Region are not flow-limited, with respect to fishery resources, because the  
20 vast majority of available water stays within the stream (OCCCCP 2007). Water diversions for agricultural  
21 and municipal purposes are not prominent throughout this region. The exceptions are the Middle  
22 Umpqua and South Umpqua Basins, where reduced water quantity during the summer was identified as  
23 limiting salmon production (OCCCCP 2007). The tributary streams of the Upper Rogue Basin (not the  
24 mainstem Rogue River) also have a substantial amount of consumptive use that may affect salmon  
25 production within those reaches. Streamflow in the mainstem Rogue River is not appreciably affected  
26 because of flow augmentation from Lost Creek reservoir.

27  
28 Ten hatchery facilities are currently used to support the hatchery programs along the Oregon Coast  
29 (Subsection 1.4, Project Area). All of the hatchery facilities use surface water as their primary water  
30 source (Table 3). Three hatchery facilities (Elk, Nehalem, Indian) may also use groundwater only during  
31 specific time periods for incubating the eggs in the hatchery. Otherwise, surface water is used for  
32 hatchery operations. The length of stream affected by the hatchery's water withdrawal (from inlet to  
33 outlet) ranges from 100 to 5,943 feet in length for the 10 hatchery facilities (Table 2). Cole Rivers  
34 Hatchery has the longest diversion (5,943 feet). However, this diversion to the hatchery does not affect

1 the adjacent Rogue River because water is piped directly from within the reservoir to the hatchery facility  
2 located at the tailrace of the dam. No change in the discharge of the Rogue River occurs from the  
3 hatchery’s water diversion. A similar situation occurs at Bandon Hatchery, where the hatchery is located  
4 at the tailrace of Ferry and Geiger reservoirs. Discharge from these reservoirs literally flows through  
5 some hatchery raceways, which is located immediately downstream of the reservoirs. The water from the  
6 hatchery then continues to flow downstream as Ferry Creek. The remaining eight hatchery facilities  
7 divert water from the adjacent stream and affect the length of stream estimated in Table 2. The percent of  
8 stream miles affected by all of the hatchery facility water withdrawal within the watershed (as indexed by  
9 critical habitat designated for coho salmon (see Oregon Coastal Coho Salmon discussion in Subection  
10 3.4, Salmon and Steelhead and Their Habitats) ranges from zero to 0.23 percent (Table 2).

11  
12 The maximum allowable water use permitted by the hatchery’s surface water right ranges from three to  
13 224 cubic feet per second (cfs) (Table 2). However, most of the hatchery facilities do not use their full  
14 water right throughout the entire year. Water use depends upon fish production levels and the capacity of  
15 the hatchery facility. During the lowest streamflow periods throughout the year (typically August through  
16 October), each hatchery facility uses only a small fraction of their full water right (Table 2).

17

1 Table 3. Water source and use by hatchery facility. See Appendix 1 for HGMP citations.

Hatchery Facility	Maximum Surface Water Use Permitted by Water Right (cfs) <sup>1</sup>	Maximum Ground-water Use Permitted by Water Right (cfs)	Surface Water Source	Minimum Mean Monthly Surface Water Flows during Facility Operation (cfs, month)	Actual Surface Water Use (cfs) by Hatchery Facility <sup>3</sup> During Minimum Mean Monthly Surface Flows (previous column)	Maximum length of stream affected by hatchery water withdrawal (feet) <sup>2</sup>	Discharge Location
Cole Rivers Hatchery	224	0	Lost Creek Dam and Reservoir	1000 (October)	119.54	5,943 <sup>6</sup>	Rogue River
Indian Hatchery	1.75	0.06	Indian Creek	Unknown	Not in Operation	100	Indian Creek
Elk Hatchery	20	0.7	Elk River	57 (August)	20	1,364	Elk River
Bandon Hatchery	3	0	Ferry and Geiger Reservoirs	2.5 (September)	2.7 <sup>5</sup>	1,380	Ferry Creek
Rock Hatchery	55	0	Rock Creek and North Umpqua River	975 (September)	37	1,230	Rock Creek
Alsea Hatchery	47	0	North Fork Alsea River	25 (August)	9.67	1,056	North Fork Alsea River
Salmon Hatchery	30	0	Salmon River	48.5 (August)	11.77	692	Salmon River
Cedar Hatchery	116	0	Cedar Creek and Three Rivers	Unknown	8.5 (August)	770	Cedar Creek
Trask Hatchery	19	0	Gold Creek and Marys Creek	111 (August)	6.34	2,204	Gold Creek
Nehalem Hatchery	21	2.2	North Nehalem River	Unknown	15.9 (August)	262	North Nehalem River
Oregon Hatchery Research Center <sup>1</sup>	20 <sup>3</sup>	0	Fall Creek	16 (August)	Varies depending upon research.	1,831	Fall Creek

2 Source: HGMPs (see Appendix 1 for citations), United States Geological Survey data sets (<http://waterdata.usgs.gov>),

3 [http://streamflow.engr.oregonstate.edu/links/gages\\_mainx.htm](http://streamflow.engr.oregonstate.edu/links/gages_mainx.htm), Oregon Water Resources Department ([http://apps.wrd.state.or.us/apps/sw/hydro\\_report/default.aspx](http://apps.wrd.state.or.us/apps/sw/hydro_report/default.aspx)).

*Section 3 – Affected Environment*

1

2 <sup>1</sup> The Oregon Hatchery Research Center only uses water when needed for research purposes. If no research is being conducted, then water is not used.

3 <sup>2</sup> Reported values are the maximum distance from intake of water supply to discharge point at the outfall of the hatchery facility. Some hatchery facilities have two water intake  
4 sources and the farthest intake from the facility is reported here to represent the maximum stream reach affected. Lengths were estimated visually using Google Earth..

5 <sup>3</sup> Monthly hatchery facility water use data reported by ODFW for Water Year 2012-13.

6 <sup>5</sup> Bandon Hatchery does not dewater any of the stream reaches. All of the water released from the dam flows entirely through the hatchery facility located immediately  
7 downstream from the dam.

8 <sup>6</sup> Cole Rivers Hatchery does not dewater any portion of the Rogue River. The hatchery water is piped from within the reservoir directly to the hatchery facility. The Rogue River  
9 is not affected until the water is discharged into the Rogue River below the hatchery facility (additional water to Rogue River).

1 **3.3. Water Quality**

2 Hatchery programs can affect the water quality of the adjacent stream or river from the discharge of  
3 effluent from the hatchery facility. There are potentially 11 rivers or streams within the Oregon Coast  
4 Region affected by the operation of the hatchery facilities. The areas are shown in Table 3. Each of the  
5 hatchery facilities (with the exception of Indian Creek Hatchery) is required to have a National Pollutant  
6 Discharge Elimination System (NPDES) permit administered by the Environmental Protection Agency  
7 under the Clean Water Act. Monitoring and compliance with the permits is verified on a regular basis by  
8 testing the water quality below the hatchery to determine if discharge is within the specified limits. The  
9 most common substances found in the effluent of Oregon Coast hatcheries are ammonia, nitrogen,  
10 phosphorus, and antibiotics. Bacteria, parasites, and viruses can also be transmitted from the hatchery  
11 fish to the effluent. These substances and organisms are a byproduct of hatchery fish rearing and treating  
12 the fish to ensure high survival while being grown at very high densities.

13  
14 The affected environment from the discharge of effluent from the hatchery facilities occurs from the point  
15 of discharge downstream until thorough mixing occurs in the adjacent stream or river. Even though the  
16 discharges are within the criteria of the hatchery facilities NPDES permit administered by the Oregon  
17 Department of Environmental Quality, the effluent may affect water quality, and disease and pathogen  
18 load below the hatchery facility. Bartholomew (2013) showed the effluent discharge effects to be short-  
19 lived and extending downstream for less than 200 meters before it became undetectable. Each of the  
20 hatchery facilities are required by their NPDES to circulate the effluent through an abatement pond to  
21 settle out uneaten food, fish waste, and any other substances not in solution. After this, the effluent is  
22 then discharged into the adjacent stream or river to help reduce the effects on the adjacent stream or river  
23 near the hatchery facility.

24  
25 The release of hatchery fish from the facilities are exposed to the broader range of water quality  
26 conditions throughout the watershed as the smolts, jacks, and adults migrate to and from the ocean.  
27 Hatchery fish can contribute marine-derived nutrients to the watershed if they spawn naturally or die  
28 before being collected at the hatchery facility. The current condition of most streams and rivers within  
29 the Oregon Coast Region are in violation of one or more of the Federal Clean Water Act 303(d) standards  
30 (Figure 2). Water temperature, fecal coliform, sedimentation, dissolved oxygen are the current 303(d)  
31 listings for the Oregon Coast Region (Table 4). Lack of riparian shade, poor agricultural and forestry  
32 practices are some of the causes for the 303(d) listings. The hatchery facilities are not identified as a

1 cause for any of the current 303(d) listings within the Oregon Coast Region. Most of the streams and  
 2 rivers have 303(d) listings and are not affected in any way by the operation of the hatchery programs.

3

4 Table 4. Water source and use by hatchery facility and applicable 303(d) listings.

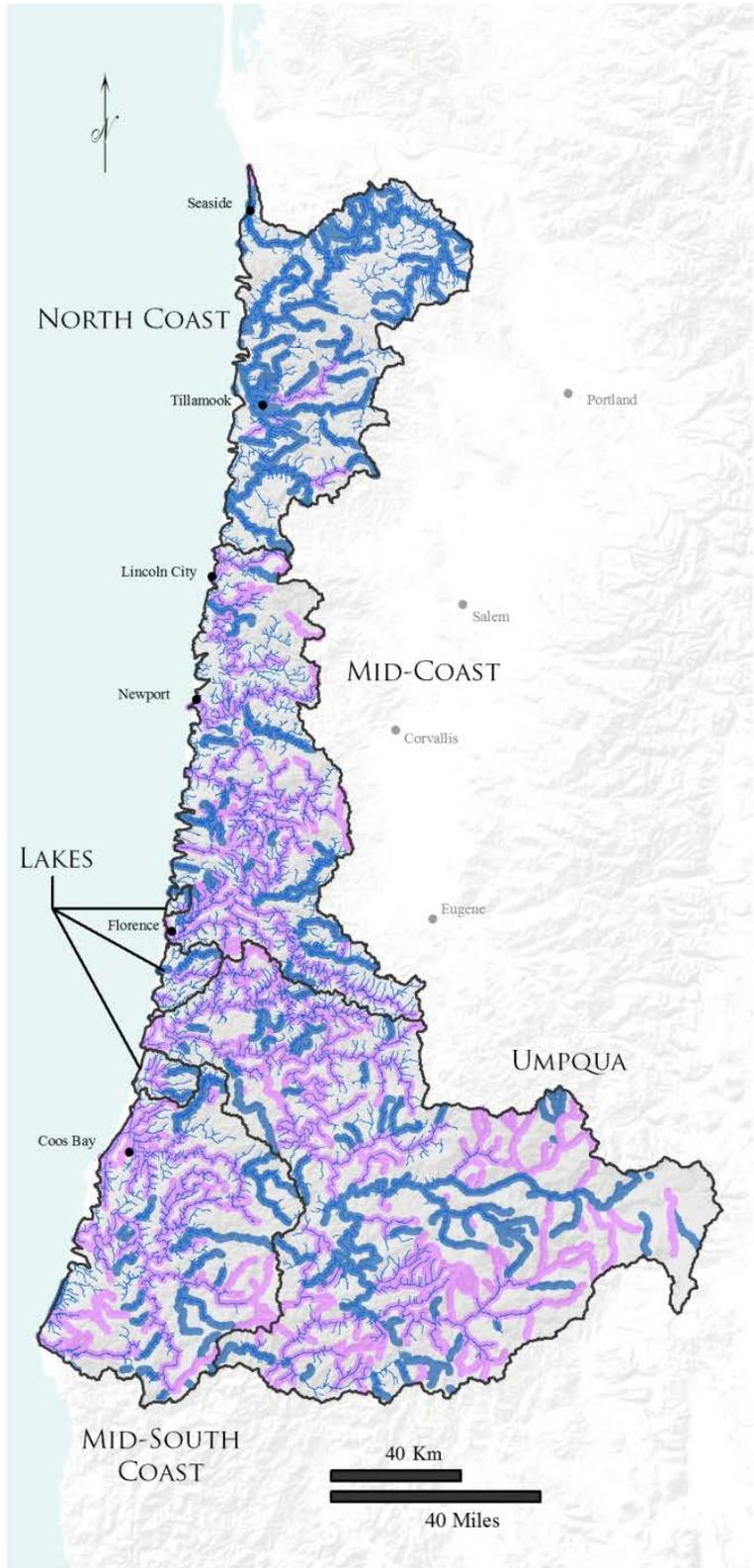
Hatchery Facility	Stream or River Adjacent to Hatchery Facility	Compliant with NPDES Permit	Discharges Effluent into a 303(d) Listed Water Body	Impaired Parameters	Cause of Impairment
Cole Rivers Hatchery	Rogue River	Yes	No	None	None
Indian Hatchery	Indian Creek	N/A	Yes	Temperature	Timber harvest – loss of riparian
Elk Hatchery	Elk River	Yes	Yes	Temperature	Timber harvest – loss of riparian habitat
Bandon Hatchery	Ferry Creek	Yes	Yes	Fecal coliform	Livestock, residential development
Rock Hatchery	Rock Creek,	Yes	Yes	Temperature, sedimentation	Timber harvest – loss of riparian, roads
Alsea Hatchery	North Fork Alsea River	Yes	Yes	Temperature	Timber harvest – loss of riparian habitat, stream widening
Salmon Hatchery	Salmon River	Yes	Yes	Temperature, dissolved oxygen, fecal coliform	Timber harvest, livestock
Cedar Hatchery	Cedar Creek	Yes	Yes	Biological criteria	Anthropogenic impacts on aquatic communities (primarily macroinvertebrates)
Trask Hatchery	Gold Creek	Yes	Yes	Temperature	Timber harvest – loss of riparian, stream widening
Nehalem Hatchery	North Fork Nehalem River	Yes	Yes	Temperature	Timber harvest – loss of riparian, stream widening
Oregon Hatchery Research Center	Fall Creek	Yes	Yes	Temperature	Timber harvest– loss of riparian, stream widening

5 Source: ODEQ (2013).

6 N/A = Not applicable because the facility is not required to have an NPDES permit because the facility  
 7 releases less than 20,000 pounds of fish per year or feeds fish less than 5,000 pounds of fish feed per year.

8

9



### 303(d) Impaired Waters of the OCCS ESU

- Biogeographic strata
  - Coho 24k distribution
  - Impaired waters (2004-2006)
  - Category 5
  - Category 4
- Category 5 - Impaired by one or more pollutants - needs TMDL (303(d) List)
- Category 4 - Impaired - does not need TMDL (TMDL approved or impaired by non-pollutant)

Citations:  
 Lawson et al. 2007,  
 Oregon Department of  
 Environmental Quality 2007, and  
 ODFW 2009.



United States Department of Commerce  
 National Oceanic and Atmospheric Administration  
 National Marine Fisheries Service  
 Northwest Fisheries Science Center

April 2012

This map for reference use only.



1  
 2 Figure 2. EPA 303(d) water-quality-impaired waters for Oregon Coast Coho Salmon ESU. Figure  
 3 taken from Stout et al. (2012).

1 **3.4. Salmon and Steelhead and Their Habitats**

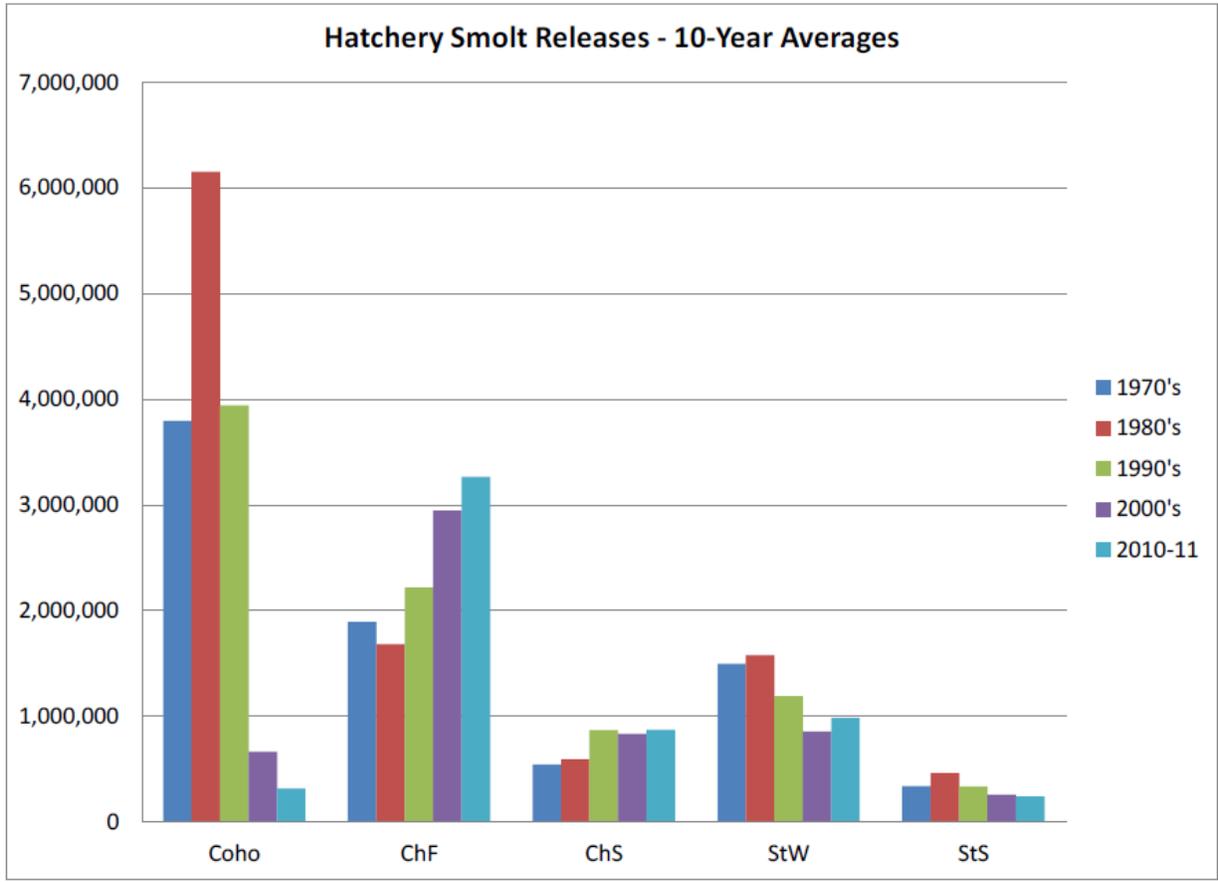
2 This section describes the current status of salmon and steelhead populations throughout the Oregon  
3 Coast Region, past and present hatchery fish releases, current effects of these hatchery programs on  
4 salmon and steelhead, and species-specific information. This information informs the comparison of  
5 alternatives in Chapter 4, Environmental Consequences.

6  
7 Within the Oregon Coast Region, natural populations of coho salmon, Chinook salmon, chum salmon,  
8 and steelhead are present. Coho salmon are the only species listed under the ESA (76 FR 35755, June 20,  
9 2011); and therefore critical habitat is designated only for this species. Chinook salmon, chum salmon,  
10 and steelhead are not protected by the ESA. The specific distribution, abundance, and habitat of each  
11 species are further described below.

12  
13 The past and present releases of hatchery fish from Oregon Coast hatcheries is shown in Figure 3. The  
14 trend in hatchery releases over time varies according to the specific species. Releases of coho salmon,  
15 winter steelhead, and summer steelhead are currently at the lowest release levels over the last four  
16 decades. Fall and spring Chinook salmon hatchery releases are at the highest levels over the last four  
17 decades (Figure 3). The location of hatchery fish releases have varied over time. Most of the hatchery  
18 fish releases occur at the hatchery facilities (Figure 1). The current release locations in the Oregon Coast  
19 ESU are shown in Figure 4. All of the current hatchery facilities (Figure 1) have been in operation for at  
20 least the last 20 years.

21  
22 The period when hatchery fish are released into the wild varies by species and hatchery program (Table 2,  
23 Appendix A). For the Oregon Coast hatchery programs, presently hatchery steelhead are released in  
24 March through April at a size of 4 to 6 fish per pound (7.5 – 8.5 inches in length). Hatchery coho salmon  
25 are released April through June at a size of 10 to 15 fish per pound (5 – 6 inches in length). Hatchery  
26 Chinook salmon are released in later summer through early fall ranging from 100 to 6 fish per pound (3 –  
27 8 inches in length).

28  
29



1  
 2 Figure 3. Smolt releases over the most recent five decades by ODFW from the Elk River to Necanicum  
 3 River (ODFW 2014a). Hatchery fish releases in the Rogue and Chetco Rivers are not included. The  
 4 numbers do not include releases of hatchery coho by private organizations prior to 1993 or unfed fry and  
 5 fingerling life stages.  
 6

7 Table 5. Comparative individual sizes and freshwater occurrence timings for rearing and/or emigrating  
 8 natural-origin salmon and steelhead juveniles by species and life stage, and hatchery-origin fish released  
 9 from Oregon Coast hatchery programs.

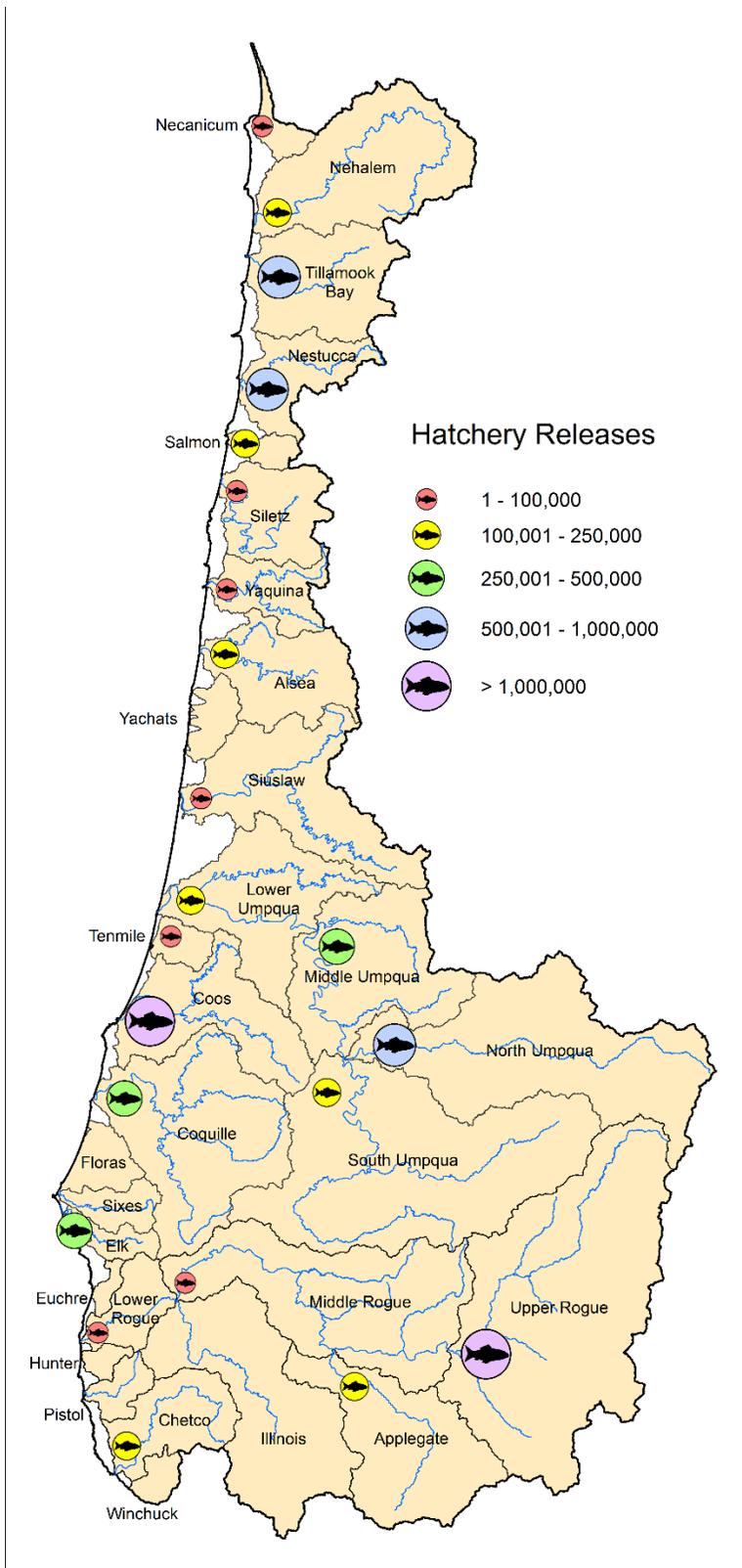
Species/Origin	Life Stage	Individual Size (average fork length (mm) and range)	Occurrence or Release Timing
Chinook salmon (wild)	Fry	40 (35-67)	Mid-February - April
Chinook salmon (wild)	Parr-Subyrlg.	64 (39-95)	May - June
Chinook salmon (wild)	Yearling	103 (78-179)	Mid-March – mid-May
Chinook salmon (hatchery)	Sub-yearling	120 (60 -200)	May - November
Steelhead (wild)	Fry	60 (23-100)	June - Oct.
Steelhead (wild)	Parr	96 (65-131)	Oct.- mid-May

Steelhead (wild)	Smolt	165 (109-215)	Late-April - June
Steelhead (hatchery)	Smolt	195 (180-220)	March - April
Rainbow trout (hatchery)	Fingerling	100 (50-150)	Spring, fall
Rainbow trout (hatchery)	Legal	>200 (200-400)	Spring, summer, fall
Coho (wild)	Fry	30 (29-36)	February - March
Coho (wild)	Parr	56 (37-70)	April - April
Coho (wild)	Yearling	95 (70-150)	May - June
Coho (hatchery)	Yearling	140 (131-156)	May-June
Chum (wild)	Fry	38 (33-50)	March - May

Notes and sources:

- Wild Chinook salmon data from Beamer et al. 2005 (yearling data) and Tulalip Tribes juvenile out-migrant trapping reports for the Skykomish River (average individual fish size, size range, and emigration timing data from Nelson et al. 2003; Nelson and Kelder 2005a; Nelson and Kelder 2005b).
- Wild steelhead individual size data and occurrence estimates from Shapovalov and Taft (1954) and WDFW juvenile out-migrant trapping reports (Volkhardt et al., 2006a, 2006b; Kinsel et al., 2007).
- Wild coho data for Skykomish River from Nelson and Kelder 2005b (smolts); Beachum and Murray 1990 and Sandcock (1991) (fry); parr size range extrapolated from smolt and fry data considering year-round residence.
- Wild chum data from Volkhardt et al. 2006a (Green River fall-run), and Tynan 2007 (Hood Canal summer-run).
- Hatchery-origin fish release size and timing data are average individual fish size and standard release timing targets as cited in ODFW’s Hatchery Operation Plans for 2012 and submitted HGMPs. See Table 2 in Appendix A for specific details.

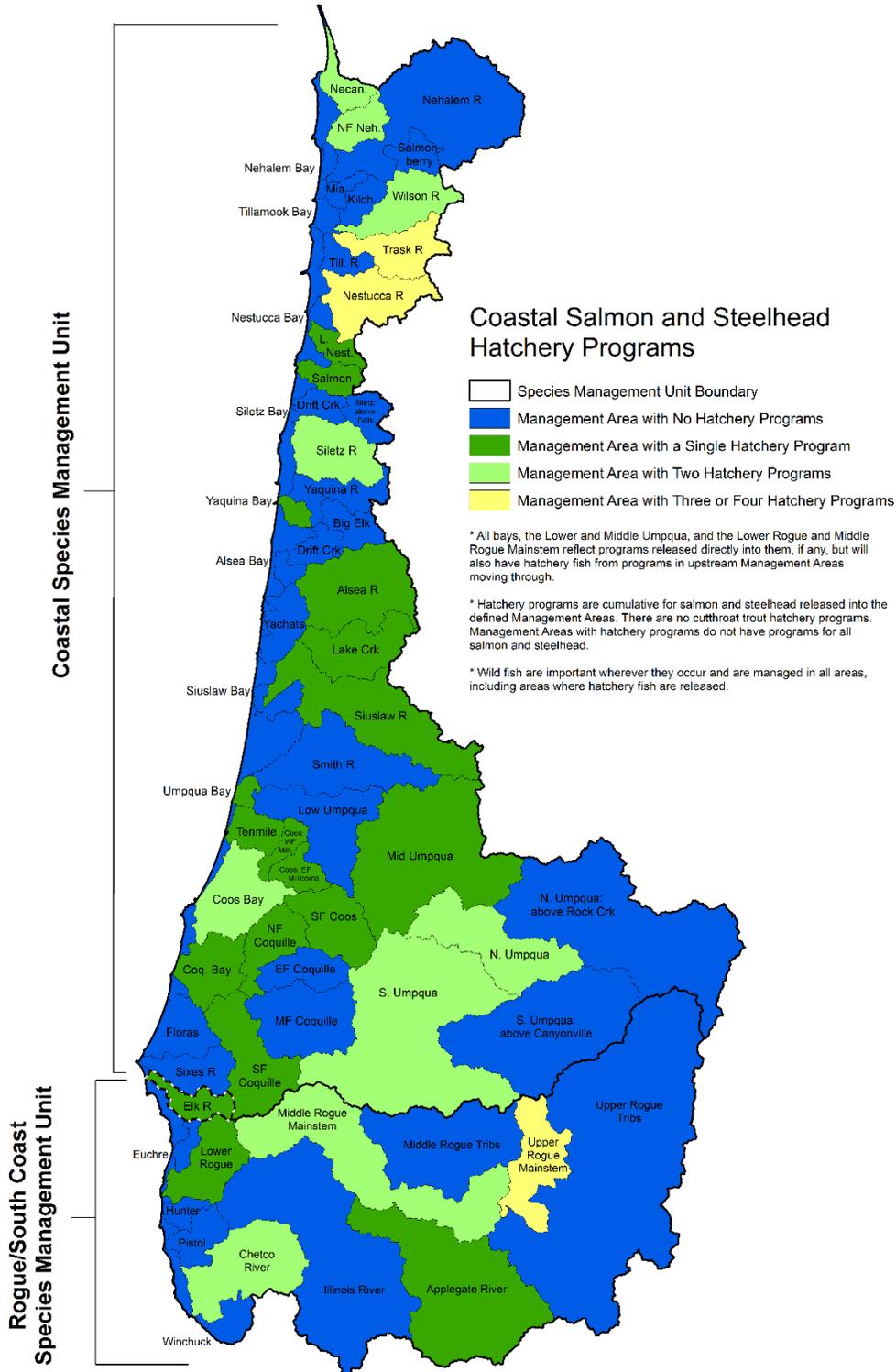
This section describes the current status of salmon and steelhead populations throughout the Oregon Coast Region, past and present hatchery fish releases, current effects of these hatchery programs on salmon and steelhead, and species-specific information. This information informs the comparison of alternatives in Chapter 4, Environmental Consequences.



1

2 Figure 4. Location and size of hatchery programs within the Oregon Coast Region. Taken from  
 3 ODFW (2014a).

1



2

3

4

5

Figure 5. Map showing salmon and steelhead population areas with and without hatchery programs within the Oregon Coast Region. Taken from ODFW (2014a).

1 The existing hatchery programs along the Oregon Coast affect natural-origin salmon and steelhead and  
2 their habitat. Operation of the hatchery facilities and release of hatchery fish into the natural environment  
3 has affected natural-origin salmon and steelhead through genetic introgression of hatchery fish into the  
4 natural population, increased competition and predation from hatchery fish, transfer of pathogens from  
5 hatchery fish and/or the hatchery facility to the adjacent river or stream, operation of the hatchery facility  
6 using water and discharging effluent, masking of natural population status from having hatchery fish  
7 spawning in the wild, incidental fishing effects, and nutrient input from carcasses (Table 6). The extent of  
8 adverse effects depends on how the hatchery program is managed, the current status of the natural-origin  
9 populations and how affected by the hatchery program, and the condition of the habitat; among other  
10 factors. Hatchery programs can also provide benefits to the natural-origin populations by increasing the  
11 amount of marine-derived nutrients to the freshwater environment from having hatchery fish spawn  
12 naturally and from the outplanting of carcasses from the hatchery facility. Hatchery programs can also  
13 potentially benefit the abundance, productivity, spatial structure, and diversity of natural populations  
14 (McElhany et al. 2000). None of the current hatchery programs within the Oregon Coast Region are  
15 managed for the supplementation or restoration of natural-origin populations. All of the hatchery  
16 programs are managed solely for fishery harvest opportunities.

17  
18 Hatchery fish that spawn in the wild can interbreed with natural-origin fish and affect the genetic integrity  
19 of the natural population (Table 6). Depending upon how the hatchery broodstock has been managed,  
20 hatchery fish that interbreed with natural fish can reduce the fitness of the wild population to varying  
21 degrees from inbreeding and outbreeding depression. The hatchery environment during early rearing of  
22 hatchery fish before release undergo different selection pressures than fish in the wild. This hatchery-  
23 influenced selection (often referred to as domestication) occurs in hatchery fish which can alter the  
24 genetic make-up of the natural-origin population. Consequently, when hatchery fish interbreed in the  
25 wild, genetic changes can occur to the wild population from the hatchery program depending upon the  
26 level of straying and interbreeding.

27  
28 Juvenile and adult hatchery fish can compete with and/or predate upon natural-origin salmon and  
29 steelhead (Table 6). Hatchery fish can be much larger than co-occurring natural-origin fish (Table 5);  
30 making them vulnerable to predation during the period when the hatchery fish emigrate to the ocean.  
31 Hatchery fish can residualize in freshwater and not emigrate to the ocean, which promotes competition  
32 with co-occurring natural fish if resources are limited.

33

1 Hatchery programs can also introduce diseases and pathogens into natural fish populations (Table 6).  
2 However, this is uncommon along the Oregon Coast because the hatchery programs all use salmon and  
3 steelhead from within the region that are naturally exposed to these diseases and pathogens. Hatchery  
4 facilities can result in elevated levels of disease and pathogen downstream of the hatchery facility effluent  
5 discharge. This is commonly caused by higher densities of fish rearing in the hatchery, which results in  
6 greater disease and pathogen levels in the hatchery than under natural conditions. Although poorly  
7 managed hatchery programs can increase disease and pathogen transfer risks, compliance with applicable  
8 protocols for fish health can effectively minimize this risk. The elevated levels of disease and pathogen  
9 are typically concentrated near the hatchery effluent and then are diluted by water as it discharges  
10 downstream. The higher concentration of disease and pathogens associated with hatcheries is typically  
11 localized and short-lived (Bartholomew et al. 2013).

12  
13 The operation of hatchery facilities can affect salmon and steelhead by the withdrawal of water from  
14 adjacent streams and rivers, whereby decreasing the amount of habitat available for natural fish in the  
15 affected reach (Table 6). The discharge of effluent from the hatchery facility can expose natural fish to  
16 elevated levels of bacteria and viruses. Both of these potential effects are described above in Section 3.2,  
17 Water Quantity and Section 3.3, Water Quantity.

18  
19 Hatchery fish can mask the true status of natural populations if straying and spawning by hatchery fish in  
20 the wild is substantial (Table 6). The continual supplementation of natural spawning by hatchery fish  
21 (intentional or unintentional) can increase production and thereby increase uncertainty of the status of the  
22 natural population to sustain itself without hatchery influence. Along the Oregon Coast, most natural  
23 populations currently have low percentage of hatchery fish on the spawning grounds (e.g., 0 to 10  
24 percent). Therefore, managers are able to evaluate the true status of the natural population because  
25 hatchery influence is relatively minor. Two notable exceptions identified by ODFW (2014a) are fall  
26 Chinook salmon hatchery programs in the Salmon and Elk Rivers. Management actions have recently  
27 been taken to reduce hatchery Chinook salmon spawning in these natural populations.

28  
29 Hatchery programs provide fish for fishery harvest opportunities in the ocean and freshwater (Table 6).  
30 Natural-origin salmon and steelhead are affected by these fisheries to some degree. In most cases along  
31 the Oregon Coast, hatchery and natural-origin salmon can be harvested, so it is difficult to precisely  
32 estimate the effects of fishing on hatchery fish. For steelhead, many fisheries along the Oregon Coast  
33 allow only the retention of hatchery steelhead, with all natural-origin steelhead released unharmed. The

- 1 incidental effects of these catch-and-release fisheries on steelhead along the Oregon Coast typically range
- 2 from 0 to 10 percent mortality on natural-origin fish.

1 Table 6. General mechanisms through which hatchery programs can affect natural-origin salmon  
2 and steelhead populations.

Effect Category	Description of Effect
Genetics	<ul style="list-style-type: none"> <li>• Hatchery-origin salmon and steelhead interbreeding with natural-origin fish in the wild can change the genetics of the affected natural population(s).</li> <li>• Hatchery-origin fish can alter the genetic integrity and/or genetic diversity of the affected natural population(s) depending upon the magnitude of interaction.</li> </ul>
Competition and predation	<ul style="list-style-type: none"> <li>• Hatchery-origin fish can increase competition for food and space.</li> <li>• Hatchery-origin fish can increase predation on natural-origin salmon and steelhead.</li> </ul>
Pathogen transfer	<ul style="list-style-type: none"> <li>• Hatchery fish can have elevated levels of pathogens and bacteria from rearing in the hatchery which can be transferred to the natural-origin population from hatchery fish and/or release of hatchery effluent.</li> </ul>
Hatchery facilities	<ul style="list-style-type: none"> <li>• Hatchery facilities can reduce water quantity or quality in adjacent streams through water withdrawal and discharge of effluent.</li> <li>• Hatchery facilities at weirs and dams to collect broodstock and/or control hatchery fish on the spawning grounds can have the following unintentional consequences:               <ul style="list-style-type: none"> <li>○ Isolation of formerly connected populations</li> <li>○ Limiting or slowing movement of migrating fish species, which may enable poaching, increase predation, and/or alter spawn timing and distribution</li> <li>○ Alteration of stream flow</li> <li>○ Alteration of streambed and riparian habitat</li> <li>○ Alteration of the distribution of spawning within a population</li> <li>○ Increased mortality or stress due to capture and handling</li> </ul> </li> <li>• Impingement of downstream migrating fish</li> </ul>
Natural population masking	<ul style="list-style-type: none"> <li>○ Hatchery-origin fish spawning naturally can mask the true status of the natural-origin population from hatchery supplementation.</li> </ul>

Effect Category	Description of Effect
Fishing	<ul style="list-style-type: none"> <li>• Fisheries targeting hatchery-origin fish can have incidental impacts on co-occurring natural-origin fish.</li> </ul>
Population viability benefits	<p>Depending upon the objective of the specific hatchery program, hatchery fish can potentially:</p> <ul style="list-style-type: none"> <li>• Increase the abundance of natural-origin fish from additional natural spawning in the wild.</li> <li>• Increase the productivity of the natural population from hatchery fish spawning and nutrient enhancement, particularly if abundance of natural-origin fish is low.</li> <li>• Preserve and/or increase the genetic and phenotypic diversity of the affected natural population, particularly for severely depressed populations.</li> </ul>
Nutrient cycling benefits	<ul style="list-style-type: none"> <li>• Returning hatchery-origin adults can increase the amount of marine-derived nutrients in freshwater systems from natural spawning and/or outplanting of carcasses from the hatchery.</li> </ul>

1  
2 Hatchery programs may also maintain and/or increase salmonid abundance and productivity, spatial  
3 structure, and diversity (Table 6). However, none of the hatchery programs within the Oregon Coast  
4 Region are managed to provide these benefits to natural populations. Still, natural spawning by hatchery  
5 fish occurs because collection efficiency at the hatchery facilities is not 100 percent and salmon and  
6 steelhead by nature can stray and spawn in the wild. The recent level of hatchery fish spawning in the  
7 wild depends upon the species, run type, and specific population. Further information is provided below  
8 for each species.

9  
10 The current hatchery programs have benefitted natural-origin salmon and steelhead by providing  
11 additional hatchery fish returns to the freshwater ecosystem, thereby enhancing the amount of marine-  
12 derived nutrients available from the decomposed carcasses (Table 6). Marine-derived nutrients are  
13 important to the coastal temperate streams of the Project Area, because streams in those areas tend to be  
14 low in terrestrial nutrients; the return of anadromous fish from the ocean environment acts as a key  
15 mechanism for bringing nutrients into the freshwater ecosystems (Cederholm et al. 1999). The carcasses

1 can provide food for aquatic and terrestrial species via direct consumption. The carcasses can also  
2 decompose with the primary nutrients available in the water and deposited in the sediments which are  
3 then available for primary production by plants and animals. Both of these pathways increase the  
4 productivity of the freshwater environment from salmon and steelhead carcasses.

5  
6 The proposed action includes the benefit of marine-derived nutrients into the freshwater environment  
7 from hatchery fish returns. Hatchery fish that are not harvested or collected at hatchery facilities can  
8 spawn in the wild and contribute marine derived nutrients to the environment. This occurs at low levels  
9 in the natural populations where the hatchery programs exist. In addition, hatchery fish collected at the  
10 facilities in excess of broodstock needs can be outplanted in streams for nutrient enhancement after  
11 routine fish health testing to ensure carcasses are not carrying non-endemic pathogens and diseases, to  
12 avoid elevating the level of risk of diseases and pathogens in the wild. In most years, tens of thousands of  
13 hatchery fish carcasses (spring Chinook, fall Chinook, and coho salmon, and winter and summer  
14 steelhead) are available for outplanting for nutrient enhancement within the Oregon Coast Region. In  
15 2012, more than 16,336 hatchery fish carcasses were outplanted within the Oregon Coast Region (ODFW  
16 2013d). The location of hatchery fish carcass outplantings occurs primarily in the watersheds where the  
17 hatcheries are located (Rogue, Elk, Coquille, Coos, Umpqua, Siuslaw, Alsea, Nestucca, Trask, Nehalem  
18 Rivers; Figure 1). Most of the hatchery carcass outplanting occurs in the smaller tributary areas where  
19 spawning and rearing of resident fish, salmon, and steelhead occurs (ODFW 2013d). Outplanting of  
20 hatchery fish is typically limited by the availability of hatchery staff to conduct the work (and funding)  
21 throughout the year and not limited by the number of hatchery fish carcasses. Based upon the abundance  
22 of hatchery-origin and natural-origin salmon and steelhead returns in the project area (see the specific  
23 species sections below for abundance information), far fewer than 20 percent of naturally spawning  
24 salmon and steelhead in the wild have been hatchery-origin fish (including outplants of hatchery fish  
25 carcasses; Figure 8; ODFW 2014a). More than 80 percent of the marine-derived nutrients available to the  
26 freshwater environment have come from natural-origin salmon and steelhead carcasses in the project area.

27  
28 The Magnuson-Stevens Fishery Conservation and Management Act (MSA) designated Essential Fish  
29 Habitat (EFH) for Pacific salmon, which includes Chinook and coho salmon along the Oregon Coast.  
30 The consultation requirement of section 305(b) of the MSA directs Federal agencies to consult with  
31 NMFS on all actions or proposed actions that may adversely affect EFH. The MSA (section 3) defines  
32 EFH as “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to  
33 maturity. Adverse effects include the direct or indirect physical, chemical, or biological alterations of the  
34 waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other

1 ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on  
2 EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or  
3 EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR  
4 600.810). Section 305(b) also requires NMFS to recommend measures that can be taken by the action  
5 agency to conserve EFH. Chapter 4, Environmental Consequences, evaluates the effects of the  
6 alternatives on EFH. In its evaluation of the HGMPs, NMFS will include analysis of the effects of the  
7 proposed action on EFH. For the purposes of this NEPA analysis, effects on habitat – and, in particular,  
8 designated critical habitat – will include effects on EFH.

9

10 A more detailed discussion of the general effects of hatchery programs on salmon, steelhead, and their  
11 habitat can be found in the Final Environmental Impact Statement to Inform Columbia River Basin  
12 Hatchery Operations and the Funding of Mitchell Act Hatchery Programs (NMFS 2014).

13

14

15

1 **Oregon Coastal Coho Salmon**

2 In the project area, two ESUs for coho salmon exist: Oregon Coast ESU and Southern Oregon/Northern  
3 California Coast ESU (SONCC) (Figure 6). Both of these ESUs are listed as threatened under the ESA  
4 (70 FR 37160, June 28, 2005; 76 FR 35755, June 20, 2011). Cape Blanco (the most westerly point on the  
5 Oregon Coast) is the boundary line between these ESUs. A total of 70 independent and dependent  
6 populations of coho salmon have been identified within the Oregon Coast Region (56 populations for  
7 Oregon Coast ESU and 14 populations on the Oregon side of SONCC ESU; Williams et al. 2006; Stout et  
8 al. 2012). All of the hatchery facilities are located within the larger, independent coho salmon  
9 populations (Figure 1). The coho hatchery programs exist in the independent population areas of the  
10 Nehalem, Tillamook, South Umpqua, and Rogue watersheds.

11  
12 For the Oregon Coast ESU, the abundance of coho salmon has decreased substantially over the last  
13 century (Figure 7; Figure 8; Stout et al. 2012). The lowest escapements on record occurred during the  
14 1990s. Since this time, the abundance of coho salmon has been increasing with escapements ranging  
15 from 66,000 to 356,000 from 2000 to 2012 (ODFW 2013). The most abundant and productive coho  
16 populations occur in the Coquille, Coos, Tenmile, Tahkenitch, and Siltcoos populations (Stout et al.  
17 2012). The most recent status review cited continued concerns regarding poor productivity, degraded  
18 freshwater habitat, and poor overwinter survival in the other populations (Stout et al. 2012). Since most  
19 of the coho salmon hatchery programs have been terminated since ESA listing, hatcheries are no longer a  
20 limiting factor for the ESU (Stout et al. 2012). The hatchery reforms due to ESA-listing in the late 1990s  
21 which substantially curtailed hatchery releases of coho salmon in the Oregon Coast ESU substantially  
22 reduced the impacts of hatchery fish on natural-origin coho salmon populations. Buhle et al. (2009)  
23 evaluated the reduction of hatchery coho salmon releases in the ESU and concluded there was an  
24 approximately 20 percent increase in productivity from the reductions in pHOS. Productivity increased  
25 by another seven percent from the reductions in ecological impacts associated with hatchery coho salmon  
26 smolt releases interacting with natural-origin coho salmon. Therefore, approximately 27 percent of the  
27 improvements to the status of coho salmon in the Oregon Coast ESU could be attributed to the hatchery  
28 reform actions taken since ESA listing (Buhle et al. 2009). The rest of the observed improvements to the  
29 status of natural-origin coho salmon in the ESU were attributed to freshwater habitat capacity and  
30 improved marine survival.

31  
32 The proposed recovery plan for Oregon Coast coho salmon states hatchery programs are currently a  
33 “low” cause of concern (NMFS 2015). ODFW (2005) cited concerns over naturally spawning hatchery

1 coho in the North Umpqua River and Salmon River populations, which resulted in the termination of the  
2 hatchery programs in 2008. Most of the natural populations have no hatchery coho salmon spawning in  
3 the wild (Stout et al. 2012). Hatchery coho salmon are found spawning naturally in the independent  
4 populations (pHOS) where the hatchery programs exist (i.e., Rogue, Cow Creek (South Umpqua), Trask,  
5 and Nehalem Rivers). In 2014, pHOS was less than two percent in the Nehalem and Trask Rivers and  
6 eight percent in the South Umpqua population (ODFW 2016a). The average pHOS from 2009 through  
7 2014 was 1.3 percent for the Oregon Coast ESU (range of zero to five percent per population; ODFW  
8 2016a). The Sixes River and Floras Creek populations (no hatchery coho salmon released) have poor  
9 productivity (ODFW 2005).

10  
11 Designated critical habitat for Oregon Coast coho salmon includes all estuarine areas and river reaches  
12 presently occupied by coho salmon within the boundaries of this ESU (73 FR 7816, February 11, 2008).  
13 Essential features of these habitats include adequate substrate (especially spawning gravel), water quality,  
14 water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and  
15 suitable migration conditions.

16  
17 For the SONCC ESU, the abundance of coho salmon has decreased substantially over the last century.  
18 Recent status information is scarce for the ESU, with the most data available for the Rogue River Basin  
19 (Williams et al. 2011). Recent abundances of coho salmon for populations on the Oregon side of the ESU  
20 have all exhibited downward trends from 2000 to present (NMFS 2011). Populations of coho salmon in  
21 the Rogue River Basin are the most abundant and productive. Only one hatchery coho salmon program  
22 exists in this ESU (Cole Rivers Hatchery on the Rogue River). The incidence of naturally spawning  
23 hatchery coho salmon is always greatest in the populations where the hatchery fish are released. Hatchery  
24 coho salmon spawning naturally in the Rogue River (where hatchery coho salmon are released) has been  
25 less than five percent in recent years (ODFW 2015). All other coho salmon populations in the Oregon  
26 portion of the SONCC ESU are at very low abundance of natural-origin coho salmon and no hatchery  
27 coho salmon have been observed in recent years. Over the last four years, the marine survival of  
28 returning SONCC coho salmon (as indexed by Cole Rivers hatchery stock) has been extremely low and,  
29 consequently, escapements poor (Williams et al. 2011). The most recent status review cited continued  
30 concerns regarding poor productivity and degraded freshwater habitat for all populations (NMFS 2011).

31  
32 Designated critical habitat for SONCC coho salmon includes all estuarine areas and river reaches  
33 presently occupied by coho salmon within the boundaries of this ESU (64 FR 24049, May 5, 1999).  
34 Essential features of these habitats include adequate substrate (especially spawning gravel), water quality,

Section 3 – Affected Environment

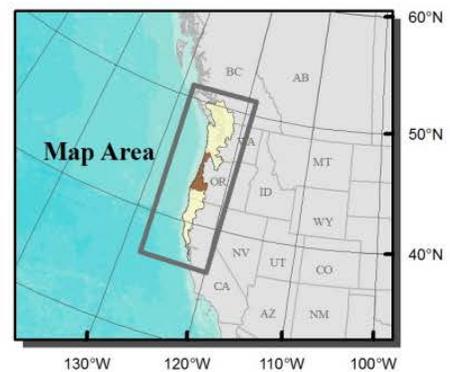
- 1 water quantity, water temperature, water velocity, cover/shelter, food, riparian vegetation, space, and
- 2 suitable migration conditions.



## Coho Salmon ESUs

- Oregon Coast ESU
- Coastal Coho ESU boundary

Citations:  
Weitkamp et al. 1995 and  
Lawson et al. 2007.



United States Department of Commerce  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northwest Fisheries Science Center

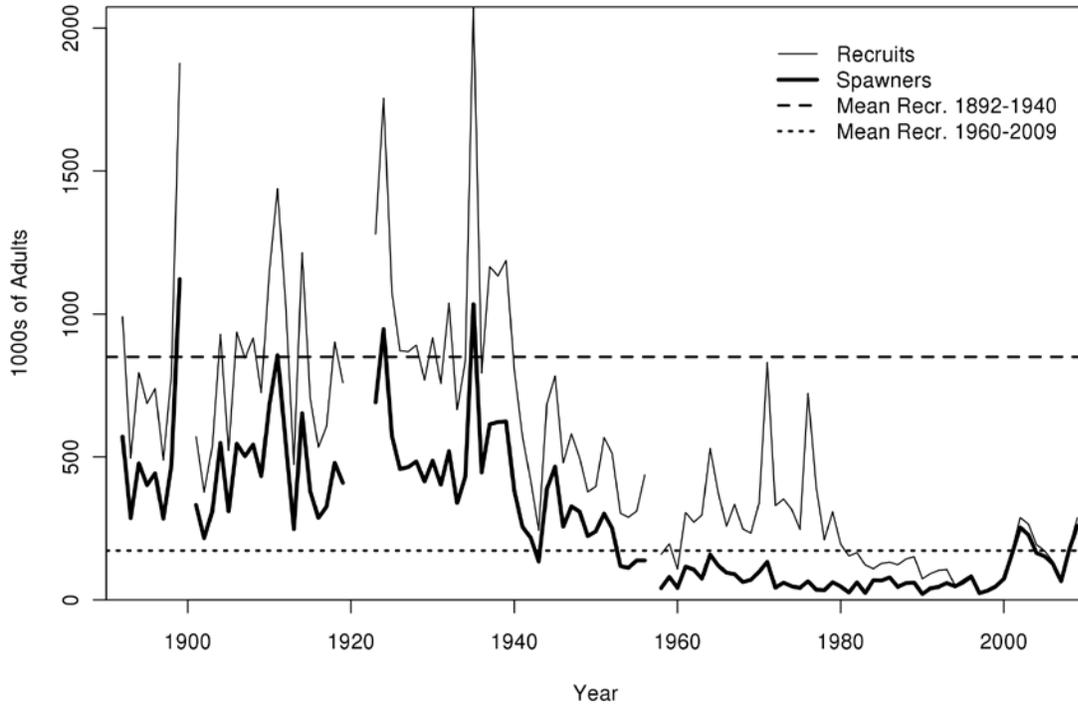
April 2012

This map for reference use only.

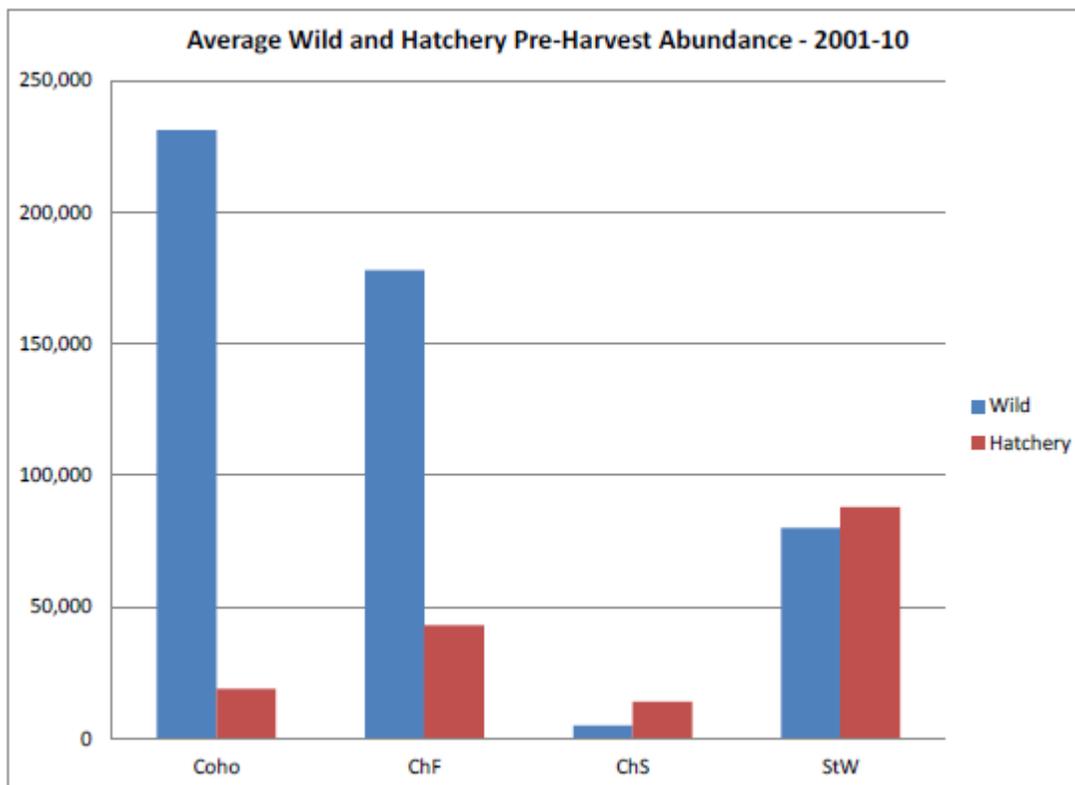


3

1 Figure 6. Map of West Coast coho salmon ESUs, including Oregon Coast and Southern Oregon  
2 Northern California Coast (SONCC). Taken from Stout et al. (2012).  
3  
4



5  
6 Figure 7. Comparison of historical (1892–1956) and recent (1958–2009) estimates of spawner  
7 abundance and preharvest recruits for the Oregon Coast Coho Salmon ESU. Horizontal  
8 lines are the geometric mean recruits for 1892–1940 and 1960–2009. Taken from Stout  
9 et al. (2012).  
10



1  
 2 Figure 8. Estimated pre-harvest abundance of coho salmon, fall Chinook salmon, spring Chinook  
 3 salmon, and winter steelhead from 2001 through 2010. Figure taken from ODFW  
 4 (2014a). These numbers are only for populations in the Oregon Coast ESU (from Elk  
 5 River to Necanicum River inclusive).  
 6

7 **Oregon Coastal Chinook Salmon**

8 Along the Oregon Coast, two ESUs for Chinook salmon are defined: the Oregon Coast ESU and the  
 9 Southern Oregon California Coastal ESU (Myers et al. 1998). Neither of these ESUs is listed under the  
 10 ESA (and no critical habitat has been designated under the ESA). Cape Blanco (in northern Curry  
 11 County) is the boundary line between these ESUs. Within these ESUs, the fall Chinook salmon life  
 12 history type is the most abundant and widespread (Myers et al. 1998). Fall Chinook salmon populations  
 13 occur throughout the entire Oregon Coast Region (ODFW 2014a). Independent populations of spring  
 14 Chinook salmon occur only in the Rogue and Umpqua Basins, which drain the Cascade Mountains.  
 15 Smaller, remnant runs of spring Chinook salmon occasionally occur in the coast range basins of the  
 16 Siletz, Tillamook, Nestucca, Coquille, and Alsea Rivers.

17  
 18 The most recent status assessments of Oregon Coastal Chinook salmon are found in ODFW (2005) and  
 19 ODFW (2014a). These assessments evaluated the Viable Salmonid Population (VSP) parameters of  
 20 abundance, productivity, spatial structure, and diversity (McElhany et al. 2000). ODFW (2014a)

1 classified fall Chinook salmon as “strong” and spring Chinook salmon as “sensitive-vulnerable” in the  
2 Oregon Coast ESU. The abundance and productivity of fall Chinook salmon within the Oregon Coast  
3 Region has been relatively stable over the last several decades (ODFW 2014a). The average abundance  
4 of fall Chinook salmon in the Oregon Coast ESU has been more than 160,000 natural-origin fish over the  
5 last decade. An additional 50,000 to 100,000 natural-origin fall Chinook salmon are typically found in  
6 the populations of southern Oregon (Elk to Chetco).

7  
8 Several populations of Chinook salmon along the Oregon Coast did not achieve ODFW’s benchmark  
9 status criteria (ODFW 2005). Most of the fall Chinook salmon populations have zero hatchery-origin fall  
10 Chinook salmon on the spawning grounds. The highest percentage of hatchery fall Chinook salmon  
11 spawning in the wild recently have been in the Elk and Salmon Rivers. In particular, genetic  
12 introgression of hatchery Chinook salmon was identified as a secondary limiting factor for fall Chinook  
13 salmon in the Elk and Salmon River populations (ODFW 2014a). The percentage of hatchery fall  
14 Chinook salmon on the spawning grounds in the Elk and Salmon Rivers ranges from 50 to 60 percent (K.  
15 Goodson, ODFW, pers. comm., November 4, 2015). For other Chinook salmon populations where  
16 hatchery fall Chinook programs occur (e.g., Chetco and Coos), pHOS is in the range of 10 to 20 percent  
17 (K. Goodson, ODFW, pers. comm., November 4, 2015). For spring Chinook populations, the limited  
18 data shows pHOS is in the range of 50 to 87 percent for years 2005-2008 in the populations with poor  
19 natural production (i.e., Nestucca, Trask, Wilson; Stewart and Suring (2008)) and less than 10 percent  
20 long-term averages for the healthier natural spring Chinook populations (i.e., Rogue and North Umpqua;  
21 ODFW 2016b).

22  
23 The Magnuson-Stevens Fishery Conservation and Management Act (MSA) designated Essential Fish  
24 Habitat (EFH) for Pacific salmon, which includes Chinook salmon along the Oregon Coast. Chapter 4,  
25 Environmental Consequences, includes evaluation of the effects of the alternatives on EFH.

## 26 27 **Oregon Coastal Chum Salmon**

28 Along the Oregon Coast, chum salmon are currently only present along the northern Oregon coast  
29 (ODFW 2014a). These populations are included as part of the Pacific Coast ESU that occurs throughout  
30 the coastlines of Washington and Oregon (Johnson et al. 1997). This ESU is not listed under the ESA  
31 (and no critical habitat has been designated under the ESA). ODFW (2014a) stated chum salmon were  
32 “sensitive-critical”. Poor productivity, low abundance, and reduced spatial distribution were the VSP  
33 parameters of most concern within the existing populations (ODFW 2014a). ODFW (2014a) also stated

1 that the lack of specific information on the runs of chum salmon make status assessments difficult. No  
2 estimates are available on the recent abundance of chum salmon. There are no hatchery chum salmon in  
3 these populations and pHOS is zero.

4  
5 The Magnuson-Stevens Fishery Conservation and Management Act (MSA) designated Essential Fish  
6 Habitat (EFH) for Pacific salmon, which includes chum salmon along the Oregon Coast. Chapter 4,  
7 Environmental Consequences, includes evaluation of the effects of the alternatives on EFH.

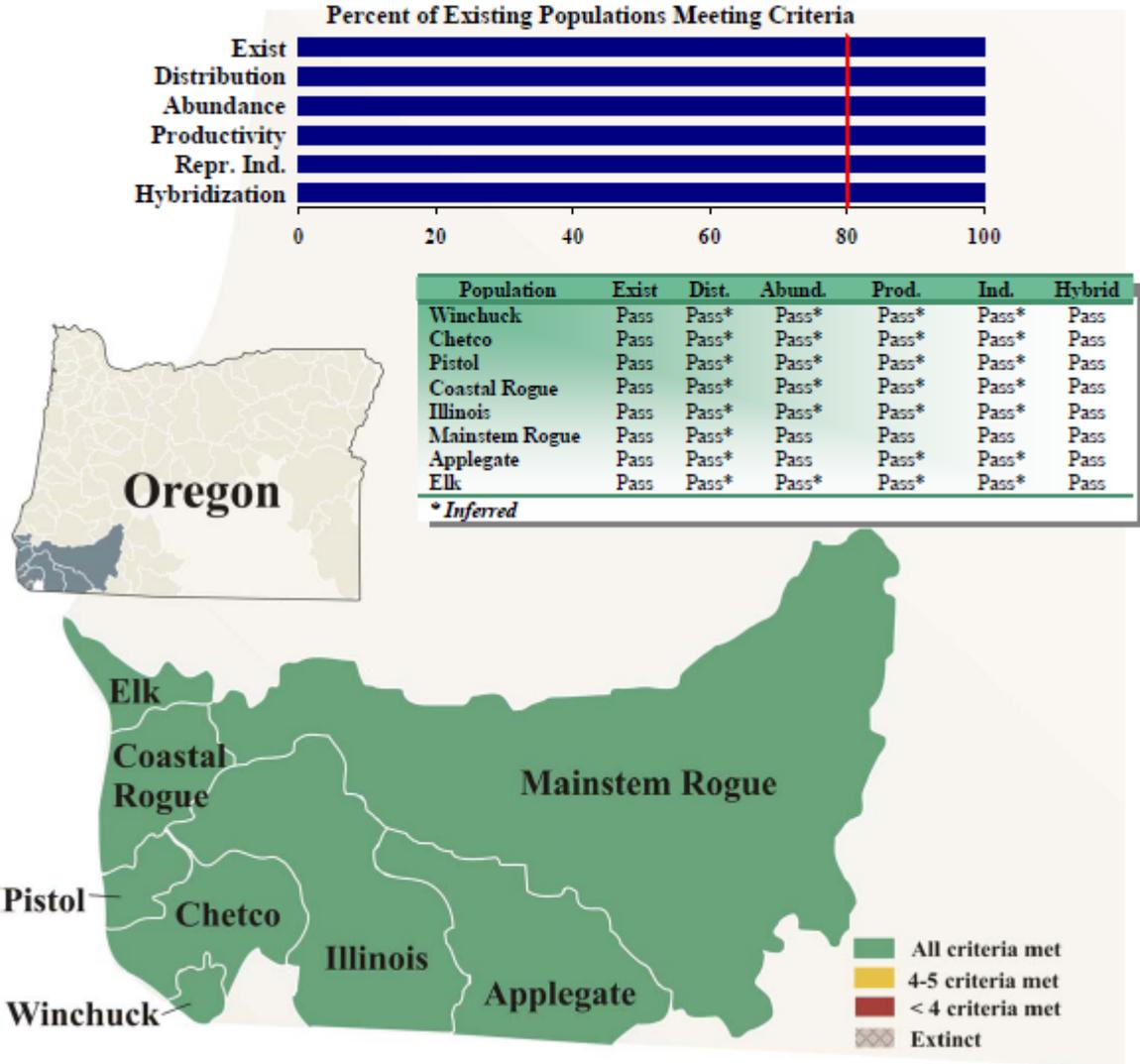
### 8 9 **Oregon Coastal Steelhead**

10 Along the Oregon Coast, two Distinct Population Segments (DPSs) of steelhead exist: Oregon Coast DPS  
11 and Klamath Mountains Province DPS (Busby et al. 1996). Neither of these DPSs is listed under the  
12 ESA (and no critical habitat has been designated under the ESA). Cape Blanco (in northern Curry  
13 County) is the boundary line between these DPSs. ODFW has listed steelhead in the Klamath Mountains  
14 Province as a sensitive species. For the Oregon Coast ESU, ODFW (2014a) described winter steelhead as  
15 “strong guarded” and summer steelhead as “sensitive guarded.” Essential Fish Habitat has not been  
16 defined under the MSA for steelhead.

17  
18 Along the Oregon Coast, both winter and summer runs of steelhead are present. Winter steelhead are  
19 most abundant and occur in every watershed along the Oregon Coast. Every population of winter and  
20 summer steelhead in the Oregon Coast ESU exceeded ODFW (2014a) VSP assessment criteria. The total  
21 abundance of winter steelhead along the Oregon Coast is not known annually, but likely exceeds an  
22 average of 100,000 natural origin fish (including southern Oregon populations; Figure 8; Figure 9). The  
23 percentage of hatchery winter steelhead on the spawning grounds ranges from approximately five percent  
24 in southern Oregon to a high of 22 percent in the mid-coast region of the Oregon Coast (Jacobsen et al.  
25 2015).

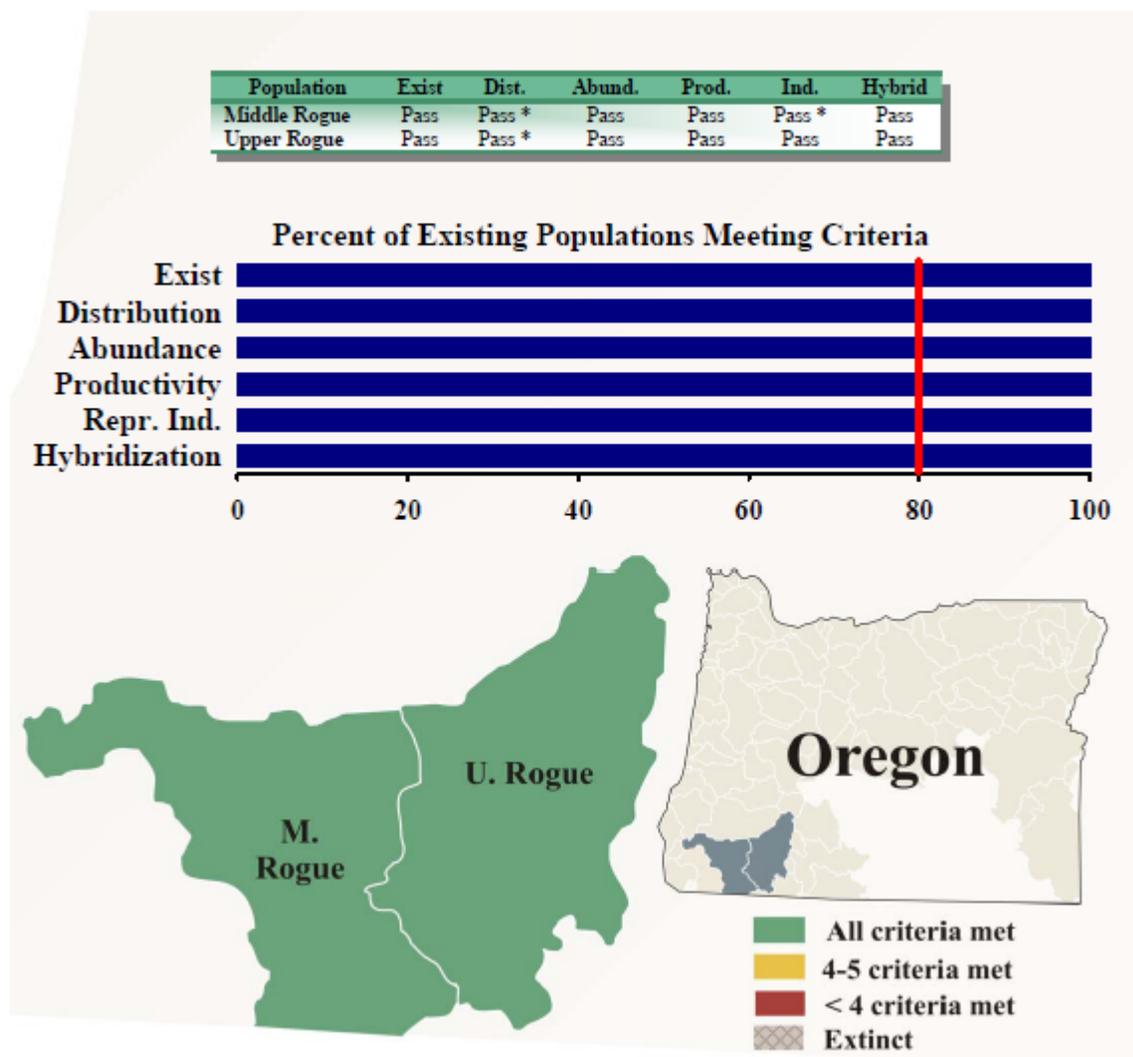
26  
27 The distribution of summer steelhead along the Oregon Coast is limited to the Siletz, North Umpqua, and  
28 Rogue Rivers (ODFW 2005; ODFW 2014a). Natural-origin summer steelhead are not present in other  
29 basins along the Oregon Coast. The average abundance of adult summer steelhead in the three  
30 populations where they occur (Rogue, North Umpqua, and Siletz) likely ranges from 10,000 to 20,000  
31 natural-origin fish. For the Klamath Mountains Province ESU, the Oregon populations were last assessed  
32 in 2005 (Figure 9; Figure 10)(ODFW 2005). The most recent status assessments by ODFW (2005) and  
33 ODFW (2014a) for summer steelhead within the Oregon Coast Region, show the populations exceeding

1 their VSP benchmark criteria (Figure 10). However, due to the lack of recent monitoring, there is some  
 2 uncertainty regarding the genetic and ecological effects of hatchery fish in the populations where they  
 3 occur in the Oregon Coast ESU (ODFW 2014a).  
 4



5  
 6 Figure 9. Southern Oregon Coast winter steelhead population status report. The criteria are  
 7 existence, distribution, abundance, productivity, reproductive independence, and  
 8 hybridization. Figure taken from ODFW (2005).  
 9

10  
 11  
 12  
 13



1  
 2 Figure 10. Rogue River summer steelhead population status report. The criteria are existence,  
 3 distribution, abundance, productivity, reproductive independence, and hybridization.  
 4 Figure taken from ODFW (2005).  
 5

6 **3.5. Other Fish and Their Habitats**

7 This section includes other fish species (not salmon and steelhead) along the Oregon Coast that have a  
 8 relationship with hatchery fish either as prey, predators, or competitors (Table 7). Generally, impacts  
 9 would occur (1) through competition for space or food used by hatchery fish, and other fish in the  
 10 analysis area, or (2) if hatchery fish are prey for other fish species or vice-versa. In the freshwater habitat  
 11 areas of the Oregon Coast Region, all resident fish species may compete with, be predators of, and/or  
 12 serve as prey for hatchery fish depending upon the life stage and time of year (Table 7). In marine areas,

1 juvenile salmon and steelhead are prey for most marine fish species. Sub-adult and adult salmon and  
2 steelhead may prey upon many forage fish such as anchovy, herring, sardine, and smelt.

3  
4 Resident hatchery rainbow trout are stocked into many reservoirs, lakes, and ponds throughout the  
5 Oregon Coast Region. Hatchery trout are stocked as fingerlings and legal-sized fish (>8 inches in length).  
6 No hatchery trout are stocked into free-flowing rivers and streams where anadromous salmon and  
7 steelhead are currently present. The current stocking locations of hatchery trout along the Oregon Coast  
8 is described in ODFW (2014b).

9  
10 In addition to coho salmon, there are two other fish species listed under the ESA within the Oregon Coast  
11 Region. The southern Eulachon DPS and the southern Green Sturgeon DPS are both listed as threatened  
12 under the ESA. Critical habitat has been designated for the southern DPS of Pacific eulachon (76 FR  
13 65324, October 20, 2011). Along the Oregon Coast, only the Umpqua River estuary and lower Tenmile  
14 Creek are designated as eulachon critical habitat. The specific habitat features described are for migration  
15 and spawning of adult eulachon in the tidally influenced areas.

16  
17 The southern Green Sturgeon DPS includes spawning populations south of the Eel River in California.  
18 The only known spawning area occurs in the Sacramento River (74 FR 52300, October 9, 2009).  
19 However, sub-adult and adult green sturgeon may migrate north and be found along the Oregon Coast.  
20 Critical habitat has been designated for the southern DPS of green sturgeon in the estuaries of the Rogue,  
21 Coos, Umpqua, Siuslaw, Alsea, Yaquina, Tillamook, and Nehalem Rivers (74 FR 52300, October 9,  
22 2009). These areas may be used by sub-adult and adult green sturgeon for feeding.

23  
24 Essential fish habitat (EFH) has been described under the MSA for most of the marine groundfish and  
25 pelagic species specified in Table 7. The MSA defines EFH as “those waters and substrate necessary to  
26 fish for spawning, breeding, feeding, or growth to maturity.” This includes aquatic areas and their  
27 associated physical, chemical, and biological properties that are used by fish, and may include areas  
28 historically used by fish. The purpose of EFH is to conserve the habitat required to support a sustainable  
29 fishery and ensure the managed species’ contribute to a healthy ecosystem throughout the full life cycle of  
30 the species.

31  
32 Pacific lamprey, river lamprey, Western Brook lamprey, coastal cutthroat trout, Millicoma dace, and  
33 Umpqua chub are Federal “species of concern” (Table 7). Lamprey and cutthroat trout are widespread  
34 throughout the Oregon Coast Region. Millicoma dace is found exclusively in the Coos Bay Basin.

1 Umpqua chub inhabits the Umpqua River basin. All of these fish species may prey upon certain life  
 2 stages of salmon and steelhead.

3  
 4 In the analysis area, all of the hatchery facilities may intercept and/or attract these fish species because  
 5 water is used during operation. The inlet and outlet water discharge for the 10 hatchery facilities are  
 6 screened to prevent fish from entering the facilities. During collection of returning hatchery salmon and  
 7 steelhead, any other fish species that are incidentally collected are returned back to the river unharmed.  
 8 For other broodstock collection and smolt release locations, the standard protocol is to release all other  
 9 fish unharmed. Rainbow and cutthroat trout, pikeminnow, dace, sculpin, and sucker are the most  
 10 common fish species incidentally captured and released within the Oregon Coast Region. The hatchery  
 11 collection facilities are designed specifically to capture and collect adult salmon and steelhead. Most of  
 12 the non-salmonid species commonly occurring in the Affected Environment are smaller-sized fish and  
 13 thus freely pass through the facilities unimpeded and are not captured. Non-target species typically are  
 14 less than five percent of the total catch.

15

16 Table 7. Range and status of other fish species that may interact with Oregon Coast salmon  
 17 and steelhead. This is not an exhaustive list of fish species, but includes the fish  
 18 most abundant and widespread in the analysis area.

Species	Range along the Oregon Coast	Federal/State Listing Status	Type of Interaction with Hatchery Fish in Analysis Area
Southern Eulachon	Lower Umpqua, lower Tenmile Creek	Federally listed threatened	<ul style="list-style-type: none"> <li>• Potential prey item for adult salmon and steelhead</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Green sturgeon	Estuaries of the Rogue, Coos, Umpqua, Siuslaw, Alsea, Yaquina, Tillamook, and Nehalem Rivers	Southern DPS Federally listed threatened. Northern DPS Federal species of concern	<ul style="list-style-type: none"> <li>• Predator of juvenile and adult salmon and steelhead.</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
White sturgeon	Estuaries of Nehalem, Tillamook, Nestucca, Salmon, Siletz, Yaquina, Alsea, Siuslaw, Umpqua, Coos, Rogue, Chetco watersheds.	Not listed	<ul style="list-style-type: none"> <li>• Predator of juvenile and adult salmon and steelhead.</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>

Species	Range along the Oregon Coast	Federal/State Listing Status	Type of Interaction with Hatchery Fish in Analysis Area
Pacific, river, and brook lamprey	All accessible reaches within watersheds of the Oregon Coast	Not listed. Pacific lamprey and river lamprey are Federal species of concern. Pacific lamprey are Oregon sensitive species	<ul style="list-style-type: none"> <li>• Potential prey item for adult salmon and steelhead</li> <li>• May compete with salmon and steelhead for food and space</li> <li>• May be a parasite on salmon and steelhead while in marine waters</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Rainbow trout	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• Potential prey item for adult salmon and steelhead</li> <li>• May compete with salmon and steelhead for food and space</li> <li>• May interbreed with steelhead</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Coastal cutthroat trout	All accessible reaches within watersheds of the Oregon Coast	Not listed. Federal species of concern	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• Potential prey item for adult salmon and steelhead</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Millicoma dace	All accessible reaches within watersheds of Coos Bay	Not listed. Federal species of concern	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Umpqua, longnose, speckled dace	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>

Species	Range along the Oregon Coast	Federal/State Listing Status	Type of Interaction with Hatchery Fish in Analysis Area
Redside shiner	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• May compete with salmon and steelhead for food and space</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Sculpin (genus <i>Cottus</i> and <i>Leptocottus spp.</i> )	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Largescale sucker	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead eggs and fry</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Northern pikeminnow	All accessible reaches within watersheds of the Oregon Coast	Not listed	<ul style="list-style-type: none"> <li>• Freshwater predator on salmon and steelhead eggs and juveniles</li> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients</li> </ul>
Umpqua chub	Umpqua River Basin	Not listed. Federal species of concern	<ul style="list-style-type: none"> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Smallmouth bass	Mainstem Umpqua, South Umpqua, Coquille	Non-native species	<ul style="list-style-type: none"> <li>• Freshwater predator of salmon and steelhead</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Largemouth bass	Coastal lakes	Non-native species	<ul style="list-style-type: none"> <li>• Freshwater predator of salmon and steelhead</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Other centrarchids (bluegill, crappie, pumpkinseed)	Coastal lakes	Non-native species	<ul style="list-style-type: none"> <li>• Freshwater predator of salmon and steelhead</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>

Species	Range along the Oregon Coast	Federal/State Listing Status	Type of Interaction with Hatchery Fish in Analysis Area
American shad	Nehalem, Tillamook, Siuslaw, Umpqua, Coquille, Coos, Rogue Rivers	Non-native species	<ul style="list-style-type: none"> <li>• May compete with salmon and steelhead for food</li> <li>• May benefit from additional marine-derived nutrients provided by hatchery-origin fish</li> </ul>
Rockfish (black, blue, lingcod, canary, vermillion, cabezon, yelloweye, greenling)	Rocky reef habitats in estuary and ocean	Not listed	<ul style="list-style-type: none"> <li>• Predators of juvenile salmon and steelhead in saltwater</li> <li>• Limited interaction for food and space due to different habitat preferences</li> </ul>
Flatfish (sole, flounder, skates, halibut)	Sand and gravel habitats in the estuary and ocean	Not listed	<ul style="list-style-type: none"> <li>• Predators of juvenile salmon and steelhead</li> <li>• Limited interaction for food and space due to different habitat preferences</li> </ul>
Forage fish (herring, anchovy, sardine)	Pelagic habitats in the estuary and ocean	Not listed	<ul style="list-style-type: none"> <li>• Prey for juvenile and adult salmon and steelhead</li> <li>• May compete with salmon and steelhead for food during smolt stage</li> </ul>
Sharks	Estuary and nearshore ocean waters	Great white shark under Federal status review for ESA listing.	<ul style="list-style-type: none"> <li>• Predators of adult salmon and steelhead.</li> </ul>

1 Sources: NMFS (2013), ODFW (2005), and USFWS (2013).

2

3 **3.6. Wildlife**

4 Within the analysis area, many species occur and potentially interact with hatchery salmon and steelhead  
5 in freshwater and marine environments within the Oregon Coast Region (Table 8). Many species are  
6 listed under the ESA including: southern resident killer whale, humpback whale, Steller sea lion, northern  
7 spotted owl, snowy plover, and marbled murrelet (Table 8). However, most of these ESA-listed species  
8 do not interact with hatchery salmon and steelhead because of their habitat preferences and distribution.  
9 No interaction is expected to occur between salmon and steelhead and northern spotted owl, gray wolf,  
10 snowy plover, sperm whale, and most sea turtles because they are not likely to be found in the analysis  
11 area or do not feed upon aquatic species (Table 8).

12

13 Steller sea lion, southern resident killer whale, and many birds, reptiles, and small mammals feed on adult  
14 salmon and steelhead or on decomposing carcasses of spawned adult salmon and steelhead (Table 8).

15 Fish are not the only component of the diets of these species, though salmon and steelhead may represent

1 a somewhat larger proportion of the diet during the relatively short period of the year that adult salmon  
2 return to the analysis area to spawn. Most of these species are opportunistic feeders responding to local  
3 prey abundance and exploit a wide range of prey species in their diet throughout the year.  
4

5 Southern resident killer whales reside predominantly in the Strait of Juan de Fuca and Puget Sound  
6 regions during late spring through summer. During this period, these killer whales feed predominantly on  
7 returning Chinook salmon to the region, with selective preference given to consuming the older and  
8 largest Chinook salmon (Hanson et al. 2010). During the fall and winter periods, southern resident killer  
9 whales have been observed outside the Puget Sound Region, ranging from central California to northern  
10 Vancouver Island, Canada (Hilborn et al. 2012). While Chinook salmon still continues to be the preferred  
11 prey species of these killer whales, other marine species such as lingcod, greenling, sole, sablefish, and  
12 squid have also been observed in their diet (NMFS 2014<sup>2</sup>). The limited data available suggest the highest  
13 likelihood of southern resident killer whales being found within the Oregon Coast Region is from late fall  
14 through early spring. The occurrence of killer whales along the Oregon Coast likely varies from year to  
15 year, but known southern resident killer whales have been observed off the Oregon Coast several times  
16 over the last decade. During the period when killer whales are most likely to be present along the Oregon  
17 Coast (late fall through early spring), a mixture of Chinook salmon stocks originating from California to  
18 southeast Alaska have been found off the Oregon Coast (Weitkamp 2009). Therefore, Chinook salmon  
19 potentially consumed by killer whales would not be solely from the Oregon Coast river basins, and only a  
20 small percentage of the total abundance of Chinook salmon would be from the proposed hatchery  
21 programs described herein, based on the abundance of hatchery-origin Chinook salmon relative to total  
22 Chinook salmon. In addition to Chinook salmon, a variety of other salmonids and marine species are also  
23 available for consumption by killer whales along the Oregon Coast.  
24

25 Other marine species such as ESA-listed sea turtles and whales may be found along the Oregon Coast  
26 during certain time periods. However, depending upon the species, their occurrence within the nearshore  
27 area is rare. Most of these species, if present in the analysis area, would not consume salmon and  
28 steelhead directly, but feed upon prey items such as zooplankton and forage fish (Table 8).  
29

30 There are several species of birds that feed on juvenile salmon including Caspian terns and cormorants.  
31 During the spring when salmon and steelhead juvenile outmigrate to the Pacific Ocean, they may be a

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<sup>2</sup> Information available from:

[http://www.westcoast.fisheries.noaa.gov/protected\\_species/marine\\_mammals/killer\\_whale/index.html](http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/killer_whale/index.html). Accessed February 13, 2014.

1 major food source for these bird populations within the Oregon Coast Region. Hatchery-produced fish  
 2 represent approximately 10 percent of the salmon and steelhead available as prey for these birds during  
 3 the spring.

4

5 Finally, fishing in the analysis area has created fishery access points, roads, boat launches, and campsites  
 6 that result in ongoing, but likely minor, habitat disruptions to terrestrial wildlife.

7

8 Table 8. Range and status of wildlife species that may interact with Oregon Coast hatchery salmon  
 9 and steelhead.

Species	Range along the Oregon Coast	Federal Listing Status	Type of Interaction with Salmon and Steelhead in Analysis Area
Snowy plover	Ten discrete locations along Oregon Coast beaches	Threatened	<ul style="list-style-type: none"> <li>No interaction</li> </ul>
Northern spotted owl	Forest habitat Coast Range and Cascade Mountains	Threatened	<ul style="list-style-type: none"> <li>No interaction</li> </ul>
Marbled murrelet	Forest habitat west of crest of Coast Range Mountains (in general)	Threatened	<ul style="list-style-type: none"> <li>Potential predator of juvenile salmon and steelhead in freshwater and saltwater areas</li> <li>May consume similar prey items in the ocean</li> </ul>
Other bird species dependent upon aquatic environment (osprey, heron, cormorant, bald eagle, dipper, gull, Caspian tern, duck, geese)	Throughout region	Not listed	<ul style="list-style-type: none"> <li>Predators of juvenile and adult salmon and steelhead in freshwater and saltwater areas</li> </ul>
Small mammals (river otter, mink, raccoon, beaver, weasel, fisher)	Throughout region. Typically riparian areas	Not listed. Fisher is a candidate species	<ul style="list-style-type: none"> <li>Predators of juvenile and adult salmon and steelhead in freshwater areas</li> </ul>
Grey wolf, Canada lynx	Not currently present	Wolf-endangered. Lynx-threatened	<ul style="list-style-type: none"> <li>Not applicable.</li> </ul>
Southern resident killer whale	Estuary and marine waters along Oregon Coast	Endangered	<ul style="list-style-type: none"> <li>Predator of salmon and steelhead</li> </ul>

Species	Range along the Oregon Coast	Federal Listing Status	Type of Interaction with Salmon and Steelhead in Analysis Area
Eastern DPS Steller sea lion	Estuary and marine waters along Oregon Coast	Threatened	<ul style="list-style-type: none"> <li>• Predator of salmon and steelhead</li> </ul>
Blue whale	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• May consume similar prey items in the ocean</li> </ul>
Fin whale	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• May consume similar prey items in the ocean</li> </ul>
Humpback whale	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• May consume similar prey items in the ocean</li> </ul>
Sperm whale	Not likely to be found along Oregon Coast	Endangered	<ul style="list-style-type: none"> <li>• Possibly occur in similar marine waters (rare)</li> </ul>
Sei whale	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• May consume similar prey items in the ocean</li> </ul>
Other marine mammals (harbor seal, California sea lion)	Coastwide	Not listed	<ul style="list-style-type: none"> <li>• Predator of juvenile and adult salmon and steelhead in freshwater and saltwater areas</li> </ul>
Leatherback sea turtle	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• Possibly occur in similar marine waters (rare)</li> </ul>
Green sea turtle	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• Possibly occur in similar marine waters (rare)</li> </ul>
Olive Ridley sea turtle	Coastwide	Endangered	<ul style="list-style-type: none"> <li>• Possibly occur in similar marine waters (rare)</li> </ul>
Loggerhead sea turtle	Coastwide	Threatened	<ul style="list-style-type: none"> <li>• Possibly occur in similar marine waters (rare)</li> </ul>
Other reptile species dependent upon aquatic environment (e.g., snakes, lizards)	Coastwide	Not Federally listed, although California mountain kingsnake, Northern sagebrush lizard, common kingsnake are species of concern (USFWS 2013)	<ul style="list-style-type: none"> <li>• Predators of juvenile and adult salmon and steelhead in freshwater areas</li> </ul>

Species	Range along the Oregon Coast	Federal Listing Status	Type of Interaction with Salmon and Steelhead in Analysis Area
Amphibians (e.g., tree frog, red-legged frog, western toad, northwestern salamander)	Coastwide	Not Federally listed, although many of these species are species of concern	<ul style="list-style-type: none"> <li>Potential predator of eggs, fry, carcasses in freshwater areas</li> </ul>

1 Sources: NMFS (2013), USFWS (2013), and <http://pages.uoregon.edu/titus/herp/> (accessed April 8,  
2 [2014](#)).

3  
4 **3.7. Socioeconomics**

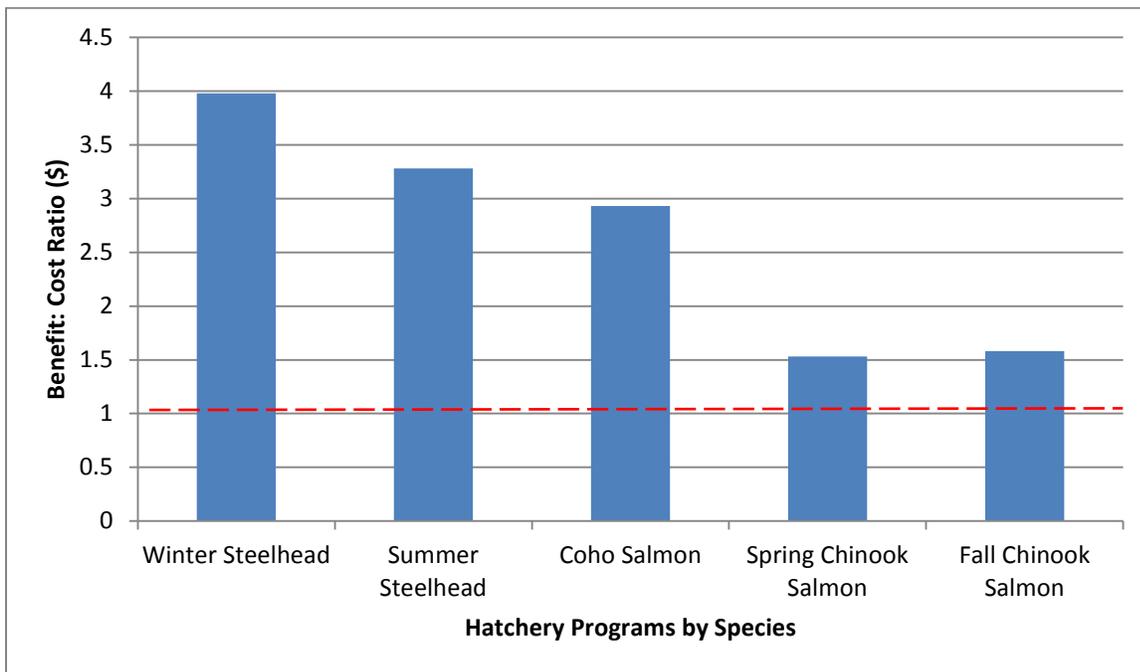
5 Socioeconomics is defined as the study of the relationship between economics and social interactions with  
6 affected regions, communities, and user groups. In addition to providing fish for harvest, hatchery  
7 programs directly affect socioeconomic conditions in the economic impact regions where the hatchery  
8 facilities operate and where hatchery fish are released. Hatchery facilities generate economic activity by  
9 providing employment opportunities and through local procurement of goods and services for hatchery  
10 operations.

11  
12 For the Oregon Coast Region, no studies were found evaluating the economics for all of the 10 hatchery  
13 facilities and programs for this specific region. All of the most recent studies found evaluated a different  
14 geographic region and/or included other fishery-related economic benefits in addition to hatchery fish.  
15 The information reported below is the best available information related to hatchery programs and  
16 associated economic benefits from several different studies.

17  
18 ODFW (2014a) reported most of the angling effort in the bays and rivers of the Oregon Coast ESU  
19 (southern Oregon coast was not part of this survey) in 2012 was focused on fall Chinook salmon and  
20 winter steelhead. Approximately 67 percent of the days fished in this region targeted fall Chinook salmon  
21 and winter steelhead (ODFW 2014a). The remaining time spent fishing focused on coho salmon (12  
22 percent), spring Chinook salmon (7.8 percent), summer steelhead (6.3 percent), cutthroat trout (6.1  
23 percent), and chum salmon (0.9 percent). The Tillamook and Umpqua bay and rivers were the most  
24 popular areas to fish, with 38 percent of the fishing effort occurring in these two areas (ODFW 2014a).

1 Hatchery fish returning to these areas make up an important component of these fisheries (in addition to  
 2 natural origin fish).

3  
 4 ODFW (2010) assessed the economic benefits of Oregon coastal hatcheries (but did not include Cole  
 5 Rivers hatchery, which is the largest facility). All of the Oregon Coastal hatcheries have an economic  
 6 benefit:cost ratio greater than one (ODFW 2010). This means the economic benefit of the hatchery fish  
 7 exceeded the cost of producing the hatchery fish. These estimates were derived using the number of  
 8 hatchery fish harvested and estimated economic expenditures accrued while harvesting hatchery fish after  
 9 subtracting out the costs of producing the hatchery fish. Overall, the winter steelhead hatchery program  
 10 has the greatest benefit – \$3.98 for every dollar invested in hatchery production (Figure 11). The spring  
 11 Chinook salmon programs had the lowest benefits – \$1.53 for every dollar invested in hatchery  
 12 production.



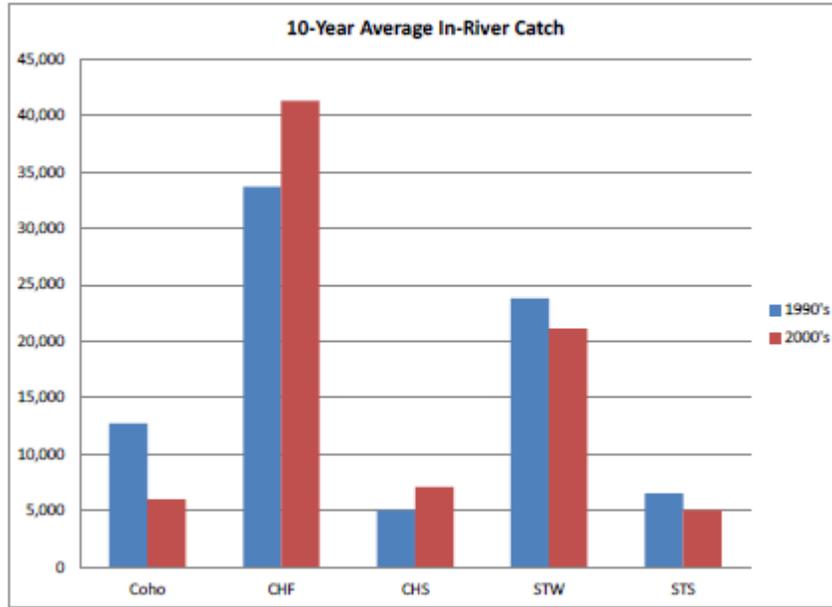
14  
 15 Figure 11. Estimated benefit:cost ratios of Oregon Coast hatcheries (excluding Cole Rivers). Values  
 16 greater than one mean economic benefit exceeds the cost of producing the hatchery fish  
 17 (indicated by dashed line). Values taken from ODFW (2010).  
 18

19 Sport fisheries contribute to local economies through the purchase of supplies such as fishing gear,  
 20 camping equipment, consumables, lodging, and fuel at local businesses. All of these expenditures  
 21 support local businesses while fishing for salmon and steelhead. Along the Oregon Coast, sport anglers  
 22 spend between \$56 to \$97 for every salmon and steelhead caught, respectively (ODFW 2010). In recent

1 years, ODFW (2010) reported more than 44,000 hatchery salmon and steelhead from Oregon Coast  
2 hatcheries (excluding Cole Rivers) were caught in fisheries. Applying the lowest cost estimates, this  
3 catch would equate to more than \$2.5 million generated per year from the harvest of hatchery-origin (i.e.,  
4 not including natural-origin fish) salmon and steelhead from Oregon coastal hatcheries. ODFW (2014a)  
5 estimated the average annual catch from inland fisheries within only the Oregon Coast ESU has been  
6 greater than 70,000 fish annually (natural and hatchery fish; Figure 12). Using the cost expenditure of  
7 \$56 per fish caught would equate to an average annual expenditure of more than \$3.9 million per year. If  
8 the economic benefits of Cole Rivers hatchery fish and rainbow trout production are also included, the  
9 likely economic benefit of the hatchery fish harvested annually from these hatchery programs is in the  
10 range of \$4-\$8 million, using the estimates provided in ODFW (2010).

11  
12 In a separate economic study, The Research Group (2011) reported the economic impact of recreational  
13 fishing on Oregon coastal communities in 2010 to be \$20.6 million from all fisheries in the ocean and  
14 freshwater catching both hatchery-origin and natural-origin salmon and steelhead. These studies provide  
15 the minimum impact of recreational fishing along the Oregon Coast because the analyses did not include  
16 other multiplier effects such as generated local, state, and Federal tax revenue. In another economic study  
17 considering additional economic impacts (such as generated tax revenues from the sale of fishing-related  
18 supplies and equipment, or salaries), ASA (2013) reported the total economic contribution of recreational  
19 fishing for the entire state of Oregon, including the Oregon Coast Region, to be \$2.4 billion (Table 9).  
20 Since the Oregon Coast Region represents an important area for salmon and steelhead fishing in the state  
21 of Oregon and the only region in Oregon for marine fishing, these estimates show recreational fishing  
22 along the Oregon Coast Region to be an important economic contributor in the state of Oregon. No  
23 estimates were found specifically for the Oregon Coast Region from this study.

24



1  
2 Figure 12. In-river catch of coho salmon, fall Chinook salmon (chf), spring Chinook salmon (chs),  
3 winter steelhead (stw) and summer steelhead (sts). Figure taken from ODFW (2014a).  
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Table 9. Economic impact of sportfishing (all types) in the state of Oregon in 2011. Data taken from ASA (2013).

<b>Economic Attribute</b>	<b>Economic impact in the state of Oregon</b>
Retail Sales	\$680,636,132
Total Multiplier or Ripple Effect	\$1,172,481,577
Salaries and Wages	\$382,802,979
Number of Jobs	11,043
Federal Tax Revenues	\$91,781,493
State and Local Tax Revenues	\$72,381,359
<b>Total</b>	<b>\$2,400,094,583</b>

Commercial fisheries also target hatchery and natural origin salmon in the ocean. Along the Oregon Coast, important commercial salmon fishery fleets sail out of the ports of Brookings, Charleston, and Garibaldi, and Winchester, Siuslaw, and Yaquina Bays. These fisheries provide personal income for fishermen, support goods and services in the local communities, create job opportunities in related sectors of the economy, and allow for fish processing plants and transportation services that generate revenue and create jobs for these economies. The Research Group (2006) estimated the landed value of salmon harvested from Oregon Coast ports was more than \$8.7 million dollars in 2003 (the last year available for that report). The highest year on record (1987) from 1970-2003 brought in a landed value of salmon of \$55 million (The Research Group 2006). The Research Group (2011) reported the commercial salmon fishery contributed \$4.0 million in economic benefits from the limited salmon fishery. These estimates include the harvest of both wild and hatchery salmon.

The 10 Oregon Coast hatchery programs directly employ 49 full-time employees (ODFW 2013b). These programs also rely upon volunteers that donate thousands of hours of labor and resource expenditures to help operate the hatchery programs (e.g., collecting and spawning broodstock, feeding juvenile fish). The employees' personal incomes spent in the local economies also provide additional economic benefits.

1 **3.8. Environmental Justice**

2 This section was prepared in compliance with Presidential Executive Order 12898, *Federal Actions to*  
3 *Address Environmental Justice in Minority Populations and Low-Income Populations* (EO 12898), dated  
4 February 11, 1994, and Title VI of the Civil Rights Act of 1964.

5  
6 Executive Order 12898 (59 FR 7629) states that Federal agencies shall identify and address, as  
7 appropriate “...disproportionately high and adverse human health or environmental effects of [their]  
8 programs, policies and activities on minority populations and low-income populations....” While there are  
9 many economic, social, and cultural elements that influence the viability and location of such populations  
10 and their communities, certainly the development, implementation and enforcement of environmental  
11 laws, regulations and policies can have impacts. Therefore, federal agencies, including NMFS, must  
12 ensure fair treatment, equal protection, and meaningful involvement for minority populations and low-  
13 income populations as they develop and apply the laws under their jurisdiction.

14  
15 Both EO 12898 and Title VI address persons belonging to the following target populations:

- 16
- 17 • Minority – all people of the following origins: Black, Asian, American Indian and Alaskan  
18 Native, Native Hawaiian or Other Pacific Islander, and Hispanic.<sup>3</sup>
  - 19 • Low income – persons whose household income is at or below the U.S. Department of Health  
20 and Human Services poverty guidelines.
- 21

22 Definitions of minority and low income areas were established on the basis of the Council on  
23 Environmental Quality’s (CEQ’s) *Environmental Justice Guidance under the National Environmental*  
24 *Policy Act* of December 10, 1997. CEQ’s *Guidance* states that “minority populations should be identified  
25 where either (a) the minority population of the affected area exceeds 50 percent or (b) the population  
26 percentage of the affected area is meaningfully greater than the minority population percentage in the  
27 general population or other appropriate unit of geographical analysis.” The CEQ further adds that “[t]he  
28 selection of the appropriate unit of geographical analysis may be a governing body’s jurisdiction, a  
29 neighborhood, a census tract, or other similar unit that is chosen so as not to artificially dilute or inflate  
30 the affected minority population.”

31

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<sup>3</sup> “Hispanic” is an ethnic and cultural identity and is not the same as race.

1 The CEQ guidelines do not specifically state the percentage considered meaningful in the case of low-  
2 income populations. For this environmental impact statement, the assumptions set forth in the CEQ  
3 guidelines for identifying and evaluating impacts on minority populations are used to identify and  
4 evaluate impacts on low-income populations. More specifically, potential environmental justice impacts  
5 are assumed to occur in an area if the percentage of minority, lower per capita income, and percentage  
6 below poverty level are meaningfully greater than the percentage of minority, lower per capita income,  
7 and percentage below poverty level in the state of Oregon as a whole.

8

9 The 10 hatchery facilities located in the Oregon Coast Region release hatchery coho salmon, Chinook  
10 salmon, and steelhead into coastal rivers, which are located in the counties listed in Table 10. All of the  
11 counties in the analysis area are environmental justice communities of concern because they meaningfully  
12 exceed thresholds for low income or minority populations, with the exception of Jackson and Clatsop  
13 Counties (Table 10). When compared to the statewide average for Oregon, lower income levels and  
14 higher proportion of American Indian/Alaska Natives in the analysis area were the most common  
15 characteristics identified.

16

1 Table 10. Demographic information regarding counties in the analysis area (USCB 2013).

County	Black (percent)	American Indian or Alaska Native (percent)	Hispanic or Latino (percent)	Poverty Rate (percent)	Per Capita Income (dollars)
Curry	0.4	2.0	5.9	14.2	24,190
Josephine	0.5	1.5	6.5	18.8	21,535
Jackson	0.8	1.5	11.2	15.8	24,263
Coos	0.5	2.7	5.6	16.0	21,771
Douglas	0.4	1.9	4.8	16.0	21,440
Lane	1.1	1.3	7.6	17.4	24,105
Benton	1.1	0.9	6.7	21.0	26,370
Lincoln	0.7	3.9	8.1	16.2	24,799
Polk	0.7	2.5	12.4	12.7	24,794
Yamhill	1.1	2.0	15.1	12.8	23,759
Tillamook	0.4	1.3	9.3	17.6	22,709
Clatsop	0.7	1.3	7.8	14.2	25,395
<b>Oregon (statewide average)</b>	<b>2.0</b>	<b>1.8</b>	<b>12.0</b>	<b>14.8</b>	<b>26,561</b>

2 Note: Shaded cells represent values that were meaningfully different (greater than or less than 10 percent) than those of the  
 3 reference population (which is treated here as the state of Oregon average values), making them an environmental justice  
 4 community of concern.

5 Source: <http://quickfacts.census.gov/qfd/states/41000.html>. Data accessed March 12, 2013.

6  
 7 EPA guidance regarding environmental justice extends beyond statistical threshold analyses to consider  
 8 explicit environmental justice effects on Native American tribes (EPA 1998). Federal duties under the  
 9 Environmental Justice Executive Order, the presidential directive on government-to-government  
 10 relations, and the trust responsibility to Indian tribes may merge when the action proposed by another  
 11 federal agency or the EPA potentially affects the natural or physical environment of a tribe. The natural or  
 12 physical environment of a tribe may include resources reserved by treaty or lands held in trust; sites of  
 13 special cultural, religious, or archaeological importance, such as sites protected under the National  
 14 Historic Preservation Act or the Native American Graves Protection and Repatriation Act; and other areas  
 15 reserved for hunting, fishing, and gathering (usual and accustomed, which may include “ceded” lands that

1 are not within reservation boundaries). Potential effects of concern may include ecological, cultural,  
2 human health, economic, or social impacts when those impacts are interrelated to impacts on the natural  
3 or physical environment (EPA 1998).

4

5 Five Native American Tribes are in the analysis area: Cow Creek Band of Umpqua Tribe of Indians;  
6 Coquille Indian Tribe; The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians;  
7 Confederated Tribes of Siletz Indians; and The Confederated Tribes of Grand Ronde. Even though none  
8 of these tribes have established fishery-related treaty rights, fisheries are a potentially important resource  
9 for all of the tribes within the Oregon Coast Region. The Confederated Tribes of Siletz Indians have  
10 demonstrated the most interest in harvesting fall Chinook salmon and coho salmon in the Siletz River,  
11 based upon recent catch information. No other information was found on the occurrence of other Native  
12 American Tribes harvesting salmon and steelhead in the project area in recent years; however, Chinook  
13 salmon may have cultural and economic importance to other tribes in the future.

1 **4. ENVIRONMENTAL CONSEQUENCES**

2 **4.1. Introduction**

3 This section evaluates the potential effects of the three alternatives (including the Proposed Action) on the  
4 biological, physical, and human resources described in Subsection 3, Affected Environment. NMFS has  
5 defined the No-action Alternative (Alternative 1) as the continued operation of the hatchery programs  
6 without ESA authorization (Subsection 2.1, Alternative 1 (No-action): Do Not Approve ODFW’s  
7 HGMPs for Operation of Hatchery Programs on the Oregon Coast). The Proposed Action Alternative  
8 (Alternative 2) is NMFS approval of the HGMPs under limit 5 of the 4(d) Rule. Alternative 3 is the  
9 termination of all existing hatchery programs along the Oregon Coast.

10

11 Where applicable, the relative magnitude of impacts is described using the following terms:

12

- 13 Undetectable: The impact would not be detectable.
- 14 Negligible: The impact would be at the lower levels of detection.
- 15 Low: The impact would be slight, but detectable.
- 16 Medium: The impact would be readily apparent.
- 17 High: The impact would be severe or greatly beneficial.

18

19 In this chapter, there are two general aspects of effects analyzed. First, is the effect from the operation of  
20 the hatchery facility (e.g., Cole Rivers Hatchery) on the affected environment. Second, is the effect from  
21 releasing hatchery fish from a particular program (e.g., Coos fall Chinook program) on the affected  
22 environment. Because of the relatively large number of programs considered here, many of the effects on  
23 resources evaluated in this section lend themselves more readily to either a discussion based on hatchery  
24 facility or discussion based on specific program. To a large extent, it is most appropriate to consider  
25 effects on water quantity (Subsection 4.2, Effects on Water Quantity), water quality (Subsection 4.3,  
26 Effects on Water Quality), wildlife (Subsection 4.6, Effects on Wildlife), and on habitat ( Subsection 4.4,  
27 Effects on Salmon and Steelhead and Their Habitats, and Subsection 4.5, Effects on Other Fish and Their  
28 Habitats) largely in terms of the facilities, since facility operation and other associated structures are the  
29 primary, potential source of impact, though any effects of individual programs on such resources are also  
30 addressed. Conversely, effects that are more the result of interactions of an ecological nature with fish  
31 originating from the proposed programs are the primary focus of the analyses on salmon and steelhead  
32 (Subsection 4.4, Effects on Salmon and Steelhead and Their Habitats) and other fish (Subsection 4.5,  
33 Effects on Other Fish and Their Habitats). Consequently, the analyses also addresses potential effects

1 from individual programs. Effects on socioeconomics (Subsection 4.7, Effects on Socioeconomics), and  
2 environmental justice (Subsection 4.8, Effects on Environmental Justice) would also be expected to  
3 accrue more from the presence and/or exploitation of the proposed fish releases; therefore, analyses of  
4 these resources primarily addresses the effects of the individual programs.

## 6 **4.2. Effects on Water Quantity**

### 7 **4.2.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery** 8 **Programs on the Oregon Coast**

9  
10 Under Alternative 1, the 10 hatchery facilities along the Oregon Coast would continue to operate as  
11 proposed in the submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred  
12 Alternative): Approve ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast);  
13 Appendix A). Consequently, short- and long-term surface water and groundwater use would be the same  
14 as current conditions (no changes are proposed to current hatchery operations). There would be no  
15 change in compliance with water permits or water rights at any of the hatchery facilities under Alternative  
16 1 because the hatchery programs have existing permits and water rights to divert water as proposed in the  
17 submitted HGMPs. An analysis of the site-specific effects under Alternative 1 is provided below.

18  
19 Cole Rivers Hatchery, Bandon Hatchery, Rock Hatchery, Alsea Hatchery, Salmon Hatchery, Cedar  
20 Hatchery, Trask Hatchery, and Oregon Hatchery Research Center use surface water exclusively. All  
21 water diverted from the stream or river (minus evaporation) is returned after it circulates through each  
22 facility, so the only segment of the river that may be impacted by these hatchery facilities would be the  
23 area between the water intake and discharge structures (Subsection 3.2, Water Quantity). Indian  
24 Hatchery, Elk Hatchery, and Nehalem Hatchery are permitted to use both surface and groundwater (Table  
25 11). However, most of the water used is surface water because the groundwater water rights are low  
26 (0.06 to 2.2 cfs) (Table 11).

#### 27 28 **4.2.1.1 Amount of Water Used**

29 Under Alternative 1, all of the hatchery facilities would continue to operate, and between 3 and 224 cfs of  
30 water could be used (by permitted water rights) from rivers, streams, and reservoirs between the water  
31 intake and discharge structures at the specific hatchery location (Table 11).

32  
33 For the Oregon Coast Region, streamflows from August through October are typically the lowest  
34 throughout the year. During this period of low streamflow, if the hatchery facility uses water up to the

1 full water right this could result in low streamflows in the area affected by the hatchery’s water  
2 withdrawal (the area affected is described below). For each hatchery facility, the actual water use by the  
3 facility was assessed for the time period of lowest streamflows in the stream or river where the hatchery  
4 facility is located (ODFW 2013e). Streamflow information is available for every location except  
5 Nehalem Hatchery, Cedar Hatchery, and Indian Hatchery (Table 2).

6  
7 Water use by the hatchery facilities during the minimum mean monthly surface flows ranges from zero to  
8 120 cfs (Table 2). The percentage of streamflow affected during the lowest streamflows is reported in  
9 Table 9. Indian Hatchery is not in operation during the low streamflow period of August through October  
10 and, thus does not use any water then. The greatest use is for Cole Rivers Hatchery, where 120 cfs is used  
11 in October during the lowest flows of the Rogue River. However, at Cole Rivers Hatchery, no diversion  
12 occurs. The water is piped directly to the hatchery from within Lost Creek reservoir. Bandon Hatchery  
13 uses the full water right of three cfs during the lowest streamflows in September, which represents the  
14 entire streamflow of Ferry and Geiger Creeks. However, Bandon Hatchery is located directly below the  
15 reservoirs, and water flows from the dam, through the hatchery, and then continues downstream. There is  
16 no passage at these dams, so adverse impacts on fish migration from water use at Bandon Hatchery would  
17 be negligible under Alternative 1.

18  
19 For the remaining hatchery facilities, the percent of the adjacent stream or river diverted during low  
20 streamflows ranges from four to 39 percent (Table 9). The hatchery facilities would not completely  
21 dewater the adjacent stream or river nor inhibit rearing and migration of any fish species. Therefore,  
22 under Alternative 1, if hatchery operations continue as proposed, there would continue to be negligible  
23 adverse impact from water withdrawal for the operation of the hatchery facilities (Table 9). The length of  
24 stream affected by the water diversion at the hatchery facilities is described below.

#### 25 26 **4.2.1.2 Length of Stream Affected by Water Use**

27 Under Alternative 1, the length of stream or river impacted from having the water withdrawn for hatchery  
28 purposes would range from 100 to 5,943 feet in length (Table 2). This length of stream or river is the  
29 distance between the intake and outlet of the hatchery facility (the length of water diversion for hatchery  
30 purposes). The percent of stream habitat affected by the hatchery facilities water withdrawal within the  
31 watershed would range from zero to 0.23 percent of the total critical habitat designated for coho salmon  
32 within each watershed (Table 9). Thus, the amount of stream habitat affected by the hatchery facilities

1 use of water before getting returned back to the stream or river under Alternative 1 would be low and only  
2 adversely affect the stream around the localized area of the hatchery.

3

4 It is important to describe the specific circumstances associated with Cole Rivers Hatchery on the Rogue  
5 River because this hatchery has the longest distance between diversion and discharge (Table 2 and Table  
6 9). Cole Rivers Hatchery is located at the base of Lost Creek Reservoir Dam (an impassable federal  
7 dam). Water for the hatchery is piped directly from within the reservoir to the hatchery facility (5,943  
8 feet in length), and so no diversion occurs from the free-flowing portion of the Rogue River. The  
9 hatchery facility decreases the amount of water within Lost Creek reservoir. This effect is negligible  
10 considering the amount of water storage within the reservoir and use by the hatchery facility. The  
11 hatchery effluent is discharged into the Rogue River below the hatchery, which increases the river's  
12 discharge below the hatchery. The continued effects associated with water withdrawal from the reservoir  
13 to Cole Rivers Hatchery would be low (beneficial) and localized under Alternative 1.

1

2 Table 11. Water use (cubic feet per second [cfs]) by hatchery facility and alternative.

Hatchery Facility	Alternative 1 (No-action)		Alternative 2 (Proposed Action)		Alternative 3 (Terminate hatchery programs)		Alternative 4 (Reduced Hatchery Production)		Maximum Percentage of Surface Water Diverted Under Alternatives 1,2,4 (percent) <sup>1</sup>	Percent of stream miles <sup>3</sup> affected by the hatchery's water withdrawal (percent)
	Surface <sup>1</sup>	Ground <sup>1</sup>	Surface <sup>1</sup>	Ground <sup>1</sup>	Surface	Ground	Surface	Ground		
Cole Rivers Hatchery	224	0	224	0	0	0	112	0	0 (from reservoir)	0
Indian Hatchery	1.75	0.06	1.75	0.06	0	0	0.875	0.03	Unknown	0.002
Elk Hatchery	20	0.7	20	0.7	0	0	10	0.35	36	0.1
Bandon Hatchery	3	0	3	0	0	0	1.5	0	100 <sup>1</sup>	0.05
Rock Hatchery	55	0	55	0	0	0	27.5	0	4	0.01
Alsea Hatchery	47	0	47	0	0	0	23.5	0	39	0.05
Salmon Hatchery	30	0	30	0	0	0	15	0	24	0.23
Cedar Hatchery	116	0	116	0	0	0	58	0	Unknown	0.07
Trask Hatchery	19	0	19	0	0	0	9.5	0	6	0.11
Nehalem Hatchery	21	2.2	21	2.2	0	0	10.5	1.1	Unknown	0.007
Oregon Hatchery Research Center <sup>2</sup>	20 <sup>3</sup>	0	20 <sup>3</sup>	0	0	0	10	0	Varies depending upon research	0.08

3 Source: HGMPs (see Appendix 1 for citations), United States Geological Survey data sets

4 (<http://waterdata.usgs.gov>), [http://streamflow.engr.oregonstate.edu/links/gages\\_mainx.htm](http://streamflow.engr.oregonstate.edu/links/gages_mainx.htm)

1 <sup>1</sup> This calculation is the actual surface water use by the hatchery facility (column 6 of Table 2 in Section 3.2, Water  
2 Quantity) divided by the minimum mean surface water flows during lowest annual streamflows (column 5 of  
3 Table 2 in Section 3.2, Water Quantity). Bandon Hatchery is reported to use 100 percent of surface water.  
4 However, the hatchery is located at the base of Geiger and Ferry Dams where water flows from the dam directly  
5 through hatchery raceways immediately downstream (no water is diverted out of the stream).

6 <sup>2</sup> The Oregon Hatchery Research Center only uses water when needed for research purposes. If no research is being  
7 conducted, then water is not used.

8 <sup>3</sup> This metric is calculated as the total stream miles of designated critical habitat for coho salmon in the population  
9 area where the hatchery facility is located for the Oregon Coast ESU (NMFS 2007). For the hatchery facilities in  
10 the SONCC ESU (Cole Rivers, Indian, Elk), where the total miles of designated critical habitat was not available  
11 for the population area, the number of stream miles for coho salmon distribution from the StreamNet database  
12 (streamnet.org) was used.

#### 14 **4.2.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for** 15 **Operation of Hatchery Programs on the Oregon Coast**

16  
17 Under Alternative 2, the 10 hatchery facilities along the Oregon Coast would operate as proposed in the  
18 submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative): Approve  
19 ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast; Appendix A). Short- and  
20 long-term surface water and groundwater use would be the same under Alternative 2 as described under  
21 Alternative 1 (No-Action). There would be no change in compliance with water permits or water rights at  
22 any of the hatchery facilities under Alternative 2 because the hatchery programs have existing permits and  
23 water rights to divert water as proposed in the submitted HGMPs. The analysis of the site-specific effects  
24 under Alternative 2 would be identical to effects analyzed under Alternative 1 (which result in negligible  
25 adverse impacts from water withdrawals at the hatcheries).

#### 27 **4.2.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

28 Under Alternative 3, operation of the 10 hatchery facilities along the Oregon Coast would be terminated  
29 (Subsection 2.3, Alternative 3: Terminate Hatchery Programs on the Oregon Coast). The hatchery  
30 facilities would no longer use water for operations throughout the year. An analysis of the site-specific  
31 effects of Alternative 3 is provided below. All effects of Alternative 3 would occur within a limited  
32 geographic extent (primarily localized to the area of the given facility or structure).

33  
34 Cole Rivers Hatchery, Bandon Hatchery, Rock Hatchery, Alsea Hatchery, Salmon Hatchery, Cedar  
35 Hatchery, Trask Hatchery, and Oregon Hatchery Research Center use surface water exclusively. Indian,

1 Elk, and Nehalem hatcheries use both surface and groundwater throughout the year. However, surface  
2 water represents the majority of water used, given that the facilities' groundwater water rights are limited  
3 (Table 11). An assessment of the effects on surface water by the hatchery facilities is provided below,  
4 with particular comparison to the No-action Alternative 1.  
5

#### 6 **4.2.3.1. Amount of Water Used**

7 Under Alternative 3, all of the hatchery facilities would be closed and no hatchery fish would be  
8 propagated and released. In comparison to the No-action Alternative 1, between 3 and 224 cfs of water  
9 would not be used by the hatchery facility and would remain in the stream or river between the water  
10 intake and discharge structures at the specific hatchery location (Table 11). Alternative 3 would provide a  
11 negligible beneficial impact on water quantity compared to Alternative 1.  
12

13 For the Oregon Coast Region, streamflows from August through October are typically the lowest  
14 throughout the year. During this period of low streamflow, the hatchery facility would not use any water  
15 under Alternative 3. The natural low flow conditions during this period would not be affected by the  
16 hatchery facilities. For each hatchery facility, the actual water use by the facility was assessed for the  
17 time period of lowest streamflows in the stream or river where the hatchery facility is located (ODFW  
18 2013e). Streamflow information is available for every location except Nehalem Hatchery, Cedar  
19 Hatchery, and Indian Hatchery (Table 2). Alternative 3 would provide a negligible benefit compared to  
20 the No-action Alternative 1 from not using water from the adjacent stream reach during the low  
21 streamflow months of the year.  
22

23 Compared to the No-action Alternative 1, an additional zero to 120 cfs of water would not be used by the  
24 hatchery facilities and therefore remain in the stream or river (Table 2). The percentage of streamflow  
25 affected during the lowest streamflows is reported in Table 9. Indian Hatchery is not in operation during  
26 the low streamflow period of August through October and thus does not use any water then and impacts  
27 under Alternative 3 would be the same as Alternative 1. The greatest use is for Cole Rivers Hatchery,  
28 where 120 cfs is used in October during the lowest flows of the Rogue River. However, at Cole Rivers  
29 Hatchery, no diversion occurs. The water is piped directly to the hatchery from within Lost Creek  
30 reservoir. Therefore, Alternative 3 would have a negligible adverse impact compared to Alternative 1 by  
31 not having the additional water from the reservoir discharged below the hatchery into the Rogue River.  
32 Bandon Hatchery uses the full water right of three cfs during the lowest streamflows in September, which  
33 represents the entire streamflow of Ferry and Geiger Creeks. However, Bandon Hatchery is located

1 directly below the reservoirs, and water flows from the dam, through the hatchery, and then continues  
2 downstream. There is no passage at these dams, so the beneficial effects of not using water at Bandon  
3 Hatchery under Alternative 3 would be undetectable compared to Alternative 1.

4  
5 For the remaining hatchery facilities, the percent of the adjacent stream or river that would remain in the  
6 river or stream under Alternative 3 and not be diverted into the hatchery facilities ranges from 4 to 39  
7 percent of the streamflow (Table 9). Alternative 3 would provide a negligible beneficial effect compared  
8 to Alternative 1 at these hatchery facilities because the majority of the streamflow remains in the stream  
9 or river from the hatchery intake to hatchery discharge location (Table 9). The length of stream affected  
10 by the water diversion at the hatchery facilities is described below.

#### 11 12 **4.2.3.2. Length of Stream Affected by Water Use**

13 Under Alternative 3 no water would be used by the hatchery facilities and therefore the stream or river  
14 from point of water intake to discharge would no longer be affected compared to Alternative 1. The  
15 length of stream or river that would no longer be impacted (compared to Alternative 1) ranges from 100  
16 to 5,943 feet in length (Table 2). The percent of stream habitat affected by the hatchery facilities not  
17 withdrawing water under Alternative 3 would range from zero to 0.23 percent of the total critical habitat  
18 designated for coho salmon within each watershed (Table 9). Thus, the amount of stream habitat affected  
19 by the hatchery facilities use of water before getting returned back to the stream or river under Alternative  
20 3 would be negligible, beneficial, and localized compared to Alternative 1.

21  
22 The longest hatchery water diversion is Cole Rivers Hatchery on the Rogue River. Even though it would  
23 seem Alternative 3 would provide some benefit to the Rogue River compared to Alternative 1 by not  
24 using water for the hatchery, the specific circumstances associated with Cole Rivers Hatchery on the  
25 Rogue River make the effects of Alternative 3 the same as Alternative 1 (which is a negligible adverse  
26 impact). Cole Rivers Hatchery is located at the base of Lost Creek Reservoir Dam (an impassable federal  
27 dam). Water for the hatchery is piped directly from within the reservoir to the hatchery facility (5,943  
28 feet in length), and so no diversion occurs from the free-flowing portion of the Rogue River. That is,  
29 there is no detectable effect on the amount of water released from the dam as a result of hatchery  
30 operations.

1 **4.2.4. Alternative 4 – Reduced Hatchery Production**

2 Under Alternative 4, hatchery production would be reduced at the 10 hatchery facilities along the Oregon  
3 Coast by 50 percent compared to the No-action Alternative. The hatchery facilities would still use water  
4 for operations throughout the year, but the quantity would be 50 percent less. An analysis of the site-  
5 specific effects of Alternative 4 is provided below. All effects of Alternative 4 would occur within a  
6 limited geographic extent (primarily localized to the area of the given facility or structure).

7  
8 Cole Rivers Hatchery, Bandon Hatchery, Rock Hatchery, Alsea Hatchery, Salmon Hatchery, Cedar  
9 Hatchery, Trask Hatchery, and Oregon Hatchery Research Center use surface water exclusively. Indian,  
10 Elk, and Nehalem hatcheries use both surface and groundwater throughout the year. However, surface  
11 water represents the majority of water used, given that the facilities’ groundwater water rights are limited  
12 (Table 11). An assessment of the effects on surface water by the hatchery facilities is provided below,  
13 with particular comparison to the No-action Alternative 1.

14  
15 **4.2.4.1. Amount of Water Used**

16 Under Alternative 4, all of the hatchery facilities would produce 50 percent less hatchery fish for release  
17 compared to the No-action (Alternative 1). Since the amount of water used by a hatchery is dependent  
18 upon the number of hatchery fish reared, a 50 percent reduction in hatchery production would equate to  
19 50 percent less water being use by the hatchery facilities compared to the No-action (Alternative 1). In  
20 comparison to the No-action Alternative 1, between 1.5 and 112 cfs of water would be used by the  
21 hatchery facilities for the production of hatchery fish. The use of this water would affect the stream or  
22 river between the water intake and discharge structures at the specific hatchery location (Table 11).

23 Alternative 4 would provide a negligible beneficial impact on water quantity compared to Alternative 1  
24 (50 percent less water would be used by the hatchery facilities), but result in a low adverse impact  
25 compared to Alternative 3 (termination of the hatchery facilities).

26  
27 For the Oregon Coast Region, streamflows from August through October are typically the lowest  
28 throughout the year. During this period of low streamflow, the hatchery facilities would use water as  
29 specified in Table 10. The natural low flow conditions during this period would be affected by the  
30 hatchery facilities. For each hatchery facility, the actual water use by the facility was assessed for the  
31 time period of lowest streamflows in the stream or river where the hatchery facility is located (ODFW  
32 2013e). Streamflow information is available for every location except Nehalem Hatchery, Cedar  
33 Hatchery, and Indian Hatchery (Table 2). Alternative 4 would provide a negligible beneficial impact

1 compared to the No-action Alternative 1 from using 50 percent less water from the adjacent stream reach  
2 during the low streamflow months of the year. Alternative 4 would result in a low adverse impact from  
3 using water compared to Alternative 3 (terminate the hatchery facilities).

4  
5 Compared to the No-action Alternative 1, an additional zero to 60 cfs of water would not be used by the  
6 hatchery facilities and therefore remain in the stream or river (Table 2). The percentage of streamflow  
7 affected during the lowest streamflows is reported in Table 9. Indian Hatchery is not in operation during  
8 the low streamflow period of August through October and thus, does not use any water then; therefore,  
9 impacts under Alternative 4 would be the same as Alternative 1. The greatest use is for Cole Rivers  
10 Hatchery, where 60 cfs is used in October during the lowest flows of the Rogue River. However, at Cole  
11 Rivers Hatchery, no diversion occurs. The water is piped directly to the hatchery from within Lost Creek  
12 reservoir. Therefore, Alternative 4 would have a negligible beneficial effect compared to Alternative 1 by  
13 having 50 percent less water being used by the hatchery facility.

14  
15 For the remaining hatchery facilities, the percent of the adjacent stream or river that would remain in the  
16 river or stream under Alternative 4 (compared to the No-action Alternative) and not be diverted into the  
17 hatchery facilities ranges from two to 19.5 percent of the streamflow (Table 10). Alternative 4 would  
18 provide a negligible beneficial effect compared to Alternative 1 at these hatchery facilities because the  
19 majority of the streamflow remains in the stream or river from the hatchery intake to hatchery discharge  
20 location (Table 10). The length of stream affected by the water diversion at the hatchery facilities is  
21 described below.

#### 22 23 **4.2.4.2. Length of Stream Affected by Water Use**

24 Under Alternative 4, the hatchery facilities would use 50 percent of the water compared to the No-action  
25 Alternative. However, water would still be used by the hatchery facilities compared to the No-action  
26 Alternative, and consequently, the length of stream or river affected from water withdrawals under  
27 Alternative 4 would be exactly the same as the No-action Alternative. Alternative 4 would continue to  
28 result in a low adverse impact on the adjacent stream or river because of the limited number of miles  
29 affected.

1 **4.3. Effects on Water Quality**

2 **4.3.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery**  
3 **Programs on the Oregon Coast**

4  
5 Under Alternative 1, the 10 hatchery facilities along the Oregon Coast would continue to operate as  
6 proposed in the submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred  
7 Alternative): Approve ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast).  
8 Consequently, discharge of treated effluent (in compliance with the hatchery facility's NPDES permit)  
9 would continue as under current conditions. Levels of ammonia, nitrogen, phosphorus, and antibiotics  
10 (the most typical substances discharged)) would continue to be monitored at the hatchery facilities to  
11 ensure the effluent is within specified limits. The effect of the effluent discharge into adjacent streams  
12 and rivers would be low and temporary because the effluent plume would mix with natural streamflows.  
13 Aquatic organisms would be exposed to higher concentrations of chemicals, viruses, parasites, and  
14 bacteria within the outfall plume immediately below the hatchery facilities. However, the effect is likely  
15 to be undetectable farther than 200 meters downstream of the hatchery outfall (Bartholomew 2013).

16  
17 Bartholomew (2013) found hatchery-related disease and pathogen transmission and outbreak in effluent  
18 of Willamette River hatchery facilities to be localized, with greatest mortality occurring at the hatchery  
19 and no mortality of fish observed in the receiving waters 400 feet downstream from the hatchery.  
20 Therefore, the potential adverse impacts are expected to be temporary and confined exclusively to the  
21 small area directly at the hatchery outfall. No impacts are expected on critical habitat and EFH as the  
22 effluent dilutes downstream (see Chapter 3, Affected Environment).

23  
24 Alternative 1 would not be expected to change any of the Clean Water Act 303(d) standards because  
25 effluent resulting from the 10 hatchery facilities is included in the current conditions of the streams and  
26 rivers described in Subsection 3.3, Water Quality. In addition, the current 303(d) list violations relate to  
27 temperature, fecal coliform, sedimentation, and dissolved oxygen, of which hatchery effluent would not  
28 affect (Table 3). For example, the 303(d) listing for Elk River is attributed to elevated stream  
29 temperatures due to timber harvest and loss of riparian habitat (Table 3); hatchery-related effluent  
30 parameters are not a factor in this listing. Also, the 303(d) listings apply to most of the streams and rivers  
31 within the Oregon Coast Region, of which most do not have any hatchery facility within the watershed.  
32 Therefore, operation of hatchery facilities in the project area do not contribute to the Clean Water Act  
33 303(d) list violations for the streams and rivers near the hatchery facilities, and do not contribute in any

1 detectable manner to the existing water quality issues in the streams and rivers near the hatchery facilities.  
2 Thus, any impacts are expected to be undetectable.

3  
4 **4.3.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for**  
5 **Operation of Hatchery Programs on the Oregon Coast**  
6

7 Under Alternative 2, the 10 hatchery facilities along the Oregon Coast would operate as proposed in  
8 submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative): Approve  
9 ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast)). Consequently, discharge  
10 of treated effluent (in compliance with the hatchery facility's NPDES permit) would continue as under  
11 current conditions and as analyzed under Alternative 1. This would be a localized, small area of adverse  
12 impact directly below the hatchery outfall from discharge of hatchery effluent. However, as the effluent  
13 mixes with surrounding waters in the streams and rivers, the impact from hatchery discharge is likely to  
14 be undetectable 400 feet downstream from the hatchery outfall. Impacts from hatchery effluent on water  
15 quality parameters and NPDES 303(d) listings would be identical to those described under Alternative 1.  
16 Present water quality concerns are related to temperature, fecal coliform, sedimentation, and dissolved  
17 oxygen, of which the hatchery facility does not affect.

18  
19 **4.3.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

20 Under Alternative 3, operation of the 10 hatchery facilities along the Oregon Coast would be terminated  
21 (Subsection 2.3, Alternative 3: Terminate Hatchery Programs on the Oregon Coast). The hatchery  
22 facilities would no longer use water, discharge effluent into adjacent streams and rivers, or grow and  
23 release hatchery fish. NPDES permits for effluent discharge would no longer be required. The elevated  
24 levels of ammonia, nitrogen, phosphorus, and antibiotics (the most typical substances discharged under  
25 Alternative 1) would be eliminated under Alternative 3. The benefits of eliminating effluent discharge  
26 from the hatchery facility would be in the area immediately downstream of the outfall. There would be  
27 no detectable benefit greater than 200 meters downstream of the outfall (Bartholomew 2013).

28  
29 Alternative 3 would not be expected to change any of the Clean Water Act 303(d) standards because none  
30 of the violations are related to the operation of the hatchery facilities. The current 303(d) lists violations  
31 relative to temperature, fecal coliform, sedimentation, and dissolved oxygen; all of which are primarily  
32 the result of forest and agricultural management uses. Therefore, Alternative 3 would result in  
33 undetectable improvements to water quality parameters of the streams and rivers of the Oregon Coast  
34 Region because the hatchery facilities are not the cause of the current water quality issues.

1 **4.3.4. Alternative 4 – Reduced Hatchery Production**

2 Under Alternative 4, hatchery production would be reduced at the 10 hatchery facilities along the Oregon  
3 Coast by 50 percent compared to the No-action Alternative. The hatchery facilities would use 50 percent  
4 less water, discharge 50 percent less effluent into adjacent streams and rivers, and grow and release 50  
5 percent of the hatchery fish compared to the No-action Alternative. NPDES permits for effluent  
6 discharge would still be in place and the specified criteria in these permits for water quality attributes  
7 would not be exceeded because 50 percent less water and discharge is required under Alternative 4. The  
8 benefits of 50 percent less effluent discharge from the hatchery facility would be in the area immediately  
9 downstream of the outfall. There would be no detectable benefit greater than approximately 600 feet(200  
10 meters) downstream of the outfall (Bartholomew 2013), similar to the No-action Alternative.

11  
12 Alternative 4 would not be expected to change any of the Clean Water Act 303(d) standards because none  
13 of the violations are related to the operation of the hatchery facilities. The current 303(d) lists violations  
14 relative to temperature, fecal coliform, sedimentation, and dissolved oxygen; all of which are primarily  
15 the result of forest and agricultural management uses. Therefore, Alternative 4 would result in  
16 undetectable improvements to water quality parameters of the streams and rivers of the Oregon Coast  
17 Region because the hatchery facilities are not the cause of the current water quality issues.

18

19 **4.4. Effects on Salmon and Steelhead and Their Habitats**

20 The environmental consequences of Alternatives 1-4 on salmon and steelhead and their habitats are  
21 described below. The principal mechanisms upon which hatchery programs can affect salmon and  
22 steelhead are found in Table 5. To summarize, hatchery programs can affect the genetics of natural  
23 populations from straying and interbreeding in the wild. Hatchery fish can compete and predate upon co-  
24 occurring natural-origin fish. Hatchery fish can transfer diseases and pathogens to natural-origin fish  
25 after release from the hatchery.

26

27 The effects of the hatchery programs builds upon information presented in prior sections of this  
28 document. It is important to consider the specific locations of the hatchery facilities within the population  
29 areas (see Table 1 and Figure 1). Table 4 describes the time periods and size at release of hatchery fish,  
30 which helps inform potential competition and predation effects. Figure 4 shows the location and numbers  
31 of hatchery fish released along the Oregon Coast. Figure 5 shows the populations of salmon and  
32 steelhead that have hatchery fish released and the populations where no hatchery fish are released.

33

1 The following assessment information informs the environmental consequences of Alternatives 1-4 on  
2 salmon and steelhead and their habitats (Table 12; Figure 13; Figure 14; Figure 15; Figure 16; Figure 17;  
3 Figure 18; Figure 19; Figure 20). This information is related to the ecological interactions between  
4 natural- and hatchery-origin juvenile and adults while in the freshwater areas of the Oregon Coast Region.  
5 Overall, the interaction area where hatchery fish are present within the Oregon portion of the SONCC  
6 coho salmon ESU represents approximately 16 percent of the total coho salmon spawning and rearing  
7 habitat. For the Oregon Coast coho salmon ESU, the interaction area where hatchery fish are present  
8 represents approximately 11 percent of the designated critical habitat. This information is further  
9 evaluated under each alternative for each salmon and steelhead species.  
10

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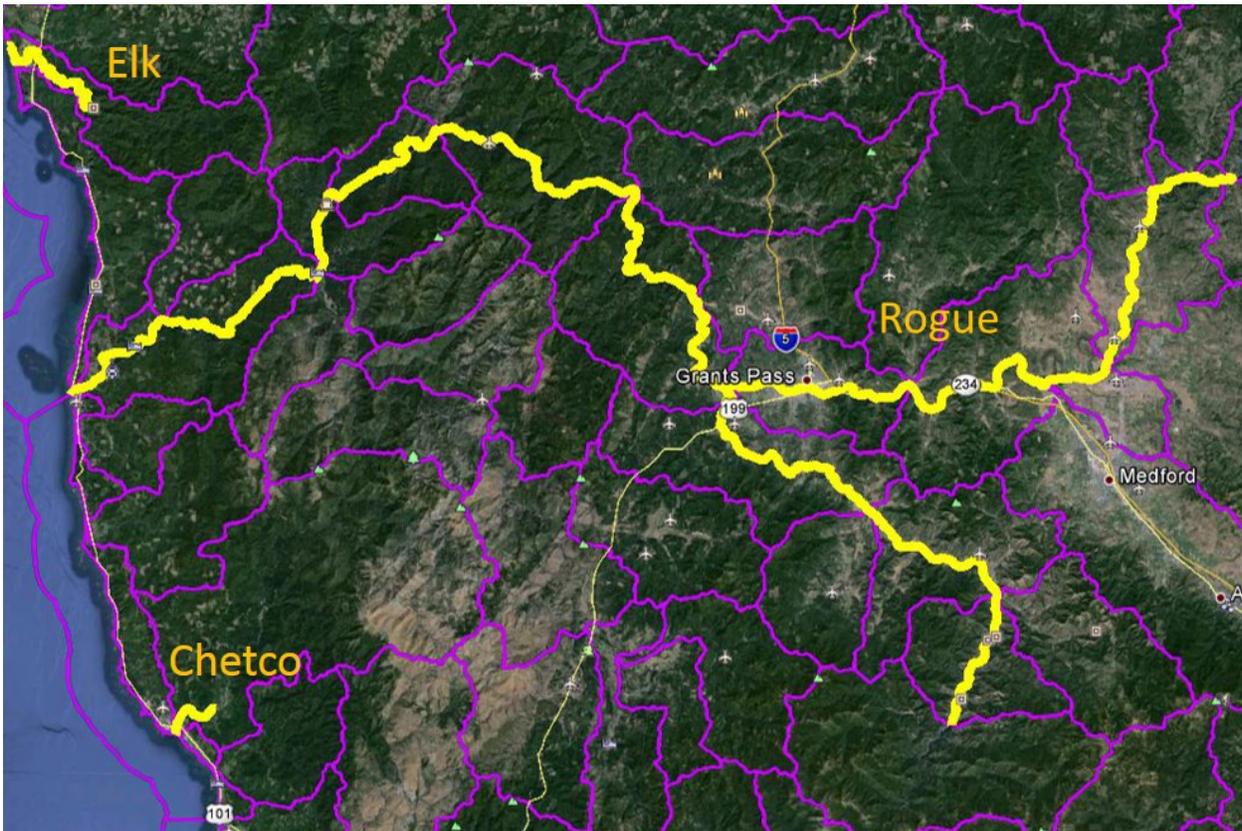
Table 12. Assessment of hatchery fish releases and risk of interaction with natural-origin salmon and steelhead in freshwater areas along the Oregon Coast.

<b>Population Area where Hatchery Fish Released</b>	<b>Time Period for Hatchery Fish Releases<sup>4</sup></b>	<b>Potential Area of Overlap between Hatchery and Natural Salmon and Steelhead</b>	<b>Relative Magnitude of Potential Hatchery Fish Interaction with Natural-origin Salmon and Steelhead</b>
Chetco River	ChF-Oct, StW-April	Chetco, Ferry	Low
Rogue River	Co-May, ChS-Aug-Sept, StS-April, StW-April	Applegate, Rogue, Indian	Medium
Elk River	ChF-Sept	Elk	Low
Coquille River	ChF-May-June, StW-April	SF, EF, NF Coquille, lower Coquille	Medium
Coos Bay	ChF-May-June, StW-April	Millicoma and SF Coos, Coos Bay	High
Tenmile Creek	StW-April	Tenmile Creek	Low
Umpqua River	Co-April, June, ChF-May, Oct, ChS-February, Sept, StS-March, April, StW-March, April	NF and SF Umpqua, Mainstem Umpqua	Medium
Siuslaw River	StW-May	Whittaker, Green, Siuslaw	Low
Alesea River	StW-April	NF Alesea, Five Rivers, Alesea	Low
Siletz River	StW-April, StS-April	Siletz	Low
Salmon River	ChF-Aug	Salmon	Low
Nestucca River	ChF-Sept, ChS-July, StS-April, StW-April	Three Rivers, Nestucca, Beaver, Little Nestucca	High
Tillamook Bay	Co-April, ChF-July, ChS-July, StS-April, StW-April,	SF Wilson, Wilson, EF Trask, Trask	High

<sup>4</sup> Abbreviations: ChF (fall Chinook salmon), ChS (spring Chinook salmon), Co (coho salmon), StS (summer steelhead), and StW (winter steelhead).

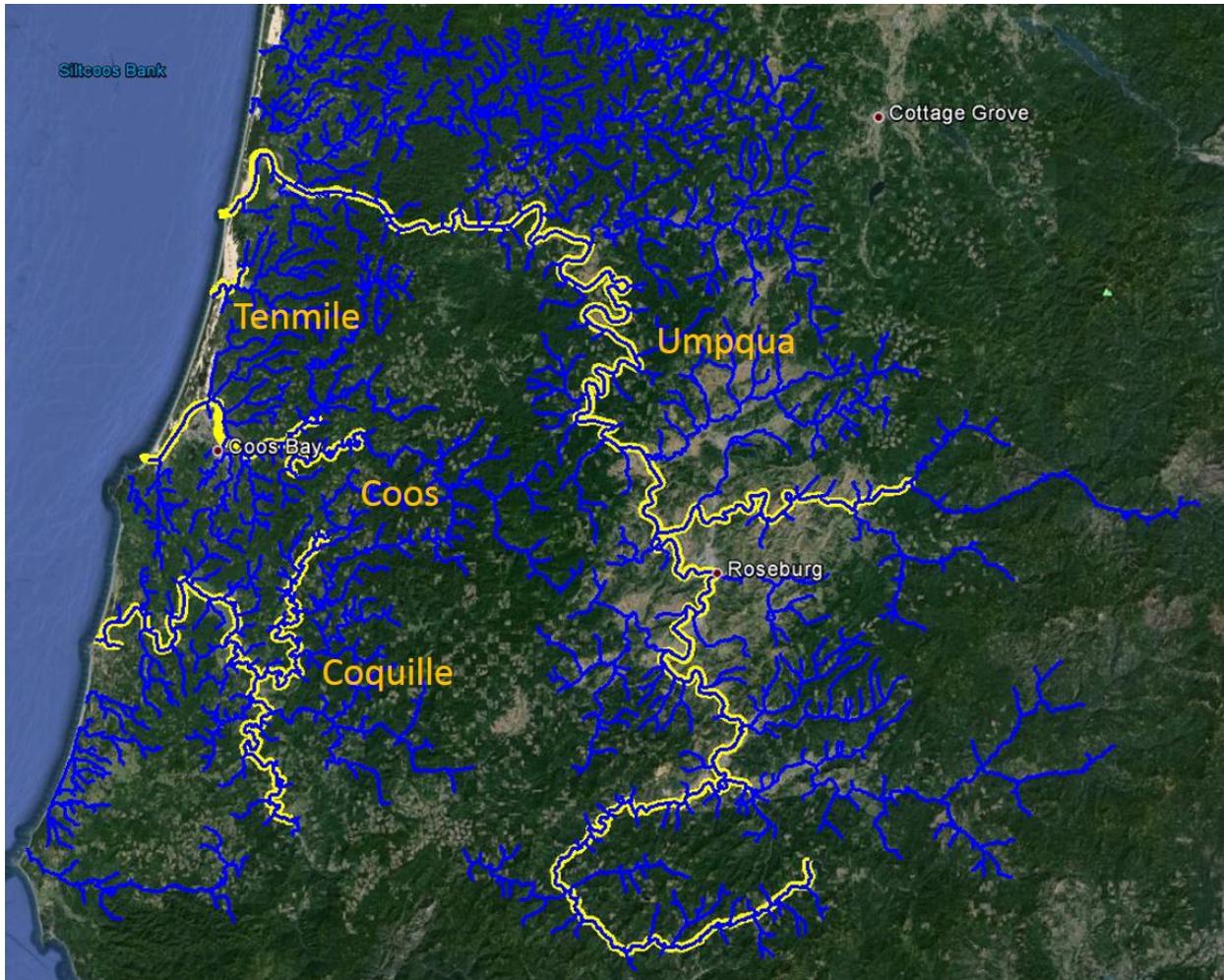
Population Area where Hatchery Fish Released	Time Period for Hatchery Fish Releases <sup>4</sup>	Potential Area of Overlap between Hatchery and Natural Salmon and Steelhead	Relative Magnitude of Potential Hatchery Fish Interaction with Natural-origin Salmon and Steelhead
Nehalem River	Co-April, StW-April	NF Nehalem, Nehalem	Low
Necanicum River	ChF-Sept, StW-April	Necanicum	Medium

1

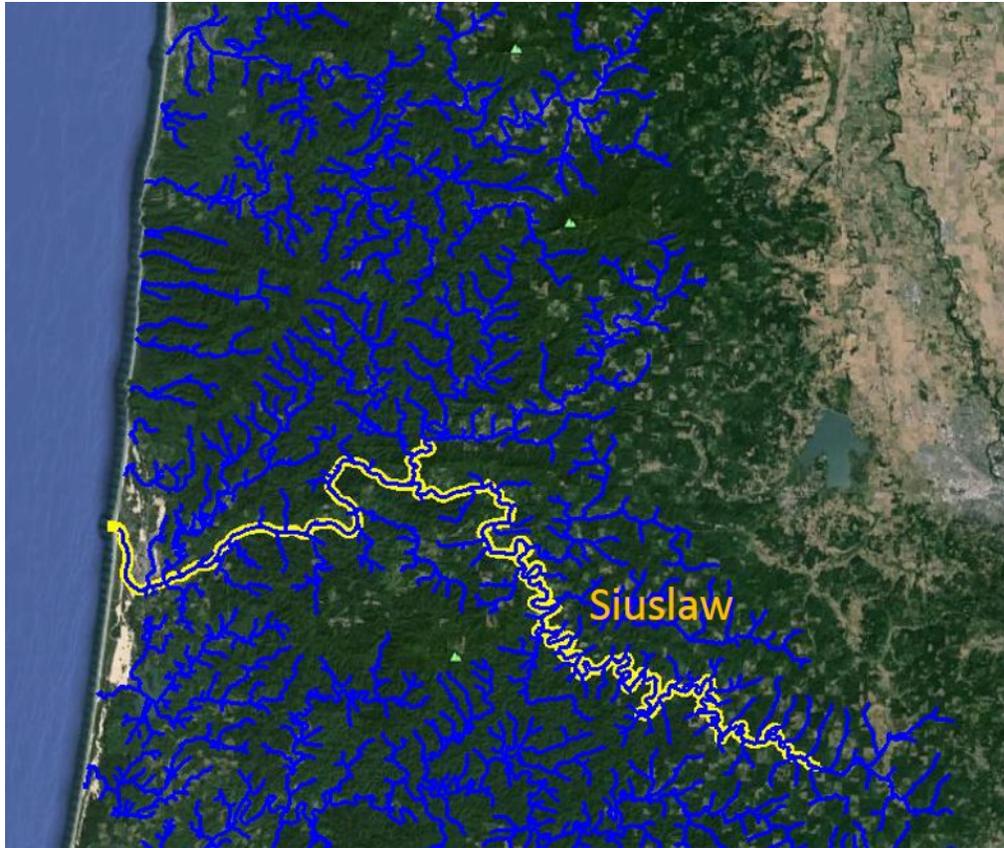


2

3 Figure 13. Geographic extent of the interaction area between hatchery fish and natural fish in the  
 4 Oregon portion of the SONCC coho salmon ESU. Hatchery fish are released into the  
 5 Chetco, Rogue, and Elk Rivers. The reaches where hatchery fish are released are the  
 6 yellow lines. The 5<sup>th</sup> HUC's are shown in purple for the watersheds (instead of  
 7 designated critical habitat) because specific stream reaches have not been specified for  
 8 the SONCC coho salmon ESU.  
 9

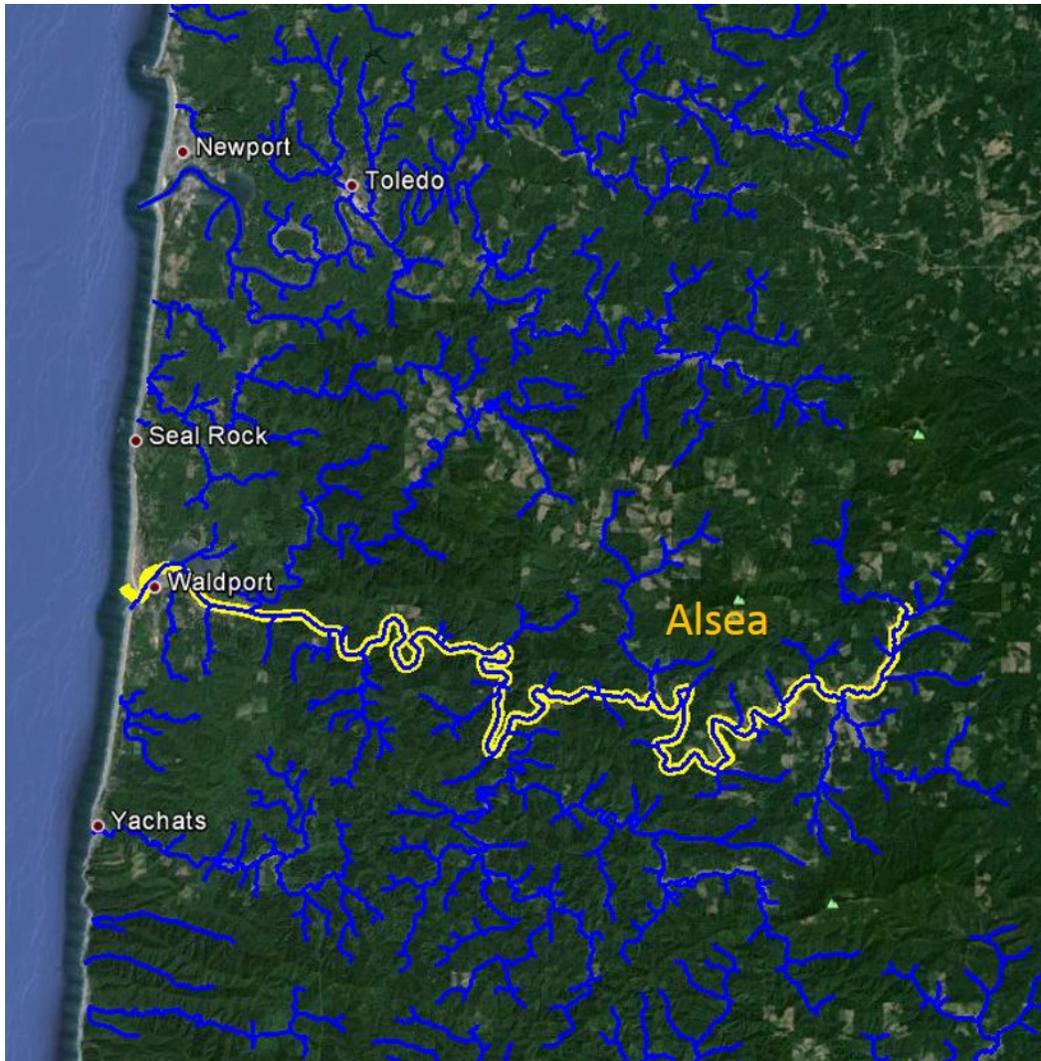


1  
2 Figure 14. Geographic extent of the interaction area between hatchery fish and natural fish  
3 compared to coho salmon critical habitat. Hatchery fish are released into the Coquille,  
4 Coos, Tenmile, and Umpqua Rivers. The reaches where hatchery fish are released are  
5 the yellow lines. Stream reaches designated as critical habitat for Oregon Coast coho  
6 salmon is identified as the blue colored lines.  
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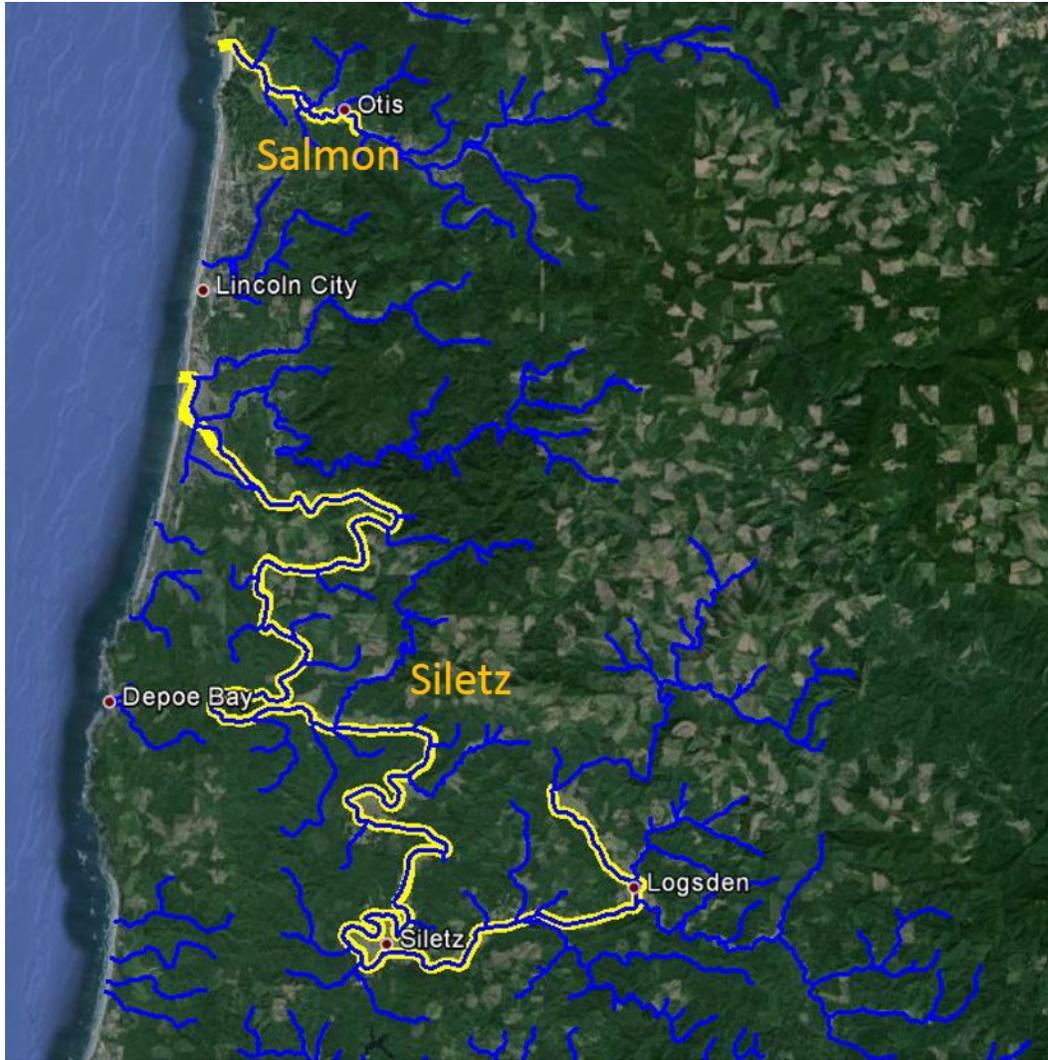
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Figure 15. Geographic extent of the interaction area between hatchery fish and natural fish compared to coho salmon critical habitat. Hatchery fish are released into the Siuslaw River. The reaches where hatchery fish are released are the yellow lines. Stream reaches designated as critical habitat for Oregon Coast coho salmon is identified as the blue colored lines.

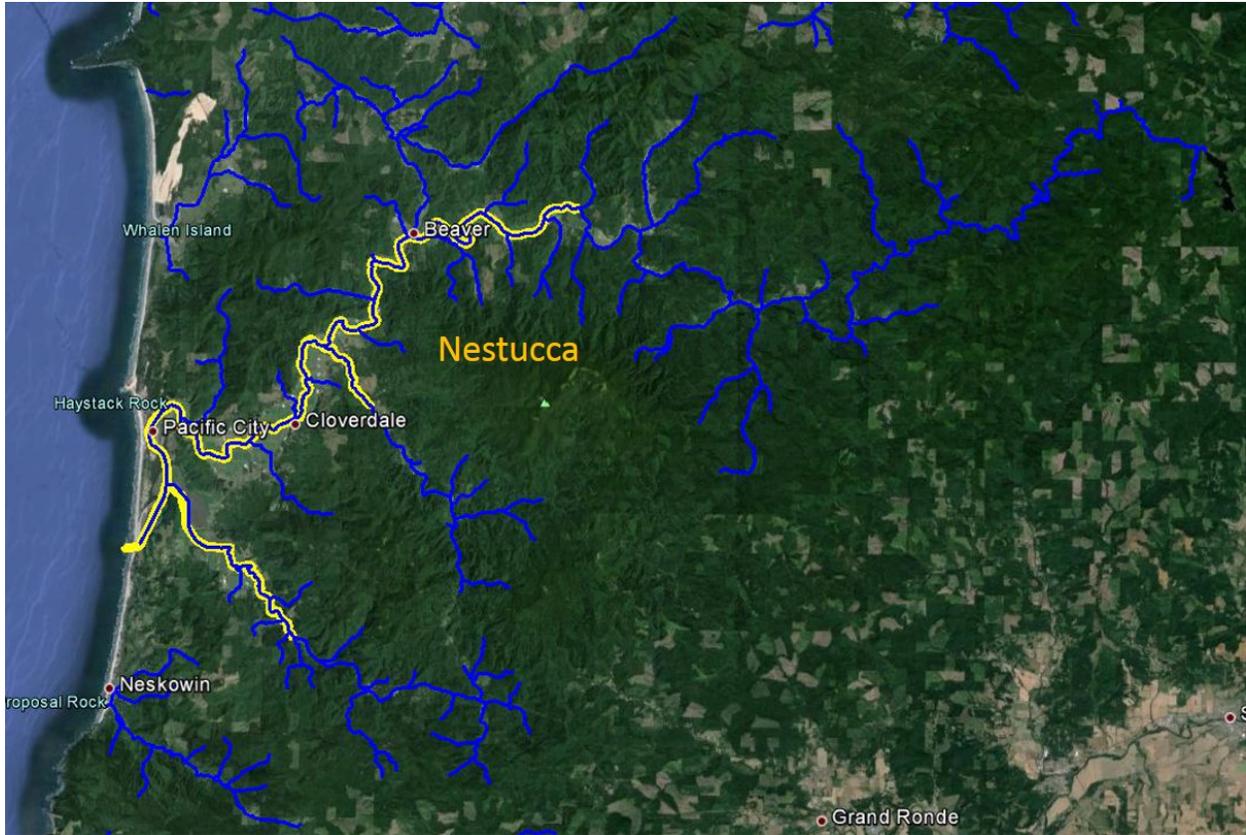


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Figure 16. Geographic extent of the interaction area between hatchery fish and natural fish compared to coho salmon critical habitat. Hatchery fish are released into the Alsea River. The reaches where hatchery fish are released are the yellow lines. Stream reaches designated as critical habitat for Oregon Coast coho salmon is identified as the blue colored lines.



1  
 2 Figure 17. Geographic extent of the interaction area between hatchery fish and natural fish  
 3 compared to coho salmon critical habitat. Hatchery fish are released into the Siletz and  
 4 Salmon Rivers. The reaches where hatchery fish are released are the yellow lines.  
 5 Stream reaches designated as critical habitat for Oregon Coast coho salmon is identified  
 6 as the blue colored lines.  
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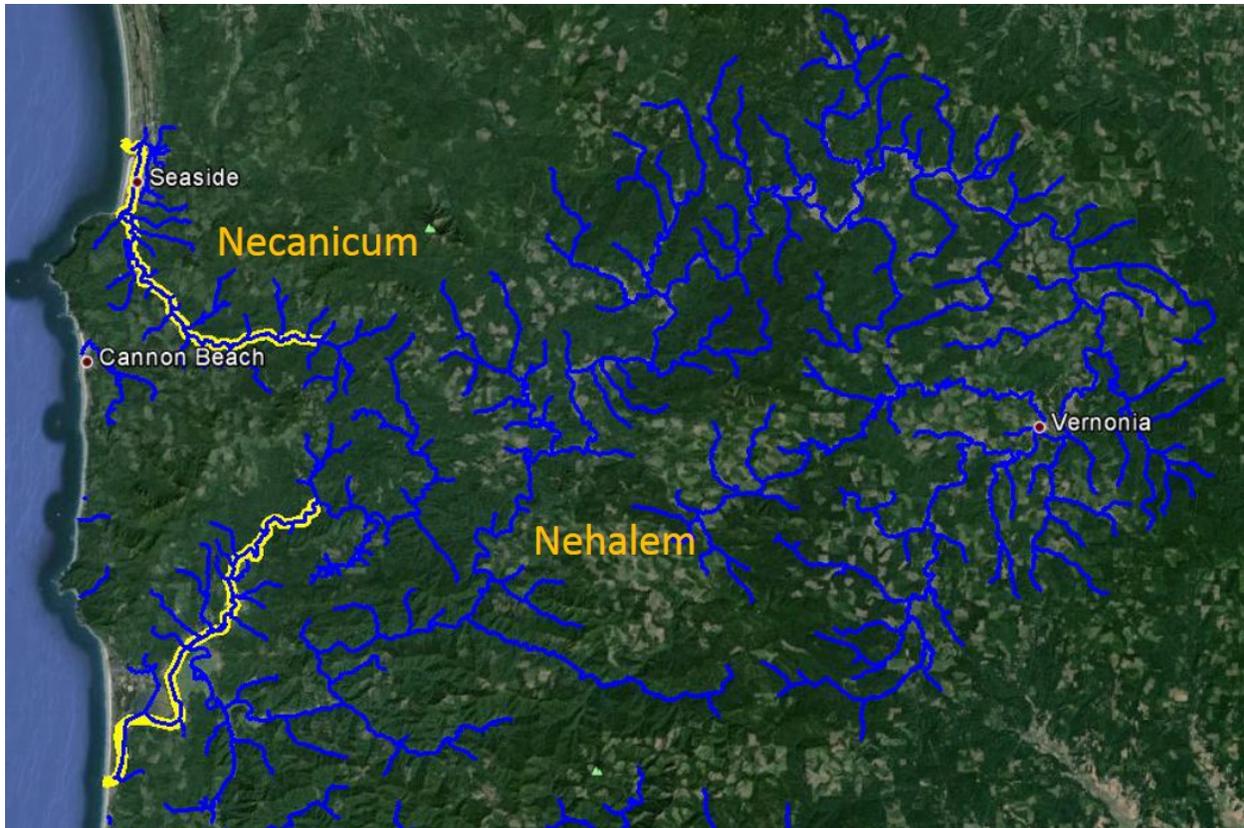


1  
2 Figure 18. Geographic extent of the interaction area between hatchery fish and natural fish  
3 compared to coho salmon critical habitat. Hatchery fish are released into the Nestucca  
4 and Little Nestucca Rivers. The reaches where hatchery fish are released are the yellow  
5 lines. Stream reaches designated as critical habitat for Oregon Coast coho salmon is  
6 identified as the blue colored lines.  
7  
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Figure 19. Geographic extent of the interaction area between hatchery fish and natural fish compared to coho salmon critical habitat. Hatchery fish are released into the Trask and Wilson Rivers. The reaches where hatchery fish are released are the yellow lines. Stream reaches designated as critical habitat for Oregon Coast coho salmon is identified as the blue colored lines.



1  
2 Figure 20. Geographic extent of the interaction area between hatchery fish and natural fish  
3 compared to coho salmon critical habitat. Hatchery fish are released into the Nehalem  
4 and Necanicum Rivers. The reaches where hatchery fish are released are the yellow  
5 lines. Stream reaches designated as critical habitat for Oregon Coast coho salmon is  
6 identified as the blue colored lines.  
7

8 **4.4.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery**  
9 **Programs on the Oregon Coast**

10  
11 Under Alternative 1, 10 hatchery facilities, and associated hatchery programs, along the Oregon Coast  
12 would continue to operate as proposed in submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed  
13 Action/Preferred Alternative): Approve ODFW's HGMPs for Operation of Hatchery Programs on the  
14 Oregon Coast)). Alternative 1 would continue to pose short- and long-term risks associated with genetic  
15 effects, competition and predation, facility effects, masking of natural population status from hatchery  
16 fish spawning, incidental fishing effects, and transfer of pathogens from hatchery fish and/or the hatchery  
17 facility to the adjacent river or stream. Alternative 1 would continue to provide some benefits to salmon  
18 and steelhead from hatchery fish carcasses and nutrient cycling in the ecosystem (Subsection 3.4, Salmon  
19 and Steelhead and Their Habitat). The species-specific effects of Alternative 1 are discussed below.  
20

1 Critical Habitat under the ESA is only designated for coho salmon. Essential Fish Habitat under the  
2 Magnuson-Stevens Fishery Conservation and Management Act applies to coho salmon, Chinook salmon,  
3 and chum salmon along the Oregon Coast. The operation of the 10 hatchery facilities adversely affects  
4 critical habitat and EFH in the local vicinity where the facilities are located. The primary impact on  
5 critical habitat and EFH is from the effluent discharge from the hatchery facilities (Subsection 4.3.1,  
6 Alternative 1 (No-action) – Do Not Approve ODFW’s HGMPs for Operation of the Hatchery Programs  
7 on the Oregon Coast, above). Alternative 1 would result in undetectable physical habitat changes to  
8 critical habitat and EFH compared to current conditions.

### 9 10 **Oregon Coastal Coho Salmon**

11 Under Alternative 1, all existing hatchery programs along the Oregon Coast would continue. The genetic  
12 effects of the hatchery programs on coho salmon would be low because there are only four small hatchery  
13 programs for coho salmon along the entire Oregon Coast. Consequently, few hatchery coho salmon have  
14 been observed spawning in natural areas of the ESUs in recent years (Stout et al. 2012; ODFW 2013a).  
15 The average proportion of hatchery coho salmon on the spawning grounds (pHOS) for the Oregon Coast  
16 ESU from 2009 to 2014 was 1.3 percent (ODFW 2016a). Even though recent data is lacking in the  
17 Oregon portion of the SONCC coho salmon ESU, pHOS is expected to be very low because few hatchery  
18 coho salmon spawn naturally in the Upper Rogue River population where the hatchery program exists. In  
19 recent years, the hatchery coho program in the Rogue River has been reduced by 63 percent to a smolt  
20 production of 75,000 fish. The highest risks for hatchery coho salmon interbreeding with natural-origin  
21 coho occurs in the Upper Rogue, South Umpqua, Trask, and North Fork Nehalem population areas where  
22 hatchery coho salmon are released. For all of these populations, the programs are managed to have less  
23 than 10 percent naturally spawning hatchery coho salmon to reduce the risk of genetic introgression.  
24 From 2009-2014, average pHOS has been two percent (Nehalem, Tillamook, Rogue) to five percent  
25 (South Umpqua; ODFW 2016a). These four independent populations are needed for recovery of the  
26 ESU, and the risks associated with hatchery operations are more concerning than with other populations  
27 less closely associated with ESU recovery. As long as pHOS continues to be low (<10 percent)  
28 population wide, it is expected there will be reduced productivity from naturally-spawning hatchery fish  
29 interbreeding with natural-origin coho salmon. However, there are 26 other independent populations  
30 where no hatchery coho salmon programs exist. In total, only four out of a total of 69 independent and  
31 dependent coho populations would be affected genetically by the hatchery coho salmon programs  
32 released into these populations (Stout et al. 2012; NMFS 2014; NMFS 2015).

1 The reductions in pHOS observed over the last decade is the result of substantial decreases in the number  
2 of hatchery coho salmon released within the Oregon Coast Region (Subsection 3.4, Salmon and Steelhead  
3 and Their Habitats). Buhle et al. (2009) concluded the increases in natural-origin coho salmon returns to  
4 the Oregon Coast ESU were influenced by these hatchery reforms. Approximately 20 percent of the  
5 improvement was attributed to decreases in pHOS for these years.

6  
7 The ecological effects (interactions between hatchery- and natural-origin salmon and steelhead) of  
8 hatchery programs would continue on coho salmon in the populations where the hatchery programs occur  
9 (Figure 5; Figure 13; Figure 14; Figure 15; Figure 16; Figure 17; Figure 18; Figure 19; Figure 20).  
10 Potential effects are greatest in the population areas that have the most miles of habitat affected by  
11 hatchery fish releases in relation to the watershed size. These population areas would have the highest  
12 densities of hatchery fish per linear mile of available habitat (Figure 4). The potential ecological effects  
13 are also influenced by the location where hatchery fish are released in the watershed. Releases of  
14 hatchery fish in the upper areas of the watershed would potentially have the greatest amount of time and  
15 space to affect naturally-occurring salmonids. In addition, if hatchery fish are released in principal  
16 spawning and rearing areas of natural-origin salmonids (i.e., tributaries), then interactions would be  
17 potentially greater than if hatchery fish are released in mainstem river areas. Therefore, the potential  
18 ecological interactions between hatchery fish and coho salmon is dependent upon space and time within  
19 the specific population areas (Table 12).

20  
21 The ecological interaction space between hatchery fish and coho salmon was evaluated as the percent of  
22 Oregon Coast coho salmon critical habitat affected by the releases of all species of hatchery fish. The  
23 river and stream reaches where hatchery fish are released compared to coho salmon critical habitat is  
24 shown in Figures 13-20. Since specific stream reaches of critical habitat for SONCC coho salmon have  
25 not been delineated by NMFS, the ODFW coho salmon spawning and rearing distribution was used for  
26 southern Oregon. Overall, 11 percent of critical habitat is affected by hatchery fish in the Oregon Coast  
27 ESU and 16 percent of coho salmon habitat is affected by hatchery fish in the SONCC ESU. The  
28 principal habitat areas affected by hatchery fish are the mainstem river areas and estuaries. The vast  
29 majority of coho salmon tributary habitat is not affected by hatchery fish (Figures 13-20).

30  
31 In addition to the geographic extent of hatchery fish released within a population area (i.e., space),  
32 another aspect of the interaction between hatchery- and natural-origin salmon and steelhead is the period  
33 of time affected by the presence of hatchery fish in the streams and rivers. The target release size for  
34 hatchery fish along the Oregon Coast is the smolt life stage for all steelhead, coho salmon, and spring

1 Chinook salmon. Hatchery fall Chinook salmon are released as smolts or just prior to smolting as  
2 fingerlings (presmolts). Depending upon the species, average fork length ranges from two inches (~60  
3 mm) for fall Chinook salmon (the smallest) to up to eight inches (~200 mm) for summer and winter  
4 steelhead (the largest). Given hatchery coho salmon, spring Chinook salmon, and steelhead are released  
5 as smolts and fall Chinook salmon released as presmolts and smolts, the interaction period is relatively  
6 short-lived because the hatchery fish are actively emigrating to the estuary and ocean. The physiological  
7 condition of the hatchery smolts triggers their desire to emigrate. Therefore, in the population areas  
8 where the hatchery fish are released near the estuary and ocean (e.g., Chetco, Elk, Coos, Tenmile,  
9 Necanicum), the time of interaction between hatchery- and natural-origin fish in the space where hatchery  
10 fish are released (Figures 13-20) is very limited (likely hours to a few days). For the population areas  
11 where hatchery fish are released many miles from the ocean (i.e., Rogue, Umpqua, Siuslaw), it takes more  
12 time to emigrate to the estuary and ocean from the hatchery release point because of the relatively long  
13 travel distances, so the total amount of time hatchery fish could potentially interact with natural-origin  
14 fish in freshwater habitat areas may be up to 1 to 2 weeks. During this one to two week period of  
15 interaction while in freshwater, the greatest impact is likely to occur in areas where hatchery steelhead are  
16 co-occurring with natural-origin salmonids (e.g., mainstem Rogue River). Hatchery steelhead are the  
17 largest sized hatchery fish released within the Oregon Coast region, and thus have the greatest potential to  
18 prey upon a variety of other fish species.

19  
20 Specific studies on predation of natural-origin salmonids by hatchery fish within the Oregon Coast  
21 Region are sparse. However, Naman and Sharpe (2012) reported a wide range of predation impacts from  
22 hatchery fish on natural-origin salmonids when they reviewed studies along the West Coast. Predation  
23 rates were greatest when the number of hatchery fish released was high and the release coincided with the  
24 presence of natural-origin salmonids. In most cases, predation by hatchery fish was low overall.  
25 However, in specific circumstances and locations, hatchery fish predation could be substantial (i.e., loss  
26 of tens of thousands juvenile salmonids). For the Oregon Coast Region, predation by hatchery fish on  
27 natural-origin salmonids does occur. Hatchery steelhead predation upon coho and Chinook salmon fry  
28 during the release periods of April through May is likely to be the greatest impact. Steelhead fry are  
29 probably less impacted because most of the steelhead are still incubating in the gravel. The other species  
30 of hatchery fish (i.e., coho salmon and Chinook salmon) are likely to have lower impacts on natural-  
31 origin fish species because they are smaller in size (i.e. more similar in size to natural-origin fish) and  
32 thus cannot consume as many fish compared to the larger hatchery steelhead. In all cases, the  
33 vulnerability of natural-origin fish to co-occurring hatchery fish is limited in time to a couple of weeks as  
34 the majority of the hatchery smolts actively emigrate through the river to the estuary and ocean. In local

1 situations at the individual fish scale, it may be limited to hours or days as the hatchery fish emigrate  
2 downstream.

3  
4 Competition between hatchery fish and natural-origin salmonids may occur if a resource becomes limited  
5 in space and time. Quantifying the impact is difficult because of the variety of factors influencing  
6 competition such as availability of potentially limiting resources in space and time and variability in  
7 natural-origin salmonid production from year to year that influences density-dependence. Within the  
8 Oregon Coast Region, competition between hatchery fish and natural-origin salmonids is likely to be very  
9 low or non-existent for the following reasons. The greatest impact from hatchery fish are likely to occur  
10 if the hatchery fish residualize and do not emigrate to the ocean. Recent information indicates less than  
11 10 percent of the total hatchery release residualize and hatchery steelhead are the most prominent species.  
12 The primary area of competitive interaction area is the area below the hatchery. Since this interaction  
13 area is relatively small compared to the total amount of habitat available for rearing (Figure 13; Figure 14;  
14 Figure 15; Figure 16; Figure 17; Figure 18; Figure 19; Figure 20), impacts from competition between  
15 hatchery fish and natural-origin fish is likely to be low.

16  
17 Buhle et al. (2009) evaluated the influence of hatchery coho salmon reforms in the late 1990s to the  
18 improvements in natural-origin fish observed in 2000-2003. Approximately seven percent of the  
19 improvement was attributed to the reduction in impacts associated with terminating most of the hatchery  
20 coho salmon releases in the Oregon Coast ESU (i.e., millions of hatchery coho salmon, Subsection 3.4,  
21 Salmon and Steelhead and Their Habitats). The effect was from the negative ecological interaction  
22 between hatchery coho salmon smolts and natural-origin juvenile coho salmon co-occurring in freshwater  
23 habitat.

24  
25 Hatchery program impacts have not been identified as a primary or secondary limiting factor/threat for  
26 coho salmon in the federal recovery plans along the Oregon Coast (NMFS 2014; NMFS 2015). The  
27 hatchery reform actions taken since ESA listings in 1997-1998 have eliminated impacts so that current  
28 hatchery management is no longer a factor impeding recovery.

29

1 **Oregon Coastal Chinook Salmon**

2 Alternative 1 would maintain all existing hatchery programs along the Oregon Coast. Effects of  
3 Alternative 1 would be substantially similar to current conditions for Chinook salmon, where some  
4 populations are affected by hatchery programs and facilities and may have various genetic and ecological  
5 risks from hatchery fish on natural-origin Chinook salmon. Genetic risks from hatchery Chinook salmon  
6 spawning in the wild would continue to be low to moderate depending upon the specific population and  
7 run type (Subsection 3.4, Salmon and Steelhead and Their Habitats).

8  
9 For fall Chinook salmon, the two programs that had the highest percentage of naturally spawning  
10 hatchery fall Chinook salmon (i.e., Elk and Salmon River populations) would be reduced in Alternative 1  
11 from recent ODFW management reforms (ODFW 2014a). For these populations, it is expected  
12 productivity may be reduced from naturally spawning hatchery fall Chinook salmon and the associated  
13 hatchery-influenced selection (domestication) effects. The reduced fitness of hatchery Chinook salmon  
14 interbreeding with natural-origin Chinook salmon is likely reducing population productivity (to an  
15 unknown extent). For the other fall Chinook salmon populations, the potential genetic effects are either  
16 non-existent because no hatchery fall Chinook salmon are released in the population area (most  
17 populations) or low impact because pHOS is low (e.g., Umpqua and Coos).

18  
19 For spring Chinook salmon, hatchery spring Chinook salmon are released into the Rogue, Nestucca,  
20 Trask, and Wilson Rivers. The Rogue River spring Chinook population is relatively abundant and pHOS  
21 in the Upper Rogue River, where the hatchery is located, has averaged nine percent from 2006-2015. The  
22 hatchery-influenced selection (domestication) effects from hatchery fish potentially interbreeding with  
23 natural-origin fish is low for the Rogue River because pHOS is low. For the other spring Chinook salmon  
24 populations, natural-origin returns are much lower than the Rogue River. Consequently, a few hatchery  
25 fish strays into the population equates to a high pHOS (in the range of 49-93 percent for these  
26 populations). The effects of hatchery Chinook salmon in these populations is likely mixed: hatchery fish  
27 interbreeding with natural is likely reducing productivity from hatchery-influenced selection  
28 (domestication) impacts (Nickum et al. 2004). However, due to low population sizes, the hatchery fish  
29 are increasing spawning escapement and likely producing more offspring, which has been shown to be a  
30 benefit to the natural population (Banks et al. 2013; Evans et al. 2014; O'Malley et al. 2015). All of the  
31 hatchery stocks are locally-derived within the ESU, so genetic risks are primarily from hatchery  
32 domestication effects, and not from out-of-ESU genetic resources.

33

1 The ecological effects (interactions between hatchery- and natural-origin salmon and steelhead) of  
2 hatchery programs would continue on Chinook salmon in the populations where the hatchery programs  
3 occur (Figure 5; Figure 13; Figure 14; Figure 15; Figure 16; Figure 17; Figure 18; Figure 19; Figure 20).  
4 Potential effects are greatest in the population areas that have the most miles of habitat affected by  
5 hatchery fish releases in relation to the watershed size. These population areas would have the highest  
6 densities of hatchery fish per linear mile of available habitat (Figure 4). The potential ecological effects  
7 are also influenced by the location where hatchery fish are released in the watershed. Releases of  
8 hatchery fish in the upper areas of the watershed would potentially have the greatest amount of time and  
9 space to affect naturally-occurring salmonids. In addition, if hatchery fish are released in principal  
10 spawning and rearing areas of natural-origin salmonids (i.e., tributaries), then interactions would be  
11 potentially greater than if hatchery fish are released in mainstem river areas. Therefore, the potential  
12 ecological interactions between hatchery fish and Chinook salmon is dependent upon space and time  
13 within the specific population areas (Table 12).

14  
15 The ecological interaction space between hatchery fish and Chinook salmon was evaluated as the percent  
16 of Oregon Coast coho salmon critical habitat affected by the releases of all species of hatchery fish. Coho  
17 salmon critical habitat was used as a proxy for Chinook salmon; however, since the spawning and rearing  
18 distribution of Chinook salmon is less than coho salmon, this would be a worst case scenario for Chinook  
19 salmon. The river and stream reaches where hatchery fish are released compared to critical habitat is  
20 shown in Figures 13 through Figure 20. Overall, less than 11 percent of critical habitat is affected by  
21 hatchery fish in the Oregon Coast ESU and less than 16 percent of Chinook salmon habitat is affected by  
22 hatchery fish in the SONCC ESU. The principal habitat areas affected by hatchery fish are the mainstem  
23 river areas and estuaries. The vast majority of Chinook salmon tributary habitat is not affected by  
24 hatchery fish (Figures 13-20).

25  
26 In addition to the geographic extent of hatchery fish released within a population area (i.e., space),  
27 another aspect of the interaction between hatchery- and natural-origin salmon and steelhead is the period  
28 of time affected by the presence of hatchery fish in the streams and rivers. The target release size for  
29 hatchery fish along the Oregon Coast is the smolt life stage for all steelhead, coho salmon, and spring  
30 Chinook salmon. Hatchery fall Chinook salmon are released as smolts or just prior to smolting as  
31 fingerlings (presmolts). Depending upon the species, average fork length ranges from 60 mm for fall  
32 Chinook salmon (the smallest) to 195 mm for summer and winter steelhead (the largest). Given hatchery  
33 coho salmon, spring Chinook salmon, and steelhead are released as smolts and fall Chinook salmon  
34 released as presmolts and smolts, the interaction period is relatively short-lived because the hatchery fish

1 are actively emigrating to the estuary and ocean. The physiological condition of the hatchery smolts  
2 triggers their desire to emigrate. Therefore, in the population areas where the hatchery fish are released  
3 near the estuary and ocean (e.g., Chetco, Elk, Coos, Tenmile, Necanicum), the time of interaction  
4 between hatchery- and natural-origin fish in the space where hatchery fish are released (Figure 13-20) is  
5 very limited (likely hours to a few days). For the population areas where hatchery fish are released many  
6 miles from the ocean (i.e., Rogue, Umpqua, Siuslaw), it takes more time to emigrate to the estuary and  
7 ocean from the hatchery release point because of the relatively long travel distances, so the total amount  
8 of time hatchery fish could potentially interact with natural-origin fish in freshwater habitat areas may be  
9 up to 1 to 2 weeks.

10  
11 Overall, the greatest ecological risks of hatchery fish to Chinook salmon likely occur in the spring  
12 Chinook salmon populations. These populations have a different life history type and are less abundant  
13 than fall Chinook salmon populations. Juvenile spring Chinook salmon along the Oregon Coast reside in  
14 freshwater for up to one year before smolting. Therefore, these populations have the most exposure to  
15 hatchery fish releases while being in freshwater. All of the hatchery releases into these population areas  
16 would interact for at least some time with juvenile spring Chinook salmon. The abundance of spring  
17 Chinook salmon is much lower than fall Chinook salmon (especially in the Nestucca, Trask, and Wilson  
18 Rivers). The risks are greater when population abundances are lower. Ecological interactions between  
19 hatchery fish and spring Chinook salmon is likely to be short-lived, with interaction periods up to 2  
20 weeks. The overall impact is expected to be low to moderate level for spring Chinook salmon.

## 21 22 **Oregon Coastal Chum Salmon**

23 Alternative 1 would maintain all existing hatchery programs along the Oregon Coast. Effects of  
24 Alternative 1 would be similar to effects under current conditions for chum salmon, where some  
25 populations are affected by hatchery facilities and hatchery fish. Since chum salmon primarily occur in  
26 rivers draining into Tillamook Bay, the Trask Hatchery programs for steelhead, Chinook salmon, and  
27 coho salmon are most likely to affect chum salmon. Chum salmon are also periodically observed in the  
28 Alsea River. All of the other rivers along the Oregon Coast within the ESU do not consistently have  
29 chum salmon present.

30  
31 There would be no genetic effects from the hatchery programs because no hatchery chum salmon are  
32 released along the Oregon Coast and other salmonid species do not spawn with chum salmon in the wild.  
33 Chum salmon would benefit from Alternative 1 because hatchery fish of other species present in the

1 rivers of Tillamook Bay would contribute nutrients to the ecosystem, benefitting existing natural-origin  
2 chum salmon populations. Fisheries would continue to be managed entirely for catch and release of all  
3 chum salmon. The incidental adverse effect of catching and releasing chum salmon while targeting other  
4 salmon would be low because few chum salmon are caught, the migrating timing of chum salmon is short  
5 when these fish are exposed to fishing while in freshwater (i.e., 1 to 2 weeks in duration). Therefore,  
6 Alternative 1 would result in genetic and fishery impacts on chum salmon essentially the same as under  
7 current conditions.

8  
9 Alternative 1 could potentially result in adverse ecological effects on chum salmon due to predation and  
10 competition with hatchery fish. Hatchery fall Chinook salmon fingerlings and smolts are most likely to  
11 interact with juvenile chum salmon while in freshwater because of the overlap between the release of  
12 these hatchery fish and the emergence timing of chum salmon fry. Hatchery fall Chinook salmon and  
13 chum salmon could be present at the same time in Tillamook Bay. The impact of hatchery fall Chinook  
14 salmon is expected to be low because of the relatively low number of hatchery fish released and the  
15 relatively large habitat area of Tillamook Bay. Predation is not likely because the two groups of fish are  
16 similar in size. All of the other hatchery fish releases occur (February-April) prior to the peak emigration  
17 of chum salmon into Tillamook Bay (May-August), and, therefore, the adverse effects are expected to be  
18 negligible.

#### 20 **Oregon Coastal Steelhead**

21 Alternative 1 would maintain all existing hatchery programs along the Oregon Coast. Effects under  
22 Alternative 1 would be similar to those under current conditions for steelhead, where some populations  
23 are affected by hatchery facilities and the release of hatchery fish.

24  
25 Genetic risks of hatchery steelhead spawning in the wild would continue to be low to moderate depending  
26 upon the population and run type (Subsection 3.4, Salmon and Steelhead and Their Habitats). The  
27 genetic risks are highest in the population areas where hatchery steelhead are released: Chetco, Rogue,  
28 Coquille, Coos, Umpqua, Tenmile, Siuslaw, Alsea, Siletz, Nestucca, Wilson, Nehalem, and Necanicum  
29 rivers. The proportion of hatchery steelhead spawning in the wild ranges from five percent (south coast),  
30 seven percent (Rogue River Basin), six percent (Umpqua River Basin), 17 percent (mid-south coast  
31 streams, like Coos, Coquille), 22 percent mid-coast, (e.g., Siuslaw, Alsea, Siletz), and 11 percent (north  
32 coast, e.g., Wilson, Nehalem, Necanicum) (Jacobsen et al. 2015). In the populations with the greatest  
33 pHOS, genetic impacts are likely to be highest (i.e., Siuslaw, Alsea, Siletz). The genetic population

1 structure of these natural-origin winter steelhead populations are likely to be most impacted by hatchery-  
2 influenced selection (domestication). Hatchery steelhead have been shown to reduce the fitness of  
3 natural-origin steelhead when interbreeding together in the wild (Araki et al. 2007). These pHOS  
4 estimates are likely to remain similar to previous years under Alternative 1.

5  
6 Natural spawning by hatchery steelhead is likely to be concentrated most in the areas around where the  
7 fish were released as smolts. Consequently, natural-origin fish will be most affected in these areas. If the  
8 hatchery fish point of release, or hatchery facility, is located near prime spawning areas, then  
9 interbreeding between hatchery and natural steelhead is likely to occur. The risks of hatchery-influenced  
10 selection will be highest in these areas. Other spawning areas not in the vicinity of the hatchery fish  
11 release points are not likely to be affected at all. Overall, given the pHOS estimates, populations of  
12 steelhead associated with the Siuslaw, Alsea, Siletz, Coos, and Coquille hatchery programs are likely to  
13 be moderately impacted by interbreeding between hatchery and natural steelhead.

14  
15 The ecological effects (interactions between hatchery- and natural-origin salmon and steelhead) of  
16 hatchery programs would continue on steelhead in the populations where the hatchery programs occur  
17 (Figure 5; Figure 13; Figure 14; Figure 15; Figure 16; Figure 17; Figure 18; Figure 19; Figure 20).  
18 Potential effects are greatest in the population areas that have the most miles of habitat affected by  
19 hatchery fish releases in relation to the watershed size. These population areas would have the highest  
20 densities of hatchery fish per linear mile of available habitat (Figure 4). The potential ecological effects  
21 are also influenced by the location where hatchery fish are released in the watershed. Releases of  
22 hatchery fish in the upper areas of the watershed would potentially have the greatest amount of time and  
23 space to affect naturally-occurring salmonids. In addition, if hatchery fish are released in principal  
24 spawning and rearing areas of natural-origin salmonids (i.e., tributaries), then interactions would be  
25 potentially greater than if hatchery fish are released in mainstem river areas. Therefore, the potential  
26 ecological interactions between hatchery fish and steelhead is dependent upon space and time within the  
27 specific population areas (Table 12).

28  
29 The ecological interaction space between hatchery fish and steelhead was evaluated as the percent of  
30 Oregon Coast coho salmon critical habitat affected by the releases of all species of hatchery fish. Coho  
31 salmon critical habitat is a good proxy for steelhead distribution. Overall, 11 percent of critical habitat is  
32 affected by hatchery fish in the Oregon Coast ESU and approximately 16 percent of steelhead habitat is  
33 affected by hatchery fish in the SONCC ESU. The principal habitat areas affected by hatchery fish are

1 the mainstem river areas and estuaries. The vast majority of salmon and steelhead habitat is not affected  
2 by hatchery fish (Figures 13-20).

3  
4 In addition to the geographic extent of hatchery fish released within a population area (i.e., space),  
5 another aspect of the interaction between hatchery- and natural-origin salmon and steelhead is the period  
6 of time affected by the presence of hatchery fish in the streams and rivers. The target release size for  
7 hatchery fish along the Oregon Coast is the smolt life stage for all steelhead, coho salmon, and spring  
8 Chinook salmon. Hatchery fall Chinook salmon are released as smolts or just prior to smolting as  
9 fingerlings (presmolts). Depending upon the species, average fork length ranges from 60 mm for fall  
10 Chinook salmon (the smallest) to 195 mm for summer and winter steelhead (the largest). Given hatchery  
11 coho salmon, spring Chinook salmon, and steelhead are released as smolts and fall Chinook salmon  
12 released as presmolts and smolts, the interaction period with juvenile steelhead is relatively short-lived  
13 because the hatchery fish are actively emigrating to the estuary and ocean. The physiological condition of  
14 the hatchery smolts triggers their desire to emigrate. Therefore, in the population areas where the  
15 hatchery fish are released near the estuary and ocean (e.g., Chetco, Elk, Coos, Tenmile, Necanicum), the  
16 time of interaction between hatchery- and natural-origin fish in the space where hatchery fish are released  
17 (Figures 13-20) is very limited (likely hours to a few days). For the population areas where hatchery fish  
18 are released many miles from the ocean (i.e., Rogue, Umpqua, Siuslaw), it takes more time to emigrate to  
19 the estuary and ocean from the hatchery release point because of the relatively long travel distances, so  
20 the total amount of time hatchery fish could potentially interact with natural-origin fish in freshwater  
21 habitat areas may be up to 1 to 2 weeks.

22  
23 Hatchery fish would contribute nutrients to the ecosystem from some natural spawning and outplanting of  
24 surplus carcasses from the hatcheries, with a resulting benefit to natural-origin steelhead. Even though  
25 hatchery carcasses would be a minority compared to the abundance of natural-origin fish, any additional  
26 marine derived nutrient is a benefit to the ecosystem. Fisheries for hatchery- and natural-origin steelhead  
27 would continue to be managed similar to current conditions. Alternative 1 would result in hatchery  
28 impacts on steelhead essentially the same as under current conditions.

29  
30 **4.4.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for**  
31 **Operation of Hatchery Programs on the Oregon Coast**

32  
33 Under Alternative 2, the 10 hatchery facilities and associated hatchery programs along the Oregon Coast  
34 would operate as proposed in the submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed  
35 Action/Preferred Alternative): Approve ODFW's HGMPs for Operation of Hatchery Programs on the

1 Oregon Coast); Appendix A). Short- and long-term risks associated with genetic effects, competition and  
2 predation, facility effects, natural population status masking, incidental fishing effects, or disease transfer  
3 from the hatchery programs would be the same under Alternative 2 as described under Alternative 1 (No-  
4 Action). There would be no change in the genetic and ecological effects under Alternative 2 because the  
5 hatchery programs have been operating according to the submitted HGMPs in Alternative 1. The analysis  
6 of the site-specific effects under Alternative 2 would be identical to effects analyzed under Alternative 1.  
7 The hatchery programs would continue to pose short- and long-term adverse risks associated with genetic  
8 effects, competition and predation, facility effects, masking of natural population status from hatchery  
9 fish spawning, incidental fishing effects, and transfer of pathogens from hatchery fish and/or the hatchery  
10 facility to the adjacent river or stream. The hatchery programs would continue to provide some benefits  
11 to salmon and steelhead from hatchery fish carcasses and nutrient cycling in the ecosystem.  
12

#### 13 **4.4.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

14 Under Alternative 3, operation of the 10 hatchery facilities along the Oregon Coast would be terminated  
15 immediately (Subsection 2.3, Alternative 3: Terminate Hatchery Programs on the Oregon Coast).  
16 Consequently, Alternative 3 would eliminate all of the short- and long-term risks associated with  
17 hatcheries (genetic effects, competition and predation, facility effects, masking of natural population  
18 status from hatchery fish spawning, incidental fishing effects, and transfer of pathogens from hatchery  
19 fish and/or the hatchery facility to the adjacent river or stream). Alternative 3 would eliminate all  
20 hatchery-related risks to salmon and steelhead compared to Alternative 1. Alternative 3 would also  
21 eliminate the benefits from the hatchery programs providing marine derived nutrients from fish carcasses  
22 in the aquatic ecosystem. This would result in some adverse effect compared to Alternative 1 (Subsection  
23 3.5, Other Fish and Their Habitats). The effects of Alternative 3 on each species are discussed below.  
24

25 Alternative 3 would terminate all of the hatchery facility operations and ancillary sites used for  
26 broodstock collection and smolt releases along the Oregon Coast. The hatchery facilities would still  
27 remain in place physically, but all of the operations associated with the hatchery programs would be  
28 terminated under Alternative 3. The hatchery facilities would cease to operate the fish ladders and trap to  
29 collect returning hatchery fish and no hatchery fish would be spawned and propagated under Alternative  
30 3. Any potential delays associated with broodstock collection at trap locations would be eliminated – the  
31 magnitude of this benefit would be minor because the traps have been managed to minimize delay of fish  
32 migration and most of the watershed is not affected by hatchery traps and is, instead, freely accessible.  
33 Incidental capture of natural-origin salmon and steelhead at hatchery collection facilities would also be

1 eliminated under Alternative 3. The hatchery facilities would not have an effect on salmon under  
2 Alternative 3. Weirs or their panels would be removed; traps would be fully open or fully closed, and  
3 would not trap fish. Alternative 3 would be expected to benefit salmon and steelhead from ceasing to  
4 operate the hatchery collection facilities compared to the No-action Alternative.

5  
6 Critical habitat under the ESA is only designated for coho salmon. Essential Fish Habitat under the  
7 Magnuson-Stevens Fishery Conservation and Management Act applies to coho salmon, Chinook salmon,  
8 and chum salmon along the Oregon Coast. The termination of the 10 hatchery facilities under Alternative  
9 3 would provide some benefits to critical habitat and EFH in the local vicinity where the facilities are  
10 currently located compared to Alternative 1. The primary benefits to critical habitat and EFH would be  
11 from not having effluent discharged from the hatchery facilities to receiving waters (discussed in  
12 Subsection 4.3, Effects on Water Quality). The benefits are likely to be negligible because the impacts  
13 under current conditions are short-lived and confined exclusively to the area near the hatchery outfall.  
14 Alternative 3 would not result in any improvements to the physical habitat components of critical habitat  
15 and EFH (besides the effects of not operating the hatchery collection facilities previously discussed)  
16 compared to the No-action Alternative 1.

### 17 18 **Oregon Coastal Coho Salmon**

19 Under Alternative 3, all existing hatchery programs along the Oregon Coast would be terminated. This  
20 would include four hatchery coho salmon programs (Cow, Munsel (STEP), Trask, and Nehalem). At this  
21 time, none of the hatchery programs are managed to provide population viability benefits to coho salmon.  
22 The primary benefits of Alternative 3 for coho salmon would be a reduction in competition and predation  
23 of hatchery-origin fish on natural-origin coho salmon, and elimination of the effects of the operation of  
24 the hatchery facilities on juvenile and adult coho salmon compared to the No-action Alternative 1. The  
25 proportion of naturally spawning hatchery coho salmon (pHOS) in these populations is already very low  
26 under current conditions (zero to five percent per population; ODFW 2016a). Therefore little to no  
27 benefits would be expected from eliminating pHOS on coho salmon.

28  
29 Under Alternative 3, the greatest proportion of hatchery fish would be eliminated from the Coos and  
30 Coquille Rivers. Approximately 42 percent of the total hatchery production within the ESU would be  
31 eliminated in these two population areas under Alternative 3 compared to the No-action Alternative  
32 (ODFW 2013c). The other 58 percent of hatchery production is distributed among 16 other coho salmon  
33 populations in Tenmile, South Umpqua, North Umpqua, lower Umpqua, Siuslaw, Alsea, Yaquina, Siletz,

1 Salmon, Nestucca, Trask, Wilson, Kilchis, North Fork Nehalem, and Necanicum Rivers (ODFW 2013c).  
2 In thirty-nine out of 56 coho salmon populations, no hatchery fish are currently released and, thus, those  
3 39 populations would not see a benefit from Alternative 3 compared to Alternative 1 (No-action).

4  
5 Under Alternative 3, the populations with the largest total hatchery releases eliminated would be expected  
6 to see the greatest benefits, particularly in the Coos population where large fall Chinook salmon hatchery  
7 programs would be eliminated. However, the coho salmon populations in the Coos and Coquille Rivers  
8 are amongst the most abundant in the ESU (Stout et al. 2012; ODFW 2013a). Therefore, eliminating the  
9 highest densities of hatchery fish in these two populations would be expected to result in few, if any,  
10 recovery benefits for the ESU under Alternative 3 compared to the No-action Alternative 1.

11  
12 For the SONCC ESU along the Oregon Coast, hatchery fish are currently released into the Chetco,  
13 Rogue, and Elk Rivers (ODFW 2013c). Seventy-six percent of the hatchery fish from these three  
14 programs are released into the Rogue River (2.24 million fish) and thus the greatest likelihood of  
15 competition and predation on coho salmon is downstream from Cole Rivers Hatchery on the mainstem  
16 Rogue River. Under Alternative 3, if all of the hatchery programs were terminated, coho salmon would  
17 benefit from reduced competition and predation, particularly in the mainstem Rogue River.

18  
19 Eliminating the release of all hatchery fish under Alternative 3, and, therefore, their return as adults,  
20 would decrease the amount of carcass nutrients provided to the natural habitat from decomposing  
21 hatchery fish. Hatchery fish contribute nutrients if they spawn in the wild or are intentionally outplanted  
22 by hatchery personnel. In 2012, more than 16,000 hatchery fish carcasses were outplanted from the  
23 hatcheries for nutrient enhancement within the Oregon Coast Region (ODFW 2013d). The percentage of  
24 total carcasses attributable to hatchery fish is estimated to be less than 20 percent. More than 80 percent  
25 of spawning salmon and steelhead are of natural-origin (Figure 8; ODFW 2014). Even though the  
26 hatchery programs may only contribute up to 20 percent of marine-derived nutrients to the freshwater  
27 environment, this additional contribution from the hatchery programs is important because habitat  
28 productivity is a key limiting factor and these watersheds are naturally low in nutrients (Stout et al. 2012;  
29 ODFW 2014) – and, for example, this would mean that nearly 20,000 hatchery fish would be contributing  
30 nutrients to natural production areas in the Rogue River. Since natural-origin salmon and steelhead  
31 returns are greatly reduced from historical levels (to 20 percent or less of historical), all additional  
32 marine-derived nutrients could help increase the productivity of the aquatic environment (Cederholm et  
33 al. 1999). Therefore, discontinuing the hatchery programs under Alternative 3 would result in an adverse  
34 effect on nutrient enhancement of the ecosystem compared to the No-action Alternative 1.

1  
2 Regarding fishery impacts, Alternative 3 would eliminate returning hatchery fish from four relatively  
3 small hatchery coho salmon programs that are targeted in recreational and commercial fisheries along the  
4 Oregon Coast. Fishing effort and catch would likely change focus from hatchery fish to areas where  
5 natural-origin fish can be legally harvested. For coho salmon, retention of natural-origin fish has been  
6 allowed under the ESA in years when the returns are abundant (NMFS 2009). If returning hatchery fish  
7 are eliminated under Alternative 3, fishery effort for natural-origin coho salmon would likely increase in  
8 years when the fishery is allowed compared to current conditions. However, the harvest impact on  
9 natural-origin coho salmon would be managed to remain the same under ESA fishery regulatory  
10 management plans (harvest impacts could not legally increase on natural-origin coho above the rates  
11 specified in Amendment 13 to the Pacific Salmon Plan (NMFS 2009). Therefore, harvest impacts on  
12 natural-origin coho salmon would remain unchanged under Alternative 3. The potential effect on fishing  
13 opportunity for hatchery coho salmon is considered in Subsection 4.7, Effects on Socioeconomics, and  
14 Subsection 4.8, Effects on Environmental Justice. Bycatch of coho salmon in fisheries targeting other  
15 species would be low, similar to the No-action Alternative conditions, given the low level of incidental  
16 take of other species in coho salmon-directed fisheries (PFMC 2013).

17

### 18 **Oregon Coastal Chinook Salmon**

19 Under Alternative 3, all existing hatchery programs along the Oregon Coast would be terminated. Most  
20 of the hatchery production within the Oregon Coast Region is spring and fall Chinook salmon (72 percent  
21 of all salmonid hatchery production in the Oregon Coast Region). At this time, none of the hatchery  
22 programs are intended to provide population viability benefits to Chinook salmon. The primary benefits  
23 of Alternative 3 to Chinook salmon (compared to the No-action Alternative) would be a reduction in  
24 genetic risks, reduction in competition, and reduction in predation of hatchery-origin fish on natural-  
25 origin Chinook salmon. Since natural spawning by hatchery fish in the wild was identified as a concern  
26 for two Chinook salmon populations (Elk River and Salmon River; Subsection 3.4, Salmon and Steelhead  
27 and Their Habitats), Alternative 3 would likely decrease the genetic risks to natural-origin Chinook  
28 salmon in these two populations and reduce ecological interactions between natural- and hatchery-origin  
29 Chinook compared to Alternative 1.

30

31 Eliminating all hatchery fish under Alternative 3 would decrease the amount of carcass nutrients provided  
32 to the natural habitat from decomposing hatchery fish in the short term compared to the No-action  
33 Alternative. Even though hatchery fish represent a relatively low proportion of available carcasses in

1 Oregon Coast streams and rivers (20 percent or less of the total), any decrease in number would likely  
2 result in an adverse effect because habitat productivity is substantially reduced from historical levels and  
3 remains a key limiting factor. Over the long term, natural production of Chinook salmon populations  
4 may increase some from the elimination of the hatchery programs, which would compensate for the  
5 immediate loss of hatchery fish carcass nutrients from the discontinuation of the hatchery programs under  
6 Alternative 3 compared to the No-action Alternative 1.

7  
8 Alternative 3 would eliminate the operation of the 10 hatchery facilities and all other ancillary sites used  
9 for broodstock collection and release of juvenile hatchery fish. Delay and handling of juvenile and adult  
10 Chinook salmon associated with trap operations would be eliminated. All of the hatchery facilities would  
11 cease to use water for hatchery operations and no hatchery effluent would be released. All of the hatchery  
12 facilities would still be in place physically, but their collection traps, operations, and associated impacts  
13 would be terminated under Alternative 3. Weirs or their panels would be removed; traps would be fully  
14 open or fully closed, and would not trap fish. Alternative 3 would be expected to benefit Chinook salmon  
15 compared to the No-action Alternative.

16  
17 Alternative 3 would eliminate returning hatchery fish that are targeted in recreational and commercial  
18 fisheries along the Oregon Coast. Fishing effort and catch would likely change focus from hatchery fish  
19 to areas where natural-origin fish can be harvested (since hatchery Chinook salmon would be eliminated  
20 under this alternative). For Chinook salmon, retention of natural-origin fish is allowed in nearly every  
21 river (with the exception of spring Chinook salmon). If returning hatchery fish are eliminated under  
22 Alternative 3, two possible outcomes are likely, depending upon the abundance of natural-origin Chinook  
23 salmon. First, if hatchery Chinook salmon are eliminated from an area where hatchery fish made up the  
24 bulk of harvested fish, fishing effort would likely decrease under Alternative 3 because too few natural-  
25 origin would be available to sustain the fishery. Second, if hatchery fish are eliminated from an area  
26 where natural-origin Chinook salmon are abundant, the fisheries would likely switch over to harvesting a  
27 greater number of natural-origin fish in the same area (this is the most likely situation with fall Chinook  
28 salmon). In these situations, fishery effort on natural-origin Chinook salmon would likely increase  
29 compared to baseline conditions in fisheries where natural-origin Chinook salmon can be retained under  
30 current fishing regulations. These Chinook salmon fisheries are intensive and the harvest rate on natural-  
31 origin Chinook salmon would be expected to increase substantially because hatchery Chinook salmon  
32 would no longer be available for harvest. The State of Oregon might have to change current regulations,  
33 which is within its purview for non-ESA-listed species and those without a prescriptive management plan,  
34 in order to maintain harvest rates at a sustainable level for natural-origin Chinook salmon in those areas

1 where hatchery programs are eliminated under Alternative 3. Compared to the No-action Alternative,  
2 Alternative 3 (termination of hatchery Chinook salmon programs) would be expected to result in a higher  
3 impact on natural-origin Chinook salmon because fishery effort and harvest would be directed more at  
4 natural-origin Chinook salmon. The overall number of Chinook salmon harvested would be expected to  
5 decrease under Alternative 3 because natural-origin Chinook salmon populations cannot sustain the  
6 higher harvest rates that can be directed at hatchery fish programs.

7

### 8 **Oregon Coastal Chum Salmon**

9 Alternative 3 would terminate all existing hatchery programs along the Oregon Coast. At this time, none  
10 of the hatchery programs are intended to provide population viability benefits to chum salmon because no  
11 hatchery chum salmon programs exist along the Oregon Coast. The primary effect of Alternative 3 on  
12 chum salmon would be a reduction in competition with and predation by hatchery-origin fish on natural-  
13 origin chum salmon. Alternative 3 would benefit chum salmon in the Yaquina, Siletz, Salmon, Nestucca,  
14 Netarts, Tillamook, Nehalem, and Necanicum River Basins compared to the No-action Alternative  
15 conditions by eliminating all hatchery fish released into those watersheds (Subsection 3.4, Salmon and  
16 Steelhead and Their Habitats). Since chum salmon are depressed in all of these areas along the Oregon  
17 Coast, the greatest benefit to chum salmon from Alternative 3 is most likely to occur in Tillamook Bay  
18 because, this area would have the largest reduction in the number of hatchery fish released. In all cases,  
19 because chum salmon populations are in low numbers and poor condition, they would likely benefit to  
20 some extent from the reduction of interactions with hatchery-origin fish, but the available data are  
21 insufficient to indicate any substantial benefit.

22

23 The greatest benefit to chum salmon from the termination of hatchery programs under Alternative 4  
24 would be for the hatchery smolt programs in Tillamook Bay. Under Alternative 4, termination of the  
25 winter and summer steelhead smolt release programs in the Wilson and Trask Rivers, coho salmon in the  
26 Trask River, and spring Chinook smolt program in the Wilson and Trask Rivers would provide the  
27 greatest potential benefits to chum salmon because the hatchery smolts are large enough to predate upon  
28 newly emerged chum salmon fry during the period of hatchery fish releases in February through April  
29 (Table 5, Table 12, Figure 4, Figure 19).

30

31 Eliminating all hatchery fish under Alternative 3 would decrease the amount of carcass nutrients provided  
32 to the natural habitat from decomposing hatchery fish. Even though hatchery fish represent a relatively  
33 low proportion of available carcasses in Oregon Coast streams and rivers (less than 20 percent of the

1 total), any decrease in number would likely result in an adverse effect because habitat productivity is  
2 substantially reduced from historical levels and remains a key limiting factor. Therefore, Alternative 3  
3 would result in less marine-derived nutrients from hatchery fish carcasses compared to the No-action  
4 Alternative.

5  
6 Alternative 3 would eliminate the operation of the 10 hatchery facilities and all other ancillary sites used  
7 for broodstock collection and release of juvenile hatchery fish. Delay and handling of juvenile and adult  
8 chum salmon associated with trap operations would be eliminated in the population areas where chum  
9 salmon occur (Tillamook and Nehalem). All of the hatchery facilities would cease to use water for  
10 hatchery operations and no hatchery effluent would be released. The hatchery facilities would still be in  
11 place physically, but their operations and associated impacts would be terminated under Alternative 3.  
12 Alternative 3 would be expected to benefit chum salmon compared to Alternative 1. However, the  
13 expected benefit is negligible because most of the hatchery facilities do not exist in the lowland areas  
14 where chum salmon spawn and rear; only Salmon River, Cedar Creek, Trask, and Nehalem Hatcheries are  
15 located where chum salmon could potentially co-occur, so those chum salmon populations in the Salmon,  
16 Nestucca, Tillamook, and Nehalem Rivers are the ones that would benefit, albeit only slightly, from  
17 cessation of the facility operations.

18  
19 Alternative 3 would eliminate returning hatchery fish that are targeted in recreational and commercial  
20 fisheries along the Oregon Coast. Fishing effort and catch would likely change focus from hatchery fish  
21 to areas where natural-origin fish can be harvested. For chum salmon, no retention is allowed along the  
22 Oregon Coast. If returning hatchery fish are eliminated under Alternative 3, fishery effort for chum  
23 salmon would not likely change compared to Alternative 1 because fisheries targeting chum salmon are  
24 essentially non-existent (with the exception of the Kilchis and Miami Rivers in Tillamook Bay where  
25 chum salmon are incidentally caught). Compared to Alternative 1, Alternative 3 would be expected to  
26 result in an undetectable benefit to chum salmon from changes in fishery harvest from the elimination of  
27 hatchery fish because chum salmon are not subject to directed fisheries and are not taken incidentally in  
28 meaningful numbers in other fisheries.

### 30 **Oregon Coastal Steelhead**

31 Alternative 3 would terminate all existing hatchery programs along the Oregon Coast. As proposed, none  
32 of the hatchery programs are intended to provide population viability benefits to summer and winter  
33 steelhead. The primary benefits of Alternative 3 to steelhead would be a reduction in genetic risks,

1 competition, and predation of hatchery-origin fish on natural-origin steelhead. Since natural spawning by  
2 hatchery fish in the wild was identified as a concern for many steelhead populations (Subsection 3.4,  
3 Salmon and Steelhead and Their Habitats), Alternative 3 would benefit steelhead compared to Alternative  
4 1 by eliminating all hatchery fish along the Oregon Coast. The greatest benefits from Alternative 3 to  
5 steelhead would be in the population areas that currently have the highest pHOS (22 percent average in  
6 mid-coast streams). The potential benefit would be moderately positive in these populations. The genetic  
7 structure of these winter steelhead populations would be improved by not having hatchery steelhead  
8 released into these populations. Natural selection would enhance the fitness of these populations without  
9 having the continual infusion of hatchery-selected genes into the wild population. For the other steelhead  
10 populations, the potential benefits would be low positive because pHOS is currently less than seven  
11 percent for the south coast, Rogue, and Umpqua Basins (Jacobsen et al. 2015). Since the existing  
12 hatchery steelhead are all derived from local broodstock, pHOS levels in the range of zero to seven  
13 percent are within the range of natural inter-population straying levels (Grant 1997). Quinn (2005) stated  
14 natural straying occurs in rates of one to five percent of any salmonid population. Given this aspect of  
15 natural straying, it would be expected that termination of the hatchery steelhead programs would  
16 eliminate human-induced, hatchery-influenced selection effects (domestication) from hatchery steelhead  
17 being reared in a hatchery, but natural straying impacts would continue to occur from adjacent wild  
18 populations.

19  
20 Eliminating all hatchery fish under Alternative 3 would decrease the amount of carcass nutrients provided  
21 to the natural habitat from decomposing hatchery fish. Even though hatchery fish represent a relatively  
22 low proportion of available carcasses in Oregon Coast streams and rivers (less than 20 percent of the  
23 total), any decrease in number would likely result in an adverse effect because habitat productivity is  
24 substantially reduced from historical levels and remains a key limiting factor. Therefore, Alternative 3  
25 would result in less marine-derived nutrients from hatchery fish carcasses compared to the No-action  
26 Alternative.

27  
28 Alternative 3 would eliminate the operation of the 10 hatchery facilities and all other ancillary sites used  
29 for broodstock collection and release of juvenile hatchery fish. The hatchery facilities would remain in  
30 place physically but the associated operations and effects would all be terminated under Alternative 3.  
31 Delay and handling of juvenile and adult steelhead associated with trap operations would be eliminated.  
32 All of the hatchery facilities would cease to use water for hatchery operations and no hatchery effluent  
33 would be released. Because of the elimination of the operation of hatchery facilities, Alternative 3 would  
34 be expected to benefit steelhead compared to the No-action Alternative.

1  
2 Alternative 3 would eliminate returning hatchery fish that are targeted in recreational fisheries along the  
3 Oregon Coast. Fishing effort and catch would likely change focus from hatchery fish to the few areas  
4 where natural-origin fish can be harvested. For steelhead, retention of natural-origin fish is allowed in  
5 some southern Oregon rivers. If returning hatchery fish are eliminated under Alternative 3, fishery effort  
6 for natural-origin steelhead would likely increase compared to the No-action Alternative. These steelhead  
7 fisheries are intensive and the impact rate on some stocks (like summer-run) would be expected to  
8 increase substantially even from catch and release. The State of Oregon might have to change current  
9 regulations in order to maintain harvest impact rates at a level appropriate for the populations. Some  
10 other steelhead populations, where the hatchery program was eliminated, would likely have less fishing  
11 pressure and therefore less impact from fishing. Overall, compared to the No-action Alternative  
12 conditions, Alternative 3 would be expected to result in a higher impact on natural-origin steelhead from  
13 increased fishery exploitation rates.  
14

#### 15 **4.4.4. Alternative 4 – Reduced Hatchery Production**

16 Under Alternative 4, hatchery production would be reduced at the 10 hatchery facilities along the Oregon  
17 Coast by 50 percent compared to the No-action Alternative. Consequently, Alternative 4 would reduce  
18 all of the short- and long-term risks associated with hatcheries (genetic effects, competition and predation,  
19 facility effects, masking of natural population status from hatchery fish spawning, incidental fishing  
20 effects, and transfer of pathogens from hatchery fish and/or the hatchery facility to the adjacent river or  
21 stream) compared to the No-action Alternative. Alternative 4 would eliminate all hatchery-related risks  
22 to salmon and steelhead by at least 50 percent compared to Alternative 1. Alternative 4 would also  
23 eliminate some of the benefits from the hatchery programs providing marine-derived nutrients from fish  
24 carcasses in the aquatic ecosystem. This would result in adverse effects compared to Alternative 1  
25 (Subsection 3.5, Other Fish and Their Habitats). The effects of Alternative 4 on each species are  
26 discussed below.  
27

28 Critical habitat under the ESA is only designated for coho salmon. Essential Fish Habitat under the  
29 Magnuson-Stevens Fishery Conservation and Management Act applies to coho salmon, Chinook salmon,  
30 and chum salmon along the Oregon Coast. The reduction in hatchery production at the 10 hatchery  
31 facilities under Alternative 4 would provide some benefits to critical habitat and EFH in the local vicinity  
32 where the facilities are currently located compared to Alternative 1. The primary benefits to critical  
33 habitat and EFH would be from not having as much effluent discharged from the hatchery facilities to

1 receiving waters (discussed in Subsection 4.3, Effects on Water Quality). The benefits are likely to be  
2 negligible because the impacts under current conditions are short-lived and confined exclusively to the  
3 area near the hatchery outfall. Alternative 4 would not result in any improvements to the physical habitat  
4 components of critical habitat and EFH compared to the No-action Alternative 1 because the hatchery  
5 collection facilities would still be in operation, but more limited in time of operation.

### 7 **Oregon Coastal Coho Salmon**

8 Under Alternative 4, all existing hatchery programs along the Oregon Coast would be reduced by 50  
9 percent. At this time, none of the hatchery coho salmon programs (Cow, Munsel (STEP), Trask,  
10 Nehalem) are managed to provide population viability benefits to natural coho salmon. The primary  
11 benefits of Alternative 4 for coho salmon would be a reduction in competition and predation of hatchery-  
12 origin fish on natural-origin coho salmon, and a 50 percent reduction of the effects of the operation of the  
13 hatchery facilities on juvenile and adult coho salmon compared to the No-action Alternative 1.

14  
15 Under Alternative 4, a 50 percent reduction in hatchery production would equate to the greatest  
16 elimination of hatchery fish released in the Coos and Coquille Rivers because approximately 42 percent of  
17 the total hatchery production within the ESU occurs in these rivers compared to the No-action Alternative  
18 (ODFW 2013c). The other 58 percent of hatchery production is distributed among 16 other coho salmon  
19 populations in Tenmile, South Umpqua, North Umpqua, lower Umpqua, Siuslaw, Alsea, Yaquina, Siletz,  
20 Salmon, Nestucca, Trask, Wilson, Kilchis, North Fork Nehalem, and Necanicum Rivers (ODFW 2013c).  
21 In thirty-nine out of 56 coho salmon populations, no hatchery fish are currently released and, thus, those  
22 39 populations would not see a benefit from Alternative 4 compared to Alternative 1 (No-action).

23  
24 Under Alternative 4, the populations with the largest total hatchery releases eliminated would be expected  
25 to see the greatest benefits, particularly in the Coos and Coquille populations where large fall Chinook  
26 salmon hatchery programs would be eliminated by 50 percent. No hatchery coho salmon are present in  
27 the Coquille and Coos populations so impacts under Alternative 4 would not be genetic, but ecological.  
28 The coho salmon populations in the Coos and Coquille Rivers are amongst the most abundant and  
29 productive in the ESU (Stout et al. 2012; ODFW 2013a). Therefore, reducing the highest densities of  
30 hatchery fish by 50 percent in these two populations would be expected to result in few, if any, recovery  
31 benefits for the ESU under Alternative 4 compared to the No-action Alternative 1.

1 For the SONCC ESU along the Oregon Coast, hatchery fish are currently released into the Chetco,  
2 Rogue, and Elk Rivers (ODFW 2013c). Seventy-six percent of the hatchery fish from these three  
3 programs are released into the Rogue River (2.24 million fish) and thus the greatest likelihood of  
4 competition and predation on natural-origin coho salmon is downstream from Cole Rivers Hatchery on  
5 the mainstem Rogue River. Under Alternative 4, if the hatchery programs were reduced by 50 percent,  
6 natural-origin coho salmon would slightly benefit from reduced competition and predation, particularly in  
7 the mainstem Rogue River.

8  
9 Reducing the release of hatchery fish by 50 percent under Alternative 4, and, therefore, their return as  
10 adults, would decrease the amount of carcass nutrients provided to the natural habitat from decomposing  
11 hatchery fish. Hatchery fish contribute nutrients if they spawn in the wild or are intentionally outplanted  
12 by hatchery personnel. In 2012, more than 16,000 hatchery fish carcasses were outplanted from the  
13 hatcheries for nutrient enhancement within the Oregon Coast Region (ODFW 2013d). Therefore, under  
14 Alternative 4 only 8,000 hatchery fish may be available for outplanting. The percentage of total carcasses  
15 attributable to hatchery fish under Alternative 4 is estimated to be less than 10 percent. More than 90  
16 percent of spawning salmon and steelhead are of natural-origin, and therefore, natural-origin fish make up  
17 most of the nutrient contribution along the Oregon Coast (Figure 8; ODFW 2014).

18  
19 Even though the hatchery programs may only contribute up to 10 percent of marine-derived nutrients to  
20 the freshwater environment under Alternative 4, this additional contribution from the hatchery programs  
21 is important because habitat productivity is a key limiting factor and these watersheds are naturally low in  
22 nutrients (Stout et al. 2012; ODFW 2014). Since natural-origin salmon and steelhead returns are greatly  
23 reduced from historical levels (to 20 percent or less of historical), all additional marine-derived nutrients  
24 could help increase the productivity of the aquatic environment (Cederholm et al. 1999). Therefore,  
25 reducing the hatchery programs under Alternative 4 would result in an adverse effect on nutrient  
26 enhancement of the ecosystem compared to the No-action Alternative 1.

27  
28 Alternative 4 would reduce operations of the hatchery facilities and ancillary sites used for broodstock  
29 collection and smolt releases by 50 percent along the Oregon Coast. The hatchery facilities would still  
30 remain in place physically, but all of the operations associated with the hatchery programs would be  
31 reduced under Alternative 4. The hatchery facilities would continue to operate the fish ladders and trap to  
32 collect returning hatchery fish, but operations would be reduced compared to the No-action Alternative.  
33 Potential delays associated with broodstock collection at trap locations would be reduced – the magnitude  
34 of this benefit would be minor because the traps have been managed to minimize delay of fish migration

1 and most of the watershed is not affected by hatchery traps and is, instead, freely accessible. Incidental  
2 capture of natural-origin coho salmon at hatchery collection facilities would also be reduced by 50  
3 percent under Alternative 4. However, the current reported incidental capture of natural-origin coho  
4 salmon is minimal, but would be a negligible beneficial effect of this alternative compared to the No-  
5 action alternative. The hatchery facilities would still have an effect on salmon under Alternative 4, but at  
6 a reduced rate. Weirs or their panels would still be in place; traps would still be in operation, and 50  
7 percent of the fish would be trapped as compared to the No-action Alternative. Alternative 4 would be  
8 expected to provide a negligible benefit to coho salmon compared to the No-action Alternative.

9  
10 Regarding fishery impacts, Alternative 4 would reduce returning hatchery fish from four relatively small  
11 hatchery coho salmon programs that are targeted in recreational and commercial fisheries along the  
12 Oregon Coast. Fishing effort and catch would likely change focus from hatchery fish to areas where  
13 natural-origin fish can be legally harvested. For coho salmon, retention of natural-origin fish has been  
14 allowed under the ESA in years when the returns are abundant (NMFS 2009). If returning hatchery fish  
15 are reduced under Alternative 4, fishery effort for natural-origin coho salmon would likely increase in  
16 years when the fishery is allowed compared to current conditions. However, the harvest impact on  
17 natural-origin coho salmon would be managed to remain the same under ESA fishery regulatory  
18 management plans (harvest impacts could not legally increase on natural-origin coho above the rates  
19 specified in Amendment 13 to the Pacific Salmon Plan (NMFS 2009). Therefore, harvest impacts on  
20 natural-origin coho salmon would remain unchanged under Alternative 4. The potential effect on fishing  
21 opportunity for hatchery coho salmon is considered in subsection 4.7, Effects on Socioeconomics, and  
22 subsection 4.8, Effects on Environmental Justice. Bycatch of coho salmon in fisheries targeting other  
23 species would be low, similar to the No-action Alternative conditions, given the low level of incidental  
24 take of other species in coho salmon-directed fisheries (PFMC 2013).

### 25 26 **Oregon Coastal Chinook Salmon**

27 Under Alternative 4, existing hatchery programs along the Oregon Coast would be reduced by 50 percent.  
28 Most of the hatchery production along the Oregon Coast Region is spring and fall Chinook salmon (72  
29 percent of all salmonid hatchery production in the Oregon Coast Region). At this time, none of the  
30 hatchery programs are intended to provide population viability benefits to Chinook salmon. The primary  
31 benefits of Alternative 4 to Chinook salmon (compared to the No-action Alternative) would be a  
32 reduction in genetic risks, reduction in competition, and reduction in predation of hatchery-origin fish on  
33 natural-origin Chinook salmon. Since natural spawning by hatchery fish in the wild was identified as a

1 concern for two Chinook salmon populations (Elk River and Salmon River; Subsection 3.4, Salmon and  
2 Steelhead and Their Habitats), Alternative 4 would likely reduce the genetic risks from hatchery Chinook  
3 salmon on natural-origin Chinook salmon in these two populations and reduce ecological interactions  
4 between natural- and hatchery-origin Chinook; and thus be a beneficial effect compared to Alternative 1.  
5

6 Reducing the releases of hatchery fish under Alternative 4 would decrease the amount of carcass nutrients  
7 provided to the natural habitat from decomposing hatchery fish in the short term compared to the No-  
8 action Alternative. Even though hatchery fish represent a relatively low proportion of available carcasses  
9 in Oregon Coast streams and rivers (20 percent or less of the total), any decrease in number would likely  
10 result in an adverse effect because habitat productivity is substantially reduced from historical levels and  
11 remains a key limiting factor. Over the long term, natural production of Chinook salmon may increase  
12 slightly in the populations where hatchery fish were reduced by 50 percent under Alternative 4 from  
13 having fewer hatchery fish negative interactions with natural Chinook salmon, which would compensate  
14 for the reduction in hatchery fish carcass nutrients from Alternative 4 compared to the No-action  
15 Alternative 1.  
16

17 Alternative 4 would reduce the operation of the 10 hatchery facilities and other ancillary sites used for  
18 broodstock collection and release of juvenile hatchery fish. Delay and handling of juvenile and adult  
19 Chinook salmon associated with trap operations would still occur but at a lower level. All of the hatchery  
20 facilities would use less water for hatchery operations and less hatchery effluent would be released. All  
21 of the hatchery facilities would still be in place physically, but the operation of the collection traps,  
22 operations, and associated impacts would be reduced under Alternative 4. Weirs or their panels would  
23 still be place; traps would be operated less because 50 percent less fish would need to be trapped under  
24 Alternative 4. Alternative 4 would be expected to be a negligible benefit to natural Chinook salmon  
25 compared to the No-action Alternative because hatchery facilities impacts are low.  
26

27 Alternative 4 would reduce the number of hatchery fish that are available for recreational and commercial  
28 fisheries along the Oregon Coast compared to the No-action Alternative. Fishing effort and catch would  
29 likely change focus from hatchery fish to areas where natural-origin fish can be harvested (since hatchery  
30 Chinook salmon would be reduced by 50 percent under this alternative).  
31

32 For Chinook salmon, retention of natural-origin fish is allowed in nearly every river (with the exception  
33 of spring Chinook salmon). If returning hatchery fish are reduced under Alternative 4, two possible  
34 outcomes are likely, depending upon the abundance of natural-origin Chinook salmon. First, if hatchery

1 Chinook salmon are reduced by 50 percent from an area where hatchery fish made up the bulk of  
2 harvested fish, fishing effort would likely decrease under Alternative 4 as compared to the No-action  
3 Alternative 1 because too few natural-origin would be available to sustain the fishery. Second, if hatchery  
4 fish are reduced from an area where natural-origin Chinook salmon are abundant, the fisheries would  
5 likely switch over to harvesting a greater number of natural-origin fish in the same area (this is the most  
6 likely situation with fall Chinook salmon). In these situations, fishery effort on natural-origin Chinook  
7 salmon would likely increase compared to the No-action Alternative in fisheries where natural-origin  
8 Chinook salmon can be retained under current fishing regulations.

9  
10 These Chinook salmon fisheries are intensive, and the harvest rate on natural-origin Chinook salmon  
11 would be expected to increase substantially because fewer hatchery Chinook salmon would be available  
12 for harvest. The State of Oregon might have to change current regulations, which is within its purview  
13 for non-ESA-listed species and those without a prescriptive management plan, to maintain harvest rates at  
14 a sustainable level for natural-origin Chinook salmon in those areas where hatchery programs are reduced  
15 under Alternative 4.

16  
17 Compared to the No-action Alternative, Alternative 4 (reduction of hatchery Chinook salmon programs)  
18 would be expected to result in a greater adverse impact on natural-origin Chinook salmon because fishery  
19 effort and harvest would be directed more at natural-origin Chinook salmon. The overall number of  
20 Chinook salmon harvested would be expected to decrease under Alternative 4 because natural-origin  
21 Chinook salmon populations cannot sustain the higher harvest rates that can be directed at hatchery fish  
22 programs.

23

#### 24 **Oregon Coastal Chum Salmon**

25 Alternative 4 would reduce existing hatchery programs along the Oregon Coast by 50 percent compared  
26 to the No-action Alternative. At this time, none of the hatchery programs are intended to provide  
27 population viability benefits to chum salmon because no hatchery chum salmon programs exist along the  
28 Oregon Coast. The primary effect of Alternative 4 on chum salmon would be a reduction in competition  
29 with and predation by hatchery-origin fish on natural-origin chum salmon.

30

31 Alternative 4 would potentially benefit chum salmon in the Yaquina, Siletz, Salmon, Nestucca, Netarts,  
32 Tillamook, Nehalem, and Necanicum River Basins compared to the No-action Alternative conditions by  
33 eliminating 50 percent of all hatchery fish released into those watersheds (Subsection 3.4, Salmon and

1 Steelhead and Their Habitats). Since chum salmon are depressed in all of these areas along the Oregon  
2 Coast, the greatest benefit to chum salmon from Alternative 4 is most likely to occur in Tillamook Bay  
3 because this area would have the largest reduction in the number of hatchery fish released and high  
4 potential for overlap in space and time (Table 12). In all cases, because chum salmon populations are in  
5 low numbers and poor condition, they would likely benefit to some extent from the reduction of  
6 interactions with hatchery-origin fish, but the available data are insufficient to indicate any substantial  
7 benefit.

8  
9 Reducing the number of hatchery fish under Alternative 4 would decrease the amount of carcass nutrients  
10 provided to the natural habitat from decomposing hatchery fish. Even though hatchery fish represent a  
11 relatively low proportion of available carcasses in Oregon Coast streams and rivers (less than 20 percent  
12 of the total), any decrease in number would likely result in an adverse effect because habitat productivity  
13 is substantially reduced from historical levels and remains a key limiting factor. Therefore, Alternative 4  
14 would result in less marine-derived nutrients from hatchery fish carcasses and low adverse effects  
15 compared to the No-action Alternative.

16  
17 Alternative 4 would reduce hatchery fish releases by 50 percent and consequently reduce the operation of  
18 the 10 hatchery facilities and all other ancillary sites used for broodstock collection and release of juvenile  
19 hatchery fish. Delay and handling of juvenile and adult chum salmon associated with trap operations  
20 would be reduced in the population areas where chum salmon occur (Tillamook and Nehalem). All of the  
21 hatchery facilities would decrease water use for hatchery operations and 50 percent less hatchery effluent  
22 would be released. The hatchery facilities would still be in place physically, but their operations and  
23 associated impacts would be reduced by 50 percent under Alternative 4 compared to the No-action  
24 Alternative. Alternative 4 would be expected to benefit chum salmon compared to Alternative 1.

25 However, the expected benefit is low because most of the hatchery facilities do not exist in the lowland  
26 areas where chum salmon spawn and rear; only Salmon River, Cedar Creek, Trask, and Nehalem  
27 Hatcheries are located where chum salmon could potentially co-occur, so those chum salmon populations  
28 in the Salmon, Nestucca, Tillamook, and Nehalem Rivers are the ones that would benefit, albeit only  
29 slightly, from a reduction in operation of the facility operations.

30  
31 Alternative 4 would reduce the number of returning hatchery fish that are available in recreational and  
32 commercial fisheries along the Oregon Coast compared to the No-action Alternative. Fishing effort and  
33 catch would likely change focus from hatchery fish to areas where natural-origin fish can be harvested.  
34 For chum salmon, no retention is allowed along the Oregon Coast. If returning hatchery fish are reduced

1 under Alternative 4, fishery effort for chum salmon would not likely change compared to Alternative 1  
2 because fisheries targeting chum salmon are essentially non-existent (with the exception of the Kilchis  
3 and Miami Rivers in Tillamook Bay where chum salmon are incidentally caught). Compared to  
4 Alternative 1, Alternative 4 would be expected to result in an undetectable benefit to chum salmon from  
5 changes in fishery harvest from the elimination of hatchery fish because chum salmon are not subject to  
6 directed fisheries and are not taken incidentally in meaningful numbers in other fisheries.

7

### 8 **Oregon Coastal Steelhead**

9 Alternative 4 would reduce all existing hatchery programs by 50 percent along the Oregon Coast  
10 compared to the No-action Alternative. As proposed, none of the hatchery programs are intended to  
11 provide population viability benefits to summer and winter steelhead. The primary benefits of Alternative  
12 4 to steelhead would be a reduction in genetic risks, competition, and predation of hatchery-origin fish on  
13 natural-origin steelhead. Since natural spawning by hatchery fish in the wild was identified as a concern  
14 for many steelhead populations (Subsection 3.4, Salmon and Steelhead and Their Habitats), Alternative 4  
15 would benefit steelhead compared to the No-action Alternative by eliminating 50 percent of all hatchery  
16 fish along the Oregon Coast.

17

18 Eliminating 50 percent of all hatchery fish under Alternative 4 would decrease the amount of carcass  
19 nutrients provided to the natural habitat from decomposing hatchery fish compared to the No-action  
20 Alternative. Even though hatchery fish represent a relatively low proportion of available carcasses in  
21 Oregon Coast streams and rivers (less than 20 percent of the total), any decrease in number would likely  
22 result in an adverse effect because habitat productivity is substantially reduced from historical levels and  
23 remains a key limiting factor. Therefore, Alternative 4 would result in less marine-derived nutrients from  
24 hatchery fish carcasses and low adverse effects compared to the No-action Alternative.

25

26 Alternative 4 would reduce the operation of the 10 hatchery facilities and all other ancillary sites used for  
27 broodstock collection and release of juvenile hatchery fish. The hatchery facilities would remain in place  
28 physically, but the associated operations and effects would all be reduced by 50 percent under Alternative  
29 4. Delay and handling of juvenile and adult steelhead associated with trap operations would be reduced  
30 as compared to the No-action Alternative. All of the hatchery facilities would reduce water use for  
31 hatchery operations and less hatchery effluent would be released. Because of the reduction in the  
32 operation of hatchery facilities, Alternative 4 would be expected to have a low beneficial effect on  
33 steelhead compared to the No-action Alternative.

1  
2 Alternative 4 would reduce returning hatchery fish that are targeted in recreational fisheries along the  
3 Oregon Coast as compared to the No-action Alternative. Fishing effort and catch would likely change  
4 focus from hatchery fish to the few areas where natural-origin fish can be harvested. For steelhead,  
5 retention of natural-origin fish is allowed in some southern Oregon rivers. If returning hatchery fish are  
6 reduced by 50 percent under Alternative 4, fishery effort for natural-origin steelhead would likely  
7 increase compared to the No-action Alternative.

8  
9 These steelhead fisheries are intensive, and the impact rate on some stocks (like summer-run) would be  
10 expected to increase substantially even from catch and release. The State of Oregon might have to change  
11 current regulations to maintain harvest impact rates at a level appropriate for the populations. Some other  
12 steelhead populations, where the hatchery program was reduced, would likely have less fishing pressure  
13 and therefore less impact from fishing. Overall, compared to the No-action Alternative conditions,  
14 Alternative 4 would be expected to result in a greater adverse impact on natural-origin steelhead from  
15 increased fishery exploitation rates.

16

#### 17 **4.5. Effects on Other Fish and Their Habitats**

##### 18 **4.5.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery** 19 **Programs on the Oregon Coast**

20

21 Alternative 1 would maintain all existing hatchery programs along the Oregon Coast. Alternative 1  
22 would continue current conditions for green and white sturgeon, southern eulachon, lamprey, sculpin,  
23 shiners, dace, trout, sucker, pikeminnow, chub, flatfish, forage fish, sharks (including Great White),  
24 rockfish, and non-native fish species (Table 7), where some populations (i.e., Chetco, Rogue, Elk,  
25 Coquille, Umpqua, Alsea, Salmon, Nestucca, Tillamook, and Nehalem river basins) are affected by  
26 hatchery facilities, fish compete with hatchery fish, and certain fish (i.e., redbside shiners, dace, sculpin)  
27 are potentially eaten by hatchery fish. Other species such as lamprey, sturgeon, and sharks would benefit  
28 from hatchery fish as a potential prey base. Genetic risks of hatchery fish spawning in the wild would  
29 continue to be non-existent because no hatchery programs exist for these species. Hatchery fish would  
30 contribute nutrients from naturally spawning carcasses and from outplants of surplus fish from the  
31 hatcheries similar to current conditions. Even though less than 20 percent of salmon and steelhead carcass  
32 input comes from hatchery fish, this is still an important benefit (medium effect) because of the value of  
33 marine-derived nutrients to the freshwater ecosystem. Alternative 1 would result in similar hatchery  
34 impacts on these other fish species as under current conditions from incidental harvest impacts and

1 operation of the hatchery collection facilities. Thus, the adverse effects of these impacts are expected to  
2 be negligible from the hatchery programs.

3  
4 **4.5.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for**  
5 **Operation of Hatchery Programs on the Oregon Coast**  
6

7 Under Alternative 2, the 10 hatchery facilities along the Oregon Coast would operate as proposed in the  
8 submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative): Approve  
9 ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast); Appendix A). The current  
10 conditions for green and white sturgeon, southern eulachon, lamprey, sculpin, shiners, dace, trout, sucker,  
11 pikeminnow, chub, flatfish, forage fish, sharks (including Great White), rockfish, and non-native fish  
12 species (Table 7), where some populations (i.e., Chetco, Rogue, Elk, Coquille, Umpqua, Alsea, Salmon,  
13 Nestucca, Tillamook, and Nehalem river basins) are affected by hatchery facilities, fish compete with  
14 hatchery fish, and certain fish (i.e., redband shiners, dace, sculpin) are eaten by hatchery fish would be the  
15 same under Alternative 2 as described under the Alternative 1 (No-Action). These effects are expected to  
16 be negligible in total, but result in some beneficial (medium effect from hatchery carcass nutrient  
17 enhancement) and low adverse effects (from operation of the hatchery facility and potential incidental  
18 catch of these species from targeting hatchery fish).

19  
20 **4.5.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

21 Under Alternative 3, 10 hatchery facilities along the Oregon Coast, and therefore their associated  
22 programs, would be terminated immediately (Subsection 2.3, Alternative 3: Terminate Hatchery  
23 Programs on the Oregon Coast). Alternative 3 would eliminate the water withdrawal and effluent  
24 discharge associated with the operation of the hatchery facilities in the Chetco, Rogue, Elk, Coquille,  
25 Umpqua, Alsea, Salmon, Nestucca, Tillamook, and Nehalem population, and would therefore benefit fish  
26 species such as lamprey, sculpin, shiners, dace, trout, sucker, pikeminnow, chub, lamprey, and non-native  
27 fish species in those areas (Table 7). Predation and competition between hatchery fish and freshwater fish  
28 species would be eliminated under Alternative 3 compared to No-action Alternative 1. This would  
29 eliminate this effect during the few week period when hatchery fish emigrate as smolts to the ocean.  
30 Alternative 3 would eliminate hatchery fish being a potential prey source for a variety of marine fish  
31 species compared to the No-action Alternative 1. There would be no difference in effect between  
32 Alternative 3 and the No-action Alternative 1 with respect to the genetic risks associated with hatchery  
33 fish spawning in the wild because none of the hatchery programs propagate these fish species. Hatchery  
34 fish would not contribute nutrients from naturally spawning carcasses and from outplants of surplus fish

1 from the hatcheries, which would be an adverse effect compared to the No-action Alternative. Even  
2 though less than 20 percent of salmon and steelhead carcass input comes from hatchery fish, this is still an  
3 adverse effect because of the value of marine-derived nutrients to the freshwater ecosystem. Alternative 3  
4 would not result in any change of impact from incidental harvest impacts, compared to Alternative 1,  
5 because these fish species are managed separately from salmon and steelhead harvest impacts. These  
6 effects from terminating the hatchery programs are expected to be negligible in total, but result in some  
7 adverse effects on these species (medium adverse effect from not having hatchery carcasses supplement  
8 ocean-derived nutrients in the freshwater ecosystem) and negligible beneficial effects (from closing the  
9 operation of the hatchery facilities and eliminating the potential catch of these species associated with  
10 targeting hatchery fish in fisheries).

11

#### 12 **4.5.4. Alternative 4 – Reduced Hatchery Production**

13 Under Alternative 4, 10 hatchery facilities along the Oregon Coast, and therefore their associated  
14 programs, would be reduced by 50 percent compared to the No-action Alternative (Subsection 2.4,  
15 Alternative 4: Reduced Hatchery Production). Alternative 4 would reduce the water withdrawal and  
16 effluent discharge associated with the operation of the hatchery facilities in the Chetco, Rogue, Elk,  
17 Coquille, Umpqua, Alsea, Salmon, Nestucca, Tillamook, and Nehalem river basins, and would, therefore,  
18 benefit fish species such as lamprey, sculpin, shiners, dace, trout, sucker, pikeminnow, chub, lamprey,  
19 and non-native fish species in those areas compared to the No-action Alternative 1 (Table 7).

20

21 Predation and competition between hatchery fish and freshwater fish species would be reduced under  
22 Alternative 4 compared to No-action Alternative 1. This would reduce this impact during the few week  
23 period when hatchery fish emigrate as smolts to the ocean (Table 5). Alternative 4 would reduce hatchery  
24 fish being a potential prey source for a variety of marine fish species compared to the No-action  
25 Alternative 1.

26

27 There would be no difference in effect between Alternative 4 and the No-action Alternative 1 with respect  
28 to the genetic risks associated with hatchery fish spawning in the wild because none of the hatchery  
29 programs propagate these fish species. Hatchery fish would contribute fewer nutrients from naturally  
30 spawning carcasses and from outplants of surplus fish from the hatcheries, which would be an adverse  
31 effect compared to the No-action Alternative. Even though less than 20 percent of salmon and steelhead  
32 carcass input comes from hatchery fish, this is still an adverse effect because of the value of marine-  
33 derived nutrients to the freshwater ecosystem.

1  
2 Alternative 4 would not result in any change of impact from incidental harvest impacts, compared to  
3 Alternative 1, because these fish species are managed separately from salmon and steelhead harvest  
4 impacts. The effects of reducing hatchery production by 50 percent are expected to be negligible in total,  
5 but result in some adverse effects on these species (medium adverse effect from not having hatchery  
6 carcasses supplement ocean-derived nutrients in the freshwater ecosystem) and negligible beneficial  
7 effects (from closing the operation of the hatchery facilities and eliminating the potential catch of these  
8 species associated with targeting hatchery fish in fisheries) compared to the No-action Alternative.  
9

#### 10 **4.6. Effects on Wildlife**

##### 11 **4.6.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery** 12 **Programs on the Oregon Coast**

13  
14 Under Alternative 1, 10 hatchery facilities along the Oregon Coast would continue to operate as proposed  
15 in submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative): Approve  
16 ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast)). Consequently, the number  
17 of salmon and steelhead (juvenile and adult) available to predators and scavengers that use salmon as a  
18 food source, including Federally listed Steller sea lions and southern resident killer whale (Subsection 3.6,  
19 Wildlife), would be the same as under current conditions.  
20

21 Steller sea lions and California sea lions are known to feed on returning adult salmon along the Oregon  
22 Coast and are likely eating hatchery-origin fish from Oregon Coast hatcheries (Subsection 3.6, Wildlife).  
23 Consequently, Alternative 1 would result in the same number of salmon and steelhead available to Steller  
24 sea lions and California sea lions along the Oregon Coast as under current conditions. Alternative 1 is not  
25 expected to change sea lion diet, survival, or distribution relative to current conditions.  
26

27 Southern resident killer whales also feed on adult salmon, and prefer Chinook salmon. However, because  
28 southern resident killer whales have limited spatial overlap with Oregon Coast salmon, few Chinook  
29 salmon from the proposed hatchery programs are likely to be eaten by southern resident killer whales  
30 (Subsection 3.6, Wildlife).  
31

32 Alternative 1 would maintain the number of juvenile salmon and steelhead available as a food source for  
33 bird populations as current conditions  
34

1 Habitat disruption may occur from physical damage or disruption by anglers targeting hatchery-origin  
2 salmon and steelhead. Operation of the hatchery facilities uses water from the adjacent stream. The area  
3 from intake to outfall would be affected, although these areas are extremely limited. There is also some  
4 potential for these activities to displace wildlife that may be in the area. Habitat impacts from fishing  
5 activities are usually localized and short-lived and are currently occurring related to ongoing fisheries in  
6 the analysis area. Additionally, fishery access points, roads, boat launches, and campsites are already  
7 present in the analysis area.

8  
9 Alternative 1 would result in a negligible beneficial effect overall. The hatchery programs would provide  
10 hatchery fish as a prey source for all wildlife (e.g., birds, marine mammals, and terrestrial mammals) that  
11 feed upon juvenile and adult salmon and steelhead (medium benefit). There would be a negligible  
12 adverse impact from habitat alterations near the hatchery facilities from operation and anglers fishing near  
13 the local vicinity.

14  
15 **4.6.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for**  
16 **Operation of Hatchery Programs on the Oregon Coast**

17  
18 Under Alternative 2, the 10 hatchery facilities along the Oregon Coast would operate as proposed in the  
19 submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative): Approve  
20 ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast); Appendix A). Salmon and  
21 steelhead (juvenile and adult) would be available to predators and scavengers that use salmon as a food  
22 source, including Federally listed Steller sea lions and southern resident killer whales for Alternative 2 as  
23 described under Alternative 1 (No-Action).

24  
25 The analysis of the site-specific effects under Alternative 2 would be identical to effects analyzed under  
26 Alternative 1. Alternative 2 would result in a negligible beneficial effect overall. The hatchery programs  
27 would provide hatchery fish as a prey source for all wildlife (e.g., birds, marine mammals, and terrestrial  
28 mammals) that feed upon juvenile and adult salmon and steelhead (medium benefit). There would be a  
29 negligible adverse impact from habitat alterations near the hatchery facilities from operation and anglers  
30 fishing near the local vicinity.

31  
32 **4.6.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

33 Under Alternative 3, 10 hatchery facilities along the Oregon Coast, and therefore their associated  
34 programs, would be terminated immediately (Subsection 2.1, Alternative 1 (No-action): Do Not Approve

1 ODFW’s HGMPs for Operation of Hatchery Programs on the Oregon Coast). Consequently, relative to  
2 the No-action Alternative, fewer salmon and steelhead (juvenile and adult) would be available as a food  
3 source for predators and scavengers that use salmon as a food source, including Federally listed Steller  
4 sea lion, and southern resident killer whale (Subsection 3.6, Wildlife).

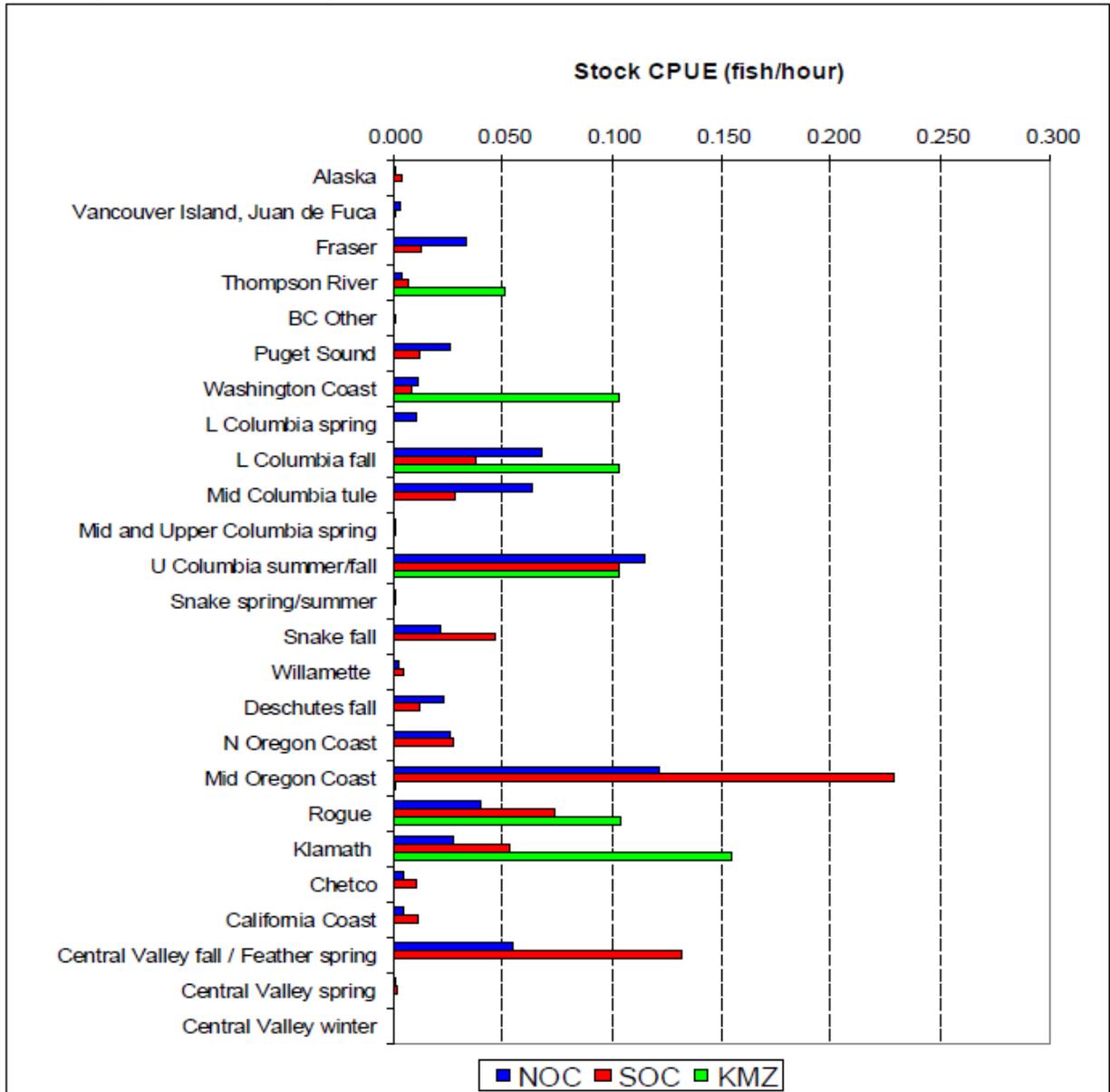
5  
6 Hatchery salmon and steelhead may represent an important component of sea lion diet during specific  
7 time periods, particularly if abundance is high and concentrated, like when salmon and steelhead return to  
8 freshwater. However, because sea lions are opportunistic predators, they transition to other marine and  
9 estuary prey species during periods when salmon and steelhead abundance is low or when other prey  
10 species are more readily accessible. Given that hatchery salmon and steelhead make up a minor  
11 component of sea lion diet throughout their life along the Oregon Coast, Alternative 3 would only lead to  
12 a low reduction in the total number of salmon and steelhead available to sea lions, that availability would  
13 be seasonal, and sea lions would easily switch to feeding on alternative prey. The abundance of natural-  
14 origin salmon and steelhead produced from watersheds within the Oregon Coast Region and hatchery fish  
15 from areas outside the Oregon Coast would still be available under Alternative 3 for sea lions.

16 Alternative 3 is not expected to change sea lion diet, survival, or distribution relative to the No-action  
17 Alternative.

18  
19 Southern resident killer whales also feed on adult salmon and steelhead and marine fish species, but  
20 prefer Chinook salmon. Based upon available information, the time period when southern resident killer  
21 whales have been periodically observed along the Oregon Coast is from late fall through late winter. For  
22 the remainder of the year, these whales are primarily found in the Strait of Juan de Fuca and Puget Sound  
23 (Hilborn et al. 2012). If killer whales migrate to the Oregon Coast Region, a variety of salmon stocks  
24 from the entire West Coast are potentially available to them for food (Figure 21). For example, in June  
25 2011, genetic testing of Chinook salmon caught in the commercial fishery off the Oregon Coast showed  
26 the presence of Chinook salmon originating from areas ranging from Alaska to California (Weitkamp  
27 2009; Figure 21). Even though this is not the timeframe when killer whales are typically present along  
28 the Oregon Coast, this is when the fisheries began that year and probably reflects the composition of  
29 salmon along the Oregon Coast earlier in the year when killer whales might be present. In addition, a  
30 variety of marine species such as lingcod, greenling, sole, and herring are also available. Under  
31 Alternative 3, since killer whales prefer Chinook salmon, elimination of all of the hatchery Chinook  
32 salmon programs (see Appendix A) would be expected to cause the greatest impact on killer whales from  
33 late fall to late winter along the Oregon Coast. It is difficult to quantify how much this reduction in  
34 hatchery Chinook salmon would affect killer whales because the total abundance of salmon off the

1 Oregon Coast is not known and varies greatly from year to year (PFMC 2013). However, adipose-fin  
2 clipped (hatchery-origin) Chinook salmon represent a minority of the Chinook salmon harvested in  
3 commercial and sport fisheries along the Oregon Coast (PFMC 2013). Of the hatchery Chinook salmon  
4 caught along the Oregon Coast, the majority of hatchery fish in the catch are Central Valley California  
5 and Klamath fall Chinook salmon because their ocean abundance is the highest (Figure 21; PFMC 2013).  
6 Therefore, available information suggests hatchery Chinook salmon released from Oregon Coast facilities  
7 would represent a low percentage of the total abundance of Chinook salmon (and hatchery-origin  
8 Chinook) along the Oregon Coast and, therefore, a low percentage of the total availability of Chinook  
9 salmon to killer whales. Given the variety of Chinook salmon stocks from the entire West Coast that  
10 inhabit the Oregon Coast and the availability of other marine species, Alternative 3 is not expected to  
11 change the diet, survival, or distribution of southern resident killer whales relative to the No-action  
12 Alternative because hatchery salmon and steelhead from hatcheries along the Oregon Coast are not the  
13 prominent prey base for southern resident killer whales.

14



1  
 2 Figure 21. Genetic stock identification of Chinook salmon caught in the commercial salmon troll fishery  
 3 from three regions along the Oregon Coast in June 2011. NOC (“Northern Oregon Coast”) is  
 4 from Cape Falcon to the Florence River south jetty, SOC (“Southern Oregon Coast”) is from  
 5 Florence River south jetty to Humbug Mountain, KMZ (“Klamath Management Zone”) is  
 6 from Humbug Mountain to the Oregon/California border. Figure taken from Pacific Fish Trax  
 7 (2011).  
 8

9 Alternative 3 would reduce the number of juvenile salmon and steelhead available as a food source for  
 10 Caspian terns, cormorants, and other bird populations in the analysis area that traditionally feed on  
 11 juvenile salmon (Subsection 3.6, Wildlife). However, because Alternative 3 would reduce the total  
 12 number of juvenile hatchery-origin salmon and steelhead by less than 20 percent, it would not be

1 expected to change the diet, survival, or distribution of Caspian terns, cormorants, or other bird  
2 populations relative to Alternative 1 because hatchery salmon and steelhead from hatcheries along the  
3 Oregon Coast are not the prominent prey base for bird species in the region.  
4

5 Habitat disruption may occur from physical damage or disruption by anglers targeting hatchery-origin  
6 salmon and steelhead. There is some potential for these activities to displace wildlife that may be in the  
7 area. Habitat impacts from fishing activities are usually localized and short-lived and are currently  
8 occurring related to ongoing fisheries in the analysis area. Additionally, fishery access points, roads, boat  
9 launches, and campsites are already present in the analysis area. Alternative 3 would reduce the number  
10 of salmon and steelhead available for harvest along the Oregon Coast relative to Alternative 1. However,  
11 fishing for other fish species (e.g., trout) would still occur in the analysis area, and there would be no  
12 change in fishery access points, roads, boat launches, and campsites in the analysis area relative to  
13 Alternative 1. Therefore, Alternative 3 would not be expected to reduce adverse impacts on wildlife from  
14 fishing activities relative to the No-action Alternative to any great degree. Alternative 3 would result in a  
15 negligible benefit near the hatchery facility on wildlife from the termination of the hatchery programs of  
16 not having human disturbance from fishing and operations.  
17

#### 18 **4.6.4. Alternative 4 – Reduced Hatchery Production**

19 Under Alternative 4, 10 hatchery facilities along the Oregon Coast, and therefore their associated  
20 programs, would be reduced by 50 percent compared to the No-action Alternative. Consequently, fewer  
21 salmon and steelhead (juvenile and adult) would be available as a food source for predators and  
22 scavengers that use salmon as a food source, including federally-listed Steller sea lion, and southern  
23 resident killer whale (Subsection 3.6, Wildlife).  
24

25 Hatchery salmon and steelhead may represent an important component of sea lion diet during specific  
26 time periods, particularly if abundance is high and concentrated, like when salmon and steelhead return to  
27 freshwater. However, because sea lions are opportunistic predators, they transition to other marine and  
28 estuarine prey species during periods when salmon and steelhead abundance is low or when other prey  
29 species are more readily accessible. Given that hatchery salmon and steelhead make up a minor  
30 component of sea lion diet throughout their life along the Oregon Coast, Alternative 4 would only lead to  
31 a very low reduction in the total number of salmon and steelhead available to sea lions, salmon, and  
32 steelhead availability would be seasonal, and sea lions would easily switch to feeding on alternative prey.  
33 The abundance of natural-origin salmon and steelhead produced from watersheds within the Oregon

1 Coast Region and hatchery fish from areas outside the Oregon Coast would still be available under  
2 Alternative 4 for sea lions. Alternative 4 is not expected to change sea lion diet, survival, or distribution  
3 relative to the No-action Alternative.  
4

5 Southern resident killer whales also feed on adult salmon and steelhead and marine fish species, but  
6 prefer Chinook salmon. Based upon available information, the time period when southern resident killer  
7 whales have been periodically observed along the Oregon Coast is from late fall through late winter. For  
8 the remainder of the year, these whales are primarily found in the Strait of Juan de Fuca and Puget Sound  
9 (Hilborn et al. 2012). If killer whales migrate to the Oregon Coast Region, a variety of salmon stocks  
10 from the entire West Coast is potentially available to them for food (Figure 21). For example, in June  
11 2011, genetic testing of Chinook salmon caught in the commercial fishery off the Oregon Coast showed  
12 the presence of Chinook salmon originating from areas ranging from Alaska to California (Weitkamp  
13 2009; Figure 21). Even though this is not the timeframe when killer whales are typically present along  
14 the Oregon Coast, this is when the fisheries began that year and probably reflects the composition of  
15 salmon along the Oregon Coast earlier in the year when killer whales might be present. In addition, a  
16 variety of marine species such as lingcod, greenling, sole, and herring are also available.  
17

18 Under Alternative 4, since killer whales prefer Chinook salmon, a 50 percent reduction in the hatchery  
19 Chinook salmon programs (see Appendix A) would be expected to cause the greatest impact on killer  
20 whales from late fall to late winter along the Oregon Coast. It is difficult to quantify how much this  
21 reduction in hatchery Chinook salmon would affect killer whales because the total abundance of salmon  
22 off the Oregon Coast is not known and varies greatly from year to year (PFMC 2013). However, adipose-  
23 fin clipped (hatchery-origin) Chinook salmon represent a minority of the Chinook salmon harvested in  
24 commercial and sport fisheries along the Oregon Coast (PFMC 2013).  
25

26 Of the hatchery Chinook salmon caught along the Oregon Coast, the majority of hatchery fish in the catch  
27 are Central Valley California and Klamath fall Chinook salmon because their ocean abundance is the  
28 greatest (Figure 21; PFMC 2013). Therefore, available information suggests hatchery Chinook salmon  
29 released from Oregon Coast facilities would represent a low percentage of the total abundance of Chinook  
30 salmon (and hatchery-origin Chinook) along the Oregon Coast and, therefore, a low percentage of the  
31 total availability of Chinook salmon to killer whales. Given the variety of Chinook salmon stocks from  
32 the entire West Coast that inhabit the Oregon Coast and the availability of other marine species,  
33 Alternative 4 is not expected to change the diet, survival, or distribution of southern resident killer whales

1 relative to the No-action Alternative because hatchery salmon and steelhead from hatcheries along the  
2 Oregon Coast are not the prominent prey base for southern resident killer whales.  
3 Alternative 4 would reduce the number of juvenile salmon and steelhead available as a food source for  
4 Caspian terns, cormorants, and other bird populations in the project area that traditionally feed on juvenile  
5 salmon (Subsection 3.6, Wildlife). However, because Alternative 4 would reduce the total number of  
6 juvenile hatchery-origin salmon and steelhead by 50 percent, it would not be expected to change the diet,  
7 survival, or distribution of Caspian terns, cormorants, or other bird populations relative to Alternative 1  
8 because hatchery salmon and steelhead from hatcheries along the Oregon Coast are not the prominent  
9 prey base for bird species in the region.

10  
11 Habitat disruption may occur from physical damage or disruption by anglers targeting hatchery-origin  
12 salmon and steelhead. There is some potential for these activities to displace wildlife that may be in the  
13 area. Habitat impacts from fishing activities are usually localized and short-lived and are currently  
14 occurring related to ongoing fisheries in the analysis area. Additionally, fishery access points, roads, boat  
15 launches, and campsites are already present in the analysis area. Alternative 4 would reduce the number  
16 of salmon and steelhead available for harvest along the Oregon Coast relative to Alternative 1. However,  
17 fishing for other fish species (e.g., trout) would still occur in the analysis area, and there would be no  
18 change in fishery access points, roads, boat launches, and campsites in the analysis area relative to  
19 Alternative 1. Therefore, Alternative 4 would not be expected to reduce adverse impacts on wildlife from  
20 fishing activities relative to the No-action Alternative to a measureable degree. Alternative 4 would result  
21 in a negligible beneficial effect near the hatchery facility on wildlife from the reduction of the hatchery  
22 programs not having human disturbance from fishing and operations.

## 23 24 **4.7. Effects on Socioeconomics**

### 25 **4.7.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery** 26 **Programs on the Oregon Coast**

27  
28 Under Alternative 1, 10 hatchery programs along the Oregon Coast would continue to operate as  
29 proposed in submitted HGMPs (Subsection 2.2, Alternative 2 (Proposed Action/Preferred Alternative):  
30 Approve ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast)). There would  
31 continue to be 49 full-time jobs associated with the hatchery programs (Subsection 3.7, Socioeconomics).  
32 Additionally, these hatchery programs would continue to use local goods and services, which would  
33 contribute to personal income or jobs along the Oregon Coast.

1 Alternative 1 would continue to provide salmon and steelhead available for commercial and recreational  
2 harvest along the Oregon Coast. Fishing opportunities provided under Alternative 1 would continue similar  
3 to current conditions for the purchase of supplies such as fishing gear, camping equipment, consumables,  
4 and fuel at local businesses (Subsection 3.7, Socioeconomics). Additionally, anglers would continue to  
5 contribute to the economy through outfitter/guide/charter fees. Alternative 1 would maintain the \$4 to \$8  
6 million spent by anglers fishing for hatchery fish along the Oregon Coast (ODFW 2010; Subsection 3.7,  
7 Socioeconomics). Applying the cost-benefit ratios from Figure 14 would value the existing hatchery  
8 programs in excess of \$8 million annually. For the Oregon Coast Region, the hatchery programs provide  
9 substantial benefits (medium effect) to socioeconomics. Depending upon the specific fishery, the benefits  
10 can be high to the local economy. For example, the fishery targeting hatchery spring Chinook salmon  
11 returning to the Rogue River is very popular and represents a significant boost to the local economies of  
12 Gold Beach, Grants Pass, Medford, and Shady Cove communities.

13

14 Even though fishing-related expenditures is a low percentage of total state revenue (less than one  
15 percent), within the Oregon Coast Region, fisheries can be an important local economic contribution  
16 particularly during the seasons when spring and fall Chinook salmon, coho salmon, and winter steelhead  
17 return. Depending upon the specific fishery, the hatchery programs add an important boost (medium to  
18 high beneficial impact) to local economies within the Oregon Coast Region.

19

20 In addition to the economic benefits from having hatchery fish available to catch in ocean and freshwater  
21 fisheries, there is also possible economic losses on fisheries that target natural-origin salmon and  
22 steelhead in the populations where hatchery programs occur. As described in Subsection 4.4, Effects on  
23 Salmon and Steelhead and Their Habitats and Subsection 4.5, Effects on Other Fish and Their Habitats,  
24 hatchery programs have negative effects on the abundance and productivity of natural-origin fish  
25 populations. Consequently, natural production is reduced in the population areas where hatchery  
26 programs occur. This translates into fewer natural-origin fish being available for fisheries. Depending  
27 upon the specific population and hatchery program, the effect of the negative impacts of hatchery fish on  
28 natural production and fisheries likely ranges from a negligible to a very low effect on the overall  
29 socioeconomics for the Oregon Coast Region.

30

31 **4.7.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for**  
32 **Operation of Hatchery Programs on the Oregon Coast**  
33

34 Under Alternative 2, 10 hatchery programs along the Oregon Coast would continue to operate as  
35 proposed in submitted HGMPs (Subsection 2.2, Alternative 2, Proposed Action/Preferred Alternative).

1 There would continue to be 49 full-time jobs associated with the hatchery programs (Subsection 3.7,  
2 Socioeconomics). Additionally, these hatchery programs would continue to use local goods and services,  
3 which would contribute to personal income or jobs along the Oregon Coast as described under Alternative  
4 1 (No-Action). Depending upon the specific fishery and circumstances, the hatchery programs would  
5 provide substantial benefits (medium to high impact) to the local economies from anglers targeting  
6 hatchery fish. For the popular fisheries targeting predominately hatchery-origin salmon (e.g., Rogue  
7 River spring Chinook salmon), the hatchery program provides a definitive boost to the local economies of  
8 Gold Beach, Grants Pass, Medford, and Shady Cove from the purchasing of tackle, sporting goods,  
9 fishing guide services, food, and lodging purchases that facilitate their outdoor activities.

#### 11 **4.7.3. Alternative 3 – Terminate the Hatchery Programs on the Oregon Coast**

12 The termination of operations at 10 hatchery facilities along the Oregon Coast would result in the loss of  
13 49 full-time employee positions (Subsection 3.7, Socioeconomics). Additionally, the hatchery programs  
14 would no longer procure local goods and services, which contribute to personal income or jobs along the  
15 Oregon Coast. Millions of dollars in revenue to the local economies from the hatchery facilities and  
16 harvest of hatchery fish in commercial and recreational fisheries would be eliminated (Subsection 3.7,  
17 Socioeconomics).

18  
19 Alternative 3 would reduce the number of salmon and steelhead available for commercial and recreational  
20 harvest along the Oregon Coast relative to Alternative 1. A loss of fishing opportunities under  
21 Alternative 3 would reduce the local purchase of supplies such as fishing gear, camping equipment,  
22 consumables, and fuel at local businesses, which would adversely impact local businesses. While not all  
23 businesses are direct beneficiaries of fishing-related activities, many are, and many more would benefit  
24 indirectly from increased numbers of visitors drawn by the fishing opportunities and fishing industries.  
25 Additionally, fewer anglers would contribute to the economy through outfitter/guide/charter fees than  
26 under Alternative 1. While closure of the hatcheries would not result in the loss of all fishing  
27 opportunity, the closure of the hatcheries would likely mean the loss of \$4 to \$8 million per year from  
28 recreational fisheries targeting the hatchery fish produced from these facilities (ODFW 2010; Subsection  
29 3.7, Socioeconomics). In addition, there would also be economic losses associated with funding and  
30 operation of the hatchery facilities and associated jobs. In addition, numerous other related jobs  
31 generated by the hatchery programs would also be lost. For the local economies of the Oregon Coast  
32 Region, Alternative 3 would be detrimental to the businesses that supply goods and services, fishing  
33 tackle, and equipment for salmon and steelhead fisheries. However, while it is not known to what degree

1 the economy would be affected, it would likely be a substantial part of the fishing-related economy, given  
2 the large proportion of the fishery industries that are served by the recreational fisheries described in the  
3 Proposed Action.

4  
5 Because fishing-related expenditures are a low percentage of total state revenue, Alternative 3 would not  
6 be expected to reduce total state revenue from recent conditions to any great extent (Subsection 3.7,  
7 Socioeconomics). In the late summer through winter, when overall tourism is down, fisheries for fall  
8 Chinook salmon, coho salmon, and winter steelhead would occur, and would generate important  
9 economic activity to support local businesses through the tourism off-season. If the hatchery programs  
10 were terminated under Alternative 3, this would be a low to medium adverse effect on the local  
11 economies dependent on revenue from fisheries in the analysis area.

#### 13 **4.7.4. Alternative 4 – Reduced Hatchery Production**

14 The reduction of the hatchery programs by 50 percent along the Oregon Coast would likely result in the  
15 loss of between zero and 49 full-time employee positions (Subsection 3.7, Socioeconomics). This range  
16 of employment loss represents the range analyzed under the No-action Alternative and Alternative 3  
17 (terminate all hatchery programs). Alternative 4 would not result in a near term reduction of 50 percent  
18 of the hatchery personnel because a minimum number of staff is required to work the hatchery facilities  
19 regardless of hatchery production. Therefore, effects on local hatchery employment under Alternative 4  
20 is somewhere between effects analyzed under Alternative 1 and Alternative 3.

21  
22 Additionally, the hatchery programs would have reduced need to procure local goods and services  
23 because fewer hatchery fish are being produced under Alternative 4, which would equate to a reduction in  
24 personal income or jobs along the Oregon Coast. The economic impact from Alternative 4 would affect  
25 the local economies of the Oregon Coast Region, and likely represent adverse impact levels assessed  
26 between Alternative 1 and Alternative 3.

27  
28 Alternative 4 would reduce the number of salmon and steelhead available for commercial and recreational  
29 harvest along the Oregon Coast relative to Alternative 1. A loss of fishing opportunities under  
30 Alternative 4 would reduce the local purchase of supplies such as fishing gear, camping equipment,  
31 consumables, and fuel at local businesses, which would adversely impact local businesses. While not all  
32 businesses are direct beneficiaries of fishing-related activities, many are, and many more would benefit  
33 indirectly from increased numbers of visitors drawn by the fishing opportunities and fishing industries.

1 Additionally, fewer anglers would contribute to the economy through outfitter/guide/charter fees than  
2 under Alternative 1.

3  
4 While a reduction in the number of hatchery fish released would not result in the loss of all fishing  
5 opportunity, the reduction would likely mean the loss of \$2 to \$4 million per year from recreational  
6 fisheries targeting the hatchery fish produced from these facilities (50 percent reduction from the No-  
7 action Alternative) (Subsection 3.7, Socioeconomics) (ODFW 2010). In addition, there would also be  
8 economic losses associated with funding and operation of the hatchery facilities and associated jobs.  
9 Numerous other related jobs generated by the hatchery programs would also be lost.

10  
11 For the local economies of the Oregon Coast Region, Alternative 4 would have a medium to high adverse  
12 impact on the businesses that supply goods and services, fishing tackle, and equipment for hatchery  
13 salmon and steelhead fisheries depending upon the local circumstances as compared to the No-action  
14 Alternative. However, while it is not known to what degree the economy would be affected for the  
15 Oregon Coast Region, Alternative 4 would likely result in a medium impact on the fishing-related  
16 economy, given the large proportion of the fishery industries that are served by the recreational fisheries  
17 described in the Proposed Action (Subsection 3.7, Socioeconomics).

18  
19 Because fishing-related expenditures are a low percentage of total state revenue, Alternative 4 would not  
20 be expected to reduce total state revenue from recent conditions to any great extent (Subsection 3.7,  
21 Socioeconomics). In the late summer through winter, when overall tourism is down, fisheries for fall  
22 Chinook salmon, coho salmon, and winter steelhead would occur, and would generate important  
23 economic activity to support local businesses through the tourism off-season. If the hatchery programs  
24 were reduced under Alternative 4, this would be a medium adverse effect on the local economies  
25 dependent on revenue from fisheries in the analysis area as compared to the No-action Alternative.

## 26 27 **4.8. Effects on Environmental Justice**

### 28 **4.8.1. Alternative 1 (No-Action) – Do Not Approve ODFW's HGMPs for Operation of Hatchery** 29 **Programs on the Oregon Coast**

30  
31 Ten of the 12 counties in the analysis area are environmental justice communities of concern because they  
32 meaningfully exceed thresholds for low income or minority populations (Table 10). Under Alternative 1,  
33 the following ecological, cultural, economic, and social effects on environmental justice communities  
34 would be expected in both the short and long term:

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- A negligible reduction in the amount of surface and ground water around the local vicinity of the hatchery facilities, but would be of no consequence to environmental justice communities (Subsection 4.2.2, Effects on Water Quantity)
- A negligible reduction in water quality around the local vicinity of the hatchery facilities. Impacts are undetectable downstream of the hatchery facilities (Subsection 4.3.2, Effects on Water Quality)
- A medium to high beneficial impact on environmental justice communities from the purchase of goods and services to support hatchery facilities (Subsection 4.7.2, Effects on Socioeconomics)
- A medium to high beneficial impact on environmental justice communities from the employment of 49 full-time and 18 seasonal employees at the hatchery facilities (Subsection 4.7.2, Effects on Socioeconomics)
- A medium to high beneficial impact on environmental justice communities from fisheries targeting hatchery salmon and steelhead that increase the local purchase of supplies such as fishing gear, camping equipment, consumables, and fuel at local businesses; these increases would benefit environmental justice communities (Subsection 4.7.2, Effects on Socioeconomics)
- There would be a medium beneficial impact in environmental justice communities through the hiring of guide and charters to take people fishing (Subsection 4.7.2, Effects on Socioeconomics)

**4.8.2. Alternative 2 (Proposed Action/Preferred Alternative) – Approve ODFW's HGMPs for Operation of Hatchery Programs on the Oregon Coast**

Ten of the 12 counties in the analysis area are environmental justice communities of concern because they meaningfully exceed thresholds for low income or minority populations (Table 10). Under Alternative 2, the proposed programs would have ecological, cultural, economic, and social effects and effects on environmental justice communities identical to those described under Alternative 1 (No-Action).

- A negligible reduction in the amount of surface and ground water around the local vicinity of the hatchery facilities, but would be of no consequence to environmental justice communities (Subsection 4.2.2, Effects on Water Quantity)
- A negligible reduction in water quality around the local vicinity of the hatchery facilities. Impacts are undetectable downstream of the hatchery facilities (Subsection 4.3.2, Effects on Water Quality)
- A medium to high beneficial impact on environmental justice communities from the purchase of goods and services to support hatchery facilities (Subsection 4.7.2, Effects on Socioeconomics)

- A medium to high beneficial impact on environmental justice communities from the employment of 49 full-time and 18 seasonal employees at the hatchery facilities (Subsection 4.7.2, Effects on Socioeconomics)
- A medium to high beneficial impact on environmental justice communities from fisheries targeting hatchery salmon and steelhead that increase the local purchase of supplies such as fishing gear, camping equipment, consumables, and fuel at local businesses; these increases would benefit environmental justice communities (Subsection 4.7.2, Effects on Socioeconomics)
- There would be a medium beneficial impact in environmental justice communities through the hiring of guide and charters to take people fishing (Subsection 4.7.2, Effects on Socioeconomics)

#### **4.8.3. Alternative 3 – Terminate Hatchery Programs on the Oregon Coast**

For purposes of the current evaluation of effects on environmental justice, the analysis area includes all 12 counties along the Oregon Coast to which hatchery fish of the proposed programs would return, because residents of all these areas could be affected by decisions regarding the hatchery programs. Ten of the 12 counties in the analysis area are environmental justice communities of concern because they meaningfully exceed thresholds for low income or minority populations (Table 10). Under Alternative 3, the following ecological, cultural, economic, and social effects on environmental justice communities would be expected in both the short and long term as compared to the No-action Alternative:

- A negligible increase in the amount of surface and ground water around the local vicinity of the hatchery facilities would occur under Alternative 3. However, this would be of no beneficial consequence to environmental justice communities because of the localized area from water intake to water outfall (Subsection 4.2.2, Effects on Water Quantity)
- A negligible increase in water quality around the local vicinity of the hatchery facilities would occur in Alternative 3. However, since impacts from the hatchery facilities on water quality are negligible and localized, the benefits would be negligible. These improvements would not benefit the current 303(d) listing parameters for water quality (Subsection 4.3.2, Effects on Water Quality)
- A medium to high adverse impact on environmental justice communities from the loss of purchasing goods and services to support hatchery facilities would occur under Alternative 3 (Subsection 4.7.2, Effects on Socioeconomics)

- 1 • A medium to high adverse impact on environmental justice communities from the loss of  
2 employment of 49 full-time and 18 seasonal employees from the termination of the hatchery  
3 facilities under Alternative 3 would occur (Subsection 4.7.2, Effects on Socioeconomics)
- 4 • A medium to high adverse impact on environmental justice communities from the loss fisheries  
5 targeting hatchery salmon and steelhead that increase the local purchase of supplies such as  
6 fishing gear, camping equipment, consumables, and fuel at local businesses in environmental  
7 justice communities would occur under Alternative 3 (Subsection 4.7.2, Effects on  
8 Socioeconomics)
- 9 • There would be a medium adverse impact in environmental justice communities from the  
10 elimination of the need to hire guides and charters to take people fishing for hatchery salmon and  
11 steelhead under Alternative 3 (Subsection 4.7.2, Effects on Socioeconomics)

#### 13 **4.8.4. Alternative 4 – Reduced Hatchery Production**

14 For purposes of the current evaluation of effects on environmental justice, the action area includes all 12  
15 counties along the Oregon Coast to which hatchery fish of the proposed programs would return, because  
16 residents of all these areas could be affected by decisions regarding the hatchery programs. Ten of the 12  
17 counties in the analysis area are environmental justice communities of concern because they meaningfully  
18 exceed thresholds for low income or minority populations (Table 10). Under Alternative 4, the following  
19 ecological, cultural, economic, and social effects on environmental justice communities would be  
20 expected in both the short and long term as compared to the No-action Alternative:

- 21  
22 • A negligible increase in the amount of surface and ground water around the local vicinity of the  
23 hatchery facilities would occur under Alternative 4. However, this would be of no beneficial  
24 consequence to environmental justice communities because of the localized area from water  
25 intake to water outfall (Subsection 4.2.2, Effects on Water Quantity)
- 26 • A negligible increase in water quality around the local vicinity of the hatchery facilities would  
27 occur in Alternative 4. However, since impacts from the hatchery facilities on water quality are  
28 negligible and localized, the benefits would be negligible. These improvements would not  
29 benefit the current 303(d) listing parameters for water quality (Subsection 4.3.2, Effects on Water  
30 Quality)
- 31 • A medium adverse impact on environmental justice communities from the loss of purchasing  
32 goods and services to support hatchery facilities would occur under Alternative 3 (Subsection  
33 4.7.2, Effects on Socioeconomics)

- 1       • A medium adverse impact on environmental justice communities from the loss of employment in  
2       the range of zero to 49 full-time and zero to 18 seasonal employees from the reduction of the  
3       hatchery programs under Alternative 4 would occur (Subsection 4.7.2, Effects on  
4       Socioeconomics)
- 5       • A medium adverse impact on environmental justice communities from the loss of fisheries  
6       targeting hatchery salmon and steelhead that increase the local purchase of supplies such as  
7       fishing gear, camping equipment, consumables, and fuel at local businesses in environmental  
8       justice communities would occur under Alternative 4 (Subsection 4.7.24, Effects on  
9       Socioeconomics)
- 10      • There would be a medium adverse impact in environmental justice communities from the  
11      elimination of the need to hire guides and charters to take people fishing for hatchery salmon and  
12      steelhead under Alternative 3 (Subsection 4.7.24, Effects on Socioeconomics)
- 13

1 **5. CUMULATIVE IMPACTS**

2 **5.1. Introduction**

3 The National Environmental Policy Act defines cumulative effects as “the impact on the environment which  
4 results from the incremental impact of the action when added to other past, present, and reasonably  
5 foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such  
6 other actions” (40 CFR 1508.7). Council on Environmental Quality (CEQ) guidelines recognize that it is  
7 not practical to analyze the cumulative effects of an action from every conceivable perspective, but rather,  
8 the intent is to focus on those effects that are truly meaningful. In other words, if several separate actions  
9 have been taken or are intended to be taken within the same geographic area, all of the relevant actions  
10 together (cumulatively) need to be reviewed, to determine whether the actions *together* could have a  
11 significant impact on the human environment. Past, present, and reasonably foreseeable future actions  
12 include those that are Federal and non-Federal. For this DEIS analysis, they also include those that are  
13 hatchery-related (e.g., hatchery production levels) and non-hatchery related (e.g., human development).

14 The cumulative effects of a Proposed Action can be represented as an equation:

15 Proposed Action + Past Actions + Present Actions + Reasonably Foreseeable Future Actions =  
16 Cumulative Effects

17 The CEQ provides an 11-step process for cumulative effects analyses that is woven into the larger NEPA  
18 process and into documents supporting a Federal action (CEQ 1997) (Table 13). Other subsections of this  
19 DEIS are relevant as support for this cumulative effects analysis.

20 Chapter 3, Affected Environment, describes the existing conditions (or baseline, for the purposes of this  
21 chapter) for each resource and reflects the effects of past actions and present condition. Chapter 4,  
22 Environmental Consequences, evaluates the direct and indirect effects of the alternatives on each resource’s  
23 baseline conditions. This chapter considers the cumulative effects of each alternative in the context of past  
24 actions, present conditions, and reasonably foreseeable future actions and conditions.

25

1 Table 13. CEQ cumulative effects analysis process and documentation within this DEIS.

		<b>Steps in the Process</b>	<b>Location within this DEIS</b>
<b>Scoping</b>	1	Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals	Subsections 1.2, 1.3, 1.6, and 5.5
	2	Establish the geographic scope for the analysis	Subsections 1.4 and 5.1.1
	3	Establish the time frame for the analysis	Subsection 5.1.1
	4	Identify other actions affecting the resources, ecosystems, and human communities of concern	Subsection 5.4
<b>Describing the Affected Environment</b>	5	Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses	Chapter 3
	6	Characterize the stresses affecting these resources, ecosystems, and human communities and relations to regulatory thresholds	
	7	Define a baseline condition for the resources, ecosystems and human communities	
<b>Determining the Environmental Consequences</b>	8	Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities	Chapter 3 and Subsections 5.2 to 5.5
	9	Determine the magnitude and significance of cumulative effects	Subsection 5.6
	10	Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects	Chapter 2
	11	Monitor the cumulative impacts of the selected alternatives and apply adaptive management	Alternative 2 (Proposed Action) includes monitoring and adaptive management as described in HGMPs

2

3 **5.1.1. Geographic and Temporal Scales**

4 The cumulative effects analysis area includes the project area and the analysis area described in Subsection  
 5 1.4, Project Area and Analysis Area. This cumulative effects area was determined based on the geography,

1 topography, waterways, and natural interactions that occur among the ecosystems present within the Oregon  
2 Coast Region. Biological resources and human populations along the Oregon Coast cumulative effects area  
3 share a common airshed, common watershed, and common flyway. The region has a population size of  
4 less than 600,000 residents. Population size increases are projected to occur in the periphery areas of the  
5 existing towns and cities in the more habitable lowland areas.

6  
7 The temporal scope of past and present actions for the affected resources encompasses actions that  
8 occurred prior to and after Oregon Coast and SONCC coho salmon ESUs became listed under the ESA.  
9 This is also the temporal context within which affected resources are described in Chapter 3, Affected  
10 Environment, whereby existing conditions are a result of prior and ongoing actions in the DEIS project  
11 area.

### 12 13 **5.1.2. Other Programs, Plans, and Policies**

14 Provided below are known past, present, and future actions within the Oregon Coast Region that have  
15 occurred, are occurring, or are reasonably likely to occur within the cumulative effects analysis area.  
16 Subsection 5.2, Past Actions, summarizes past actions that affected the cumulative effects analysis area;  
17 Subsection 5.3, Present Conditions, describes current overall trends for the area; and Subsection 5.4, Future  
18 Actions and Conditions, describes climate change effects, development, habitat restoration, hatchery  
19 production, and fisheries activities and objectives supported by agencies and other non-governmental  
20 organizations to restore habitat in the cumulative effects analysis area. Finally, Subsection 5.5, Cumulative  
21 Effects by Resource, describes how these past, present, and future actions affect each resource evaluated in  
22 this DEIS, and specifically focuses on the effects of alternatives, when possible.

### 23 24 **5.2. Past Actions**

25 Humans occupied the Oregon Coast Region for thousands of years. Before Europeans arrived in the late  
26 1700s, most human inhabitants were hunter-gatherers associated with the Native American Tribes. They  
27 relied on sea life for food, animals for food and warm clothing, and trees for building materials.

28 Indigenous peoples were known to use the waterways of the Oregon Coast as trading routes. Fire was  
29 used in some areas to modify the environment, to clear areas to aid hunting, to promote berry production,  
30 and to support the growth of grasses for making nets, baskets, and blankets.

1 In the 1800s, with the continued increase in European descendants to Oregon, trapping, logging, and  
2 fishery harvest were initiated on a large scale, which dramatically altered the landscape. The Oregon  
3 Coast Region became one of the top five producers of timber. As natural resource extraction and the  
4 number of people in the area increased, the quality of the Oregon Coast ecosystems declined. Land  
5 ownership became fragmented with many different owners and purposes (Figure 23). Most of the old-  
6 growth forest was harvested by private, state, and federal identities, and much forestland in the lowland,  
7 open areas was converted to human-dominated uses, such as agriculture and urban development in private  
8 ownership. The quantity and availability of tidal marsh and other freshwater estuarine ecosystem types  
9 declined, floodplains were altered, rivers and streams were channelized, substantial dams were  
10 constructed in some river basins, estuaries were filled, shorelines were hardened and/or modified, water  
11 and air quality declined, pollution and marine traffic increased, and habitat was lost. Additionally, some  
12 floodcontrol and hydropower developed in the 20th century (primarily in the Umpqua and Rogue Rivers),  
13 which altered stream habitat below the dam projects, eliminated historical spawning and rearing habitats,  
14 and altered the natural hydrology of the watershed.

15

16 Forest management continued to drive the local economies. Splash damming occurred in several coastal  
17 watershed as a method to get timber to local mills in the estuaries, which degraded the aquatic habitat  
18 dramatically. By the late 1980s, most of the Oregon Coast Region had been logged at least one time, with  
19 the exception of designated wilderness areas or other special designation that helped preserve the local  
20 landscape. All of the associated activities that occur with logging, like road building and building stream  
21 crossings, became extensive across the landscape. All of these activities severely affected the aquatic  
22 habitat in streams and rivers of the Oregon Coast Region. Much of the stream complexity that included  
23 large woody debris, deep pool habitat, braided channels, and intact riparian areas was lost. Streams and  
24 rivers are now much simpler, less complex, dominated by shallow riffle habitat, and exhibited warmer  
25 water temperatures than occurred historically.

26

27 Fishery harvest of salmon and steelhead and other aquatic species also increased with the increase in  
28 human population across the Oregon Coast Region. Initially, fishery harvest occurred for subsistence  
29 needs but then grew into commercial harvest in the rivers and ocean. By the 1920s, fishery harvest in  
30 freshwater had severely affected the salmon and steelhead runs from the millions of pounds harvested  
31 annually. Commercial fisheries in the rivers and bays was dramatically curtailed and eventually became  
32 illegal. The fishing fleet developed in the coastal ports to commercially harvest fish in the ocean.  
33 Commercial and recreational harvest increased throughout the 20<sup>th</sup> century until the early 1990s when

1 many of the salmon runs plummeted to all-time low abundances. Fishery harvest rates were dramatically  
2 reduced and still occur at much lower harvest rates than occurred historically.

3  
4 The decreases in salmon and steelhead harvest from overexploitation and reduced productivity from  
5 freshwater habitat degradation initiated hatchery programs for salmon and steelhead since the late 1800s  
6 in the Oregon Coast Region in an effort to increase fishery harvest. One of the first rivers to have  
7 hatchery programs was the Rogue River. The hatchery programs increased fishery harvest in many cases,  
8 especially during the high ocean survival periods. However, many concerns arose over excessive harvest  
9 of natural-origin stocks, interbreeding between hatchery- and natural-origin fish, and competition reduced  
10 hatchery production beginning in the 1980s. Over 10 million hatchery coho salmon were released along  
11 the Oregon Coast prior to the mid-1990s (Stout et al. 2012). Those hatchery coho salmon releases were  
12 substantially curtailed due to ESA-listings in the late 1990s.

### 14 **5.3. Present Conditions**

15 As described in Subsection 5.2, Past Actions, substantial changes have occurred to the Oregon Coast  
16 terrestrial and aquatic ecosystems over the last century. Presently, the landscape continues to be managed  
17 for timber production over a broad landscape of the Oregon Coast Region given the superb growing  
18 conditions for timber. Several regulations and best management practices have been implemented and are  
19 still in effect to help recover and protect aquatic habitat, such as the Oregon State Forest Practices Act and  
20 the Northwest Forest Plan (Subsection 1.7.1, Oregon Plan for Salmon and Watersheds). Federal lands in  
21 the region have greater riparian protections and are managed to a greater extent for late-successional  
22 timber stands than what typically occurs on private timberlands in the Oregon Coast Region. In  
23 watersheds dominated by private, timberland owners, timber harvest occurs regularly on 25-35 year  
24 rotations. Over the last two decades, timber harvest has decreased overall on federal lands but increased  
25 on private lands (Stout et al. 2012). Since the Oregon Coast Region is dominated by non-federal lands,  
26 timber harvest continues to be a prominent issue for the restoration of aquatic habitat along the Oregon  
27 Coast (Meehan 1991).

28  
29 Land development continues to increase prominently in the lowland areas associated with the major  
30 towns and cities throughout the region. The greatest concentration of human population, and  
31 consequently associated development, is presently found in the cities of Medford, Grants Pass, Roseburg,  
32 Central Point, Coos Bay, Newport, North Bend, and Eagle Point. Of these cities, most are found in  
33 Jackson and Josephine Counties (Rogue River Basin), which exhibited the greatest human population

1 increases from 1980 to present. Coos County (Coos Bay and North Bend) was the only county that  
2 decreased in residency between 1980 and present. Overall, due to the prominent forest landscape, land  
3 development to support urban growth is not as extensive as in other parts of the state (i.e., Willamette  
4 Valley), and consequently the Oregon Coast Region currently supports less than 600,000 residents.  
5 Fishery harvest of all species of fish (resident and anadromous) is managed principally by ODFW. For  
6 ESA-listed coho salmon, management is governed by NMFS and ODFW. All other salmon species are  
7 also managed under the auspices of the Magnuson-Stevens Act via NMFS. Presently, all salmon species  
8 along the Oregon Coast are governed by existing management plans that prohibit overfishing so that all of  
9 the salmon populations remain viable. Stocks of concern are managed more conservatively to rebuild  
10 these stocks to healthy abundances. Listed coho salmon are presently governed by Amendment 13 of the  
11 Pacific Salmon Plan and has been authorized under the ESA.

12  
13 The existing hatchery programs along the Oregon Coast affect natural-origin salmon and steelhead and  
14 their habitat (Subsection 3.4, Salmon and Steelhead and Their Habitats). Operation of the hatchery  
15 facilities and release of hatchery fish into the natural environment has affected natural-origin salmon and  
16 steelhead through genetic introgression of hatchery fish into the natural population, increased competition  
17 and predation from hatchery fish, transfer of pathogens from hatchery fish and/or the hatchery facility to  
18 the adjacent river or stream, operation of the hatchery facility using water and discharging effluent,  
19 masking of natural population status from having hatchery fish spawning in the wild, incidental fishing  
20 effects, and nutrient input from carcasses (Table 6). The extent of adverse effects depends on how the  
21 hatchery program is managed, the current status of the natural-origin populations and how affected by the  
22 hatchery program, and the condition of the habitat; among other factors.

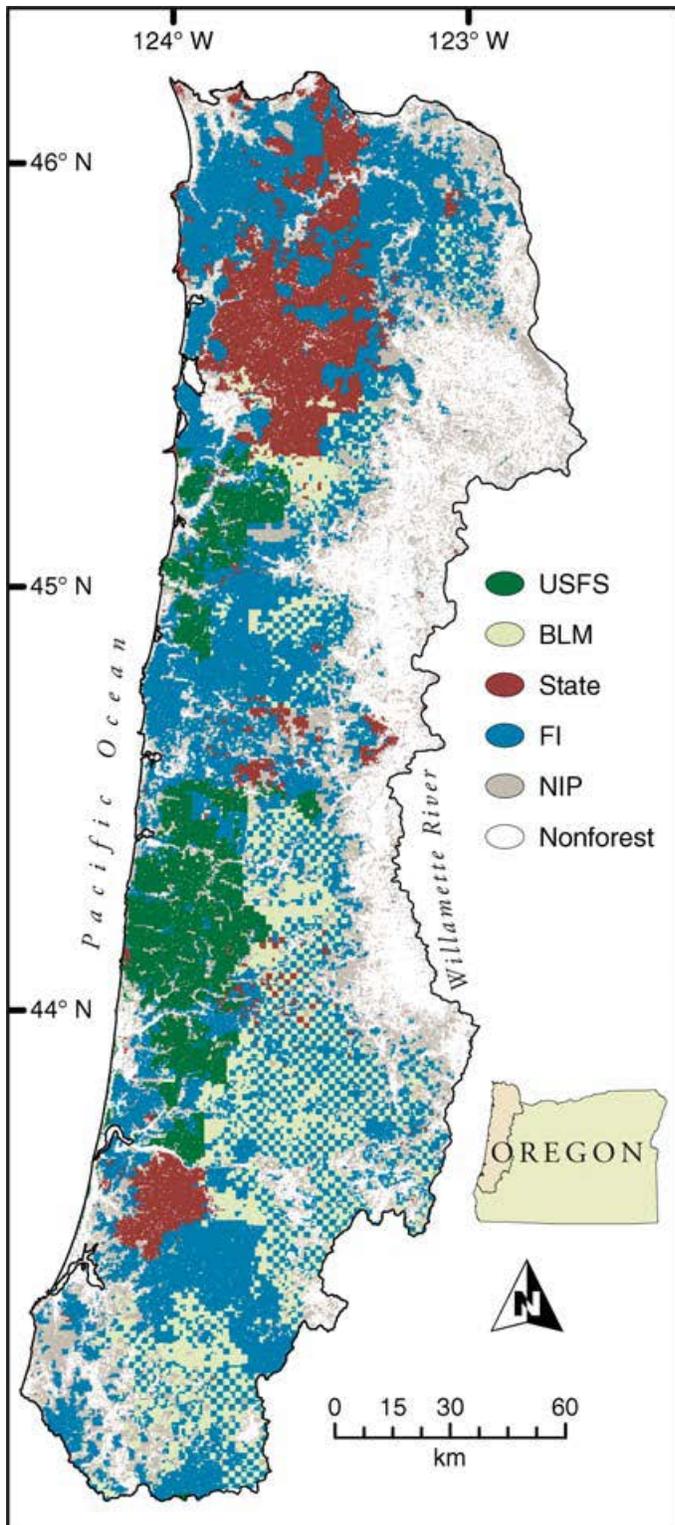
23  
24 Hatchery programs along the Oregon Coast can also provide benefits to the natural-origin populations by  
25 increasing the amount of marine-derived nutrients to the freshwater environment from having hatchery  
26 fish spawn naturally and from the outplanting of carcasses from the hatchery facility. Hatchery programs  
27 can also potentially benefit the abundance, productivity, spatial structure, and diversity of natural  
28 populations (McElhany et al. 2000). None of the current hatchery programs within the Oregon Coast  
29 Region are managed for the supplementation or restoration of natural-origin populations. All of the  
30 hatchery programs are managed solely for fishery harvest opportunities.

31  
32 Hatchery programs along the Oregon Coast continue to be operated and managed by ODFW at levels  
33 specified in the current HGMPs being considered in this DEIS. Overall production levels have remained  
34 stable over the last 10 years. There were some reforms that occurred from implementation of ODFW's

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1 Management Plans under its Native Fish Conservation Policy (ODFW 2002), but production levels have  
2 remained similar across the Oregon Coast Region overall. For ESA-listed coho salmon, total hatchery  
3 releases for the entire Oregon Coast Region is less than 350,000 smolts annually (compared to over  
4 10,000,000 in the 1980s).

5



1  
 2 Figure 22. Map of ownership classes for forest land along the Oregon Coast (does not include the  
 3 headwater areas of the Rogue and Umpqua watersheds). Figure taken from Spies et al.  
 4 (2007). Abbreviations in legend are: USFS (U.S. Forest Service), BLM (Bureau of Land  
 5 Management), State (state of Oregon), FI (forest industry), NIP (nonindustrial private  
 6 forest and other miscellaneous owners, nonforest (other land uses).

1 Altogether, the stressors described above under present conditions (e.g., human development and habitat  
2 degradation, hatchery practices, and fisheries) are expected to continue under future actions and  
3 conditions as described below.  
4

#### 5 **5.4. Future Actions and Conditions**

6 Reasonably foreseeable future actions include forest management, land development, hatchery  
7 production, fisheries, habitat restoration activities, and climate change. Many plans, regulations, and laws  
8 are in place at the local, state, and federal levels within the Oregon Coast Region to continue economic  
9 benefits while minimizing and/or reducing environmental degradation (Subsection 1.7.1, Oregon Plan for  
10 Salmon and Watersheds). However, it is unclear if these plans, regulations, and laws will be successful in  
11 meeting their environmental goals and objectives. In addition, it is not possible to predict the magnitude  
12 of effects from future timber harvest, human development, and habitat restoration with certainty for  
13 several reasons: (1) the activities may not have yet been formally proposed, (2) mitigation measures  
14 specific to future actions may not have been identified for many proposed projects, and (3) there is  
15 uncertainty whether mitigation measures for these actions will be fully implemented. However, when  
16 combined with climate change, a general trend in expected cumulative effects can be estimated for each  
17 resource as described in Subsection 5.5, Cumulative Effects by Resource.  
18

19 Because of the large geographic scope of this analysis, it is not feasible to conduct a detailed assessment  
20 of all project-level activities that have occurred, are occurring, or are planned in the future for the  
21 cumulative effects analysis area. Rather, this cumulative effects analysis qualitatively assesses the overall  
22 trends in cumulative effects considering past, present, and reasonably foreseeable future actions, and  
23 describes how the alternatives contribute to those trends.  
24

##### 25 **5.4.1. Forest Management**

26 The Coastal Landscape Analysis and Modeling Study (see <http://www.fsl.orst.edu/clams/>; accessed April  
27 5, 2016) evaluated the ecological, economic, and social consequences of forest management policies of  
28 different landowners along the Oregon Coast mountain range (excludes the headwater areas of the Rogue  
29 and Umpqua watersheds). One aspect of this study modeled the likely ecological outcomes, under  
30 existing State Forest Practices Act and Northwest Forest Plan management policies, across the landscape  
31 in 100 years from 2006 (Spies et al. 2007). The results show substantial increases in (compared to current  
32 conditions): mature/old growth forest habitat, well-developed old growth, streamside conifers, large  
33 blocks of forestland, and timber production output from non-industrial, private timberlands. Substantial

1 decreases in hardwood forests, diversity of early successional forests, foothill oak woodland, and overall  
2 landscape diversity is expected to occur over the next 100 years. The 100 year projections are dependent  
3 upon land ownership. Federal lands are likely to exhibit the greatest increases in mature/old growth forest  
4 habitat, increased riparian condition and function, and habitat for ESA-listed terrestrial species like the  
5 northern spotted owl and marbled murrelet, even though this land ownership only represents  
6 approximately 25 percent of the land base. Conversely, industrial private timberlands will continue to be  
7 harvested under existing forest practices leading to less mature/old growth forests, increased early seral  
8 staged forests, and reduced riparian condition and function (Spies et al. 2007).

#### 10 **5.4.2. Land Development**

11 Future human population growth is expected to continue into the foreseeable future within the Oregon  
12 Coast Region, but not to the extent as other areas along the West Coast like Central Valley in California,  
13 Willamette Valley in Oregon, and Puget Sound in Washington. This is primarily an artifact of the  
14 topography and forests of the Oregon Coast Region. Developable land is more limited in the Oregon  
15 Coast Region than in other West Coast areas because of the limited open, lowland topography. Most of  
16 the future development is projected to occur as the existing cities of Medford, Grants Pass, Roseburg,  
17 Central Point, Coos Bay, Newport, North Bend, and Eagle Point continue to expand due to population  
18 growth (Spies et al. 2007). Most of this development will occur in the Rogue and Umpqua valleys (Spies  
19 et al. 2007).

21 Continued population growth will result in increased demand for housing, transportation, food, water,  
22 energy, and commerce. These needs will result in changes to existing land uses because of increases in  
23 residential and commercial development and roads, increases in impervious surfaces, conversions of  
24 private agricultural and forested lands to developed uses, increases in use of non-native species and  
25 increased potential for invasive species, and redevelopment and infill of existing developed lands. The  
26 need to provide food and supplies to a growing human population in the cumulative effects analysis area  
27 will result in increases in shipping, increases in withdrawals of fresh water to meet increasing food and  
28 resource requirements, and increases in energy demands. Although the rate of urban sprawl has been  
29 decreasing in comparison to previous increases in the late 1900s (Puget Sound Regional Council 2012),  
30 development will continue to affect the natural resources in the cumulative effects analysis area.

1 **5.4.3. Hatchery Production**

2 It is likely that the type and extent of salmon and steelhead hatchery programs and the numbers of fish  
3 released in the analysis area will change over time. These changes are likely to reduce effects on natural-  
4 origin salmon and steelhead such as genetic effects, competition, and predation risks that are described in  
5 Subsection 3.4, Salmon and Steelhead and Their Habitats, especially for those species that are listed under  
6 the ESA. For example, effects on natural-origin salmon and steelhead would be expected to decrease  
7 over time to the extent that hatchery programs are reviewed and approved by NMFS under the ESA.  
8 Hatchery program compliance with conservation provisions of the ESA will ensure that listed species are  
9 not jeopardized, and that “take” under the ESA from salmon and steelhead hatchery programs is  
10 minimized or avoided.

11  
12 Where needed, reductions in effects on listed and natural-origin salmon and steelhead may occur through  
13 changes such as refinement of times and locations of fish releases to reduce risks of competition and  
14 predation; management of overlap in hatchery-origin and natural-origin spawners to meet gene flow  
15 objectives; decreased use of isolated hatchery programs; increased use of integrated hatchery programs  
16 for conservation purposes; when available, incorporation of new research results and improved best  
17 management practices for hatchery operations; decreased production levels; or termination of programs.  
18 Similar changes would be expected for non-listed species as well, motivated by the desire to avoid species  
19 from becoming listed.

20  
21 Since the existing hatchery programs are managed by ODFW, substantial increases in hatchery  
22 production is not likely in the foreseeable future for the following reasons:

- 23 • State-funded programs come primarily from fishing license sales, which has continued to decline  
24 over the last 30 years.
- 25 • Unless society’s priorities and interests change back to outdoor activities like hunting and fishing  
26 in the future that increase license sales, funding for state-operated hatchery programs will  
27 continue to be limited.
- 28 • The only federal mitigation programs are in the Rogue River basin. These programs are likely to  
29 be continually funded, but will not likely increase in production because of the original mitigation  
30 obligations when William Jess and Applegate Dams were built.

31

1 **5.4.4. Fisheries**

2 It is likely that the salmon and steelhead fisheries in the analysis area will change over time. These  
3 changes are likely to reduce effects on natural-origin salmon and steelhead listed under the ESA. For  
4 example, effects on natural-origin salmon and steelhead would be expected to decrease over time to the  
5 extent that fisheries management programs continue to be reviewed and approved by NMFS under the  
6 ESA, as evidenced by the beneficial changes to programs that have thus far undergone ESA review.  
7 Fisheries management program compliance with conservation provisions of the ESA will ensure that  
8 listed species are not jeopardized and that “take” under the ESA from salmon and steelhead fisheries is  
9 minimized or avoided. Where needed, reductions in effects on listed salmon and steelhead may occur  
10 through changes in areas or timing of fisheries, or changes in types of harvest methods used.

11

12 **5.4.5. Habitat Restoration**

13 To counterbalance the human-induced changes that will affect biodiversity in the cumulative effects  
14 analysis area (Subsection 5.4.1, Forest Management and Subsection 5.4.2, Land Development), funding  
15 for habitat conservation and restoration is likely to continue into the foreseeable future because the  
16 majority of habitat restoration projects occurs from federal funding to the state of Oregon’s Watershed  
17 Enhancement Board to local Watershed Councils for on-the-ground implementation of projects. As  
18 funding continues to be prioritized, emphasis on habitat restoration projects benefitting the most critical  
19 limiting factors and threats within the watershed will occur. These habitat restoration projects will  
20 continue to enhance the conservation and recovery of the watersheds.

21

22 **5.4.6. Climate Change**

23 The changing climate is becoming recognized as a long-term trend that is occurring throughout the world.  
24 Within the Pacific Northwest, Ford (2011) summarized expected climate changes in the coming years as  
25 leading to the following physical and chemical changes (certainty of occurring is in parentheses):

26

- 27 • Increased air temperature (high certainty)
- 28 • Increased winter precipitation (low certainty)
- 29 • Decreased summer precipitation (low certainty)
- 30 • Reduced winter and spring snowpack (high certainty)
- 31 • Reduced summer stream flow (high certainty)
- 32 • Earlier spring peak flow (high certainty)

- 1 • Increased flood frequency and intensity (moderate certainty)
- 2 • Higher summer stream temperatures (moderate certainty)
- 3 • Higher sea level (high certainty)
- 4 • Higher ocean temperatures (high certainty)
- 5 • Intensified upwelling (moderate certainty)
- 6 • Delayed spring transition (moderate certainty)
- 7 • Increased ocean acidity (high certainty)

8  
9 These changes will affect human and other biological ecosystems within the cumulative effects analysis  
10 area (Ecology 2012a). Changes to biological organisms and their habitats are likely to include shifts in  
11 timing of life history events, changes in growth and development rates, changes in habitat and ecosystem  
12 structure, and rise in sea level and increased flooding (Littell et al. 2009; Johannessen and Macdonald  
13 2009).

14  
15 For the Pacific Northwest portion of the United States, Hamlet (2011) notes that climate changes will  
16 have multiple effects. Expected effects include:

- 17  
18 • Overtaxing of storm water management systems at certain times
- 19 • Increases in sediment inputs into water bodies from roads
- 20 • Increases in landslides
- 21 • Increases in debris flows and related scouring that damages human infrastructure
- 22 • Increases in fires and related loss of life and property
- 23 • Reductions in the quantity of water available to meet multiple needs at certain times of year (e.g.,  
24 for irrigated agriculture, human consumption, and habitat for fish)
- 25 • Shifts in irrigation and growing seasons
- 26 • Changes in plant, fish, and wildlife species' distributions and increased potential for invasive  
27 species
- 28 • Declines in hydropower production
- 29 • Changes in heating and energy demand
- 30 • Impacts on homes along coastal shorelines from beach erosion and rising sea levels

31  
32 The most heavily affected ecosystems and human activities along the Pacific coast are likely to be near  
33 areas having high human population densities, and the continental shelves off Oregon and Washington  
34 (Halpern et al. 2009).

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## **5.5. Cumulative Effects by Resource**

Provided below is an analysis of the cumulative effects of forest management, land development, hatchery production, fisheries, habitat restoration, and climate change under the alternatives and for each resource analyzed in this DEIS. The resources for which cumulative effects are described are:

- Water quantity
- Water quality
- Salmon and Steelhead and Their Habitats
- Other Fish and Their Habitats
- Wildlife
- Socioeconomics
- Environmental justice

### **5.5.1. Water Quantity**

Subsection 3.2, Water Quantity, describes the baseline conditions of water quantity, and Subsection 4.2, Effects on Water Quantity, evaluates the direct and indirect effects of the four alternatives of the hatchery programs within the Oregon Coast Region. All of the hatchery facilities divert water from nearby sources, pass the water through the hatchery, and then discharge the water back into the stream or river. There is typically a net gain of water at the point of discharge from the hatchery if groundwater sources are used at the hatchery. The amount of water available in the stream or river at the hatchery and local groundwater sources is the result of many years of past practices of forest management, land development, and climate change.

Future actions in the overall cumulative effects analysis area are described in Subsection 5.4, Future Actions and Conditions. This subsection considers effects that may occur as a result of the alternatives being implemented at the same time as other anticipated future actions. This subsection discusses the incremental impacts of the alternatives in addition to past, present, and reasonably foreseeable future actions (i.e., cumulative effects) on water quantity.

Successful operation of hatcheries depends upon the use of water from adjacent streams and rivers and groundwater at the hatchery facilities. The hatchery programs are subject to the amount and availability of water at the hatchery facility by all of the other prior influences and uses. The primary upstream influence on water quantity for the hatchery facilities along the Oregon Coast is forest management and climate

1 change. Land development and urban use are not primary influences because all of the major population  
2 areas are downstream of the hatchery facilities.

3 Habitat restoration could principally influence water quantity, especially if diversions are eliminated, but  
4 no projects are known to exist upstream of the hatchery facilities. Fisheries do not influence water quantity.  
5 It is uncertain how water quantity will be affected at the hatchery facilities due to federal land management  
6 being more conservative now and into the future for recovering aquatic habitat and climate change likely  
7 leading to less water being available during the low streamflow periods of the summer (surface and  
8 groundwater). Given these future conditions, it is likely water quantity in the analysis area will be the same  
9 or slightly worse than current conditions.

10 All of the four alternatives evaluated in Subsection 4.2, Effects on Water Quantity, resulted in negligible  
11 impacts on water quantity from the operation of the hatchery facilities. Therefore, hatchery programs are  
12 not likely to influence future conditions for water quantity downstream of the hatchery facilities. Of all of  
13 the areas evaluated along the Oregon Coast, most of the impacts on water quantity are likely to be caused  
14 from municipal and agricultural uses downstream of Cole Rivers Hatchery on the Rogue River where the  
15 highest human population areas and demand occurs near the cities of Medford, Grants Pass, Central Point,  
16 and Eagle Point. However, most of the water quantity issues are in the tributaries of the Rogue River,  
17 where diversions for agriculture and municipal uses dramatically reduce streamflows and salmonid  
18 rearing habitat. The operation of Cole Rivers hatchery in the mainstem, upper Rogue River does not  
19 affect the streamflows of the tributaries entering the Rogue River. Presently, in the mainstem Rogue  
20 River below the hatchery, there is water designated for municipal and irrigation uses that is currently  
21 unallocated. It is anticipated this unallocated water will eventually be used and withdrawn from the  
22 Rogue River as population growth continues to occur. None of the four alternatives evaluated in this  
23 DEIS related to the operation of Cole Rivers hatchery are likely to contribute to the above issues with  
24 water quantity downstream of the hatchery facility because there is no net loss of water from use at the  
25 hatchery.

26  
27 In summary, cumulative effects from forest management, land development, climate change, and habitat  
28 restoration would likely impact water quantity (increased demand on limited water supplies) in the  
29 analysis area more than the direct or indirect effects that described in Subsection 4.2, Effects on Water  
30 Quantity, under all alternatives. However, implementation of the four alternatives would not affect or  
31 contribute to the overall trend in cumulative effects on water quantity within the Oregon Coast Region.  
32

1 **5.5.2. Water Quality**

2 Subsection 3.3, Water Quality, describes the baseline conditions of water quality, and Subsection 4.3,  
3 Effects on Water Quality, evaluates the direct and indirect effects of the four alternatives of the hatchery  
4 programs within the Oregon Coast Region. All of the hatchery facilities divert water from nearby  
5 sources, pass the water through the hatchery, and then discharge the water back into the stream or river.  
6 The hatchery fish and operations add substances and diseases to the water within the specified limits of  
7 the NPDES permit for each hatchery.

8  
9 Future actions in the overall cumulative effects analysis area are described in Subsection 5.4, Future  
10 Actions and Conditions. This subsection considers effects that may occur as a result of the alternatives  
11 being implemented at the same time as other anticipated future actions. This subsection discusses the  
12 incremental impacts of the alternatives in addition to past, present, and reasonably foreseeable future  
13 actions (i.e., cumulative effects) on water quality.

14  
15 The most common substances found in the effluent of Oregon Coast hatcheries are ammonia, nitrogen,  
16 phosphorus, and antibiotics. Bacteria, parasites, and viruses can also be transmitted from the hatchery  
17 fish to the effluent. These substances and organisms are a byproduct of hatchery fish rearing and treating  
18 the fish to ensure high survival while being grown at very high densities. Most of the streams and rivers  
19 within the Oregon Coast Region have reaches that are on the EPA’s 303(d) list for impaired waters.  
20 Water temperature, fecal coliform, sedimentation, dissolved oxygen are the current 303(d) listings for the  
21 Oregon Coast Region, regardless of whether there is a hatchery facility in the basin or not (Table 4).  
22 Lack of riparian shade, poor agricultural, and forestry practices are some of the causes for the current  
23 303(d) listings. The hatchery facilities are not identified as a cause for any of the current 303(d) listings  
24 within the Oregon Coast Region.

25  
26 As long as the hatchery facilities continue to operate as evaluated under the alternatives of this DEIS  
27 (Chapter 4, Environmental Consequences), the hatcheries will continue to discharge substances, viruses,  
28 and bacteria into the effluent of the hatchery facility. However, as evaluated in Subsection 4.3, Effects on  
29 Water Quality, the effects are minimal and short-lived because the effluent is diluted as it travels  
30 downstream and becomes undetectable a few hundred meters downstream (Bartholomew et al. 2013).  
31 The 303(d) list impairments for water quality are expected to continue into the foreseeable future in areas  
32 where hatchery facilities are (and are not) present (Figure 2). Future forest management on non-federal  
33 lands, land development, and climate change can be expected to further impair water quality on existing

1 303(d) stream reaches due to increases in water temperature, continued agricultural practices, and logging  
2 activities. However, such impairments from these activities would not be increased by hatchery  
3 operations under any alternative.  
4

5 **5.5.3. Salmon and Steelhead and Their Habitats**

6 Subsection 3.2, Salmon and Steelhead, describes baseline conditions for salmon and steelhead. These  
7 conditions are the result of many years of forest management, climate change, land development, habitat  
8 restoration, hatchery production, and fisheries (Lackey et al. 2006). The expected direct and indirect  
9 effects of the alternatives on salmon and steelhead are described in Subsection 4.4, Effects on Salmon and  
10 Steelhead and Their Habitat.  
11

12 Future actions are described in Subsection 5.4, Future Actions and Conditions. This subsection describes  
13 cumulative effects on salmon and steelhead that may occur as a result of implementing any of the  
14 alternatives at the same time as other future actions. This subsection discusses the incremental impacts of  
15 the alternatives in addition to past, present, and reasonably foreseeable future actions (i.e., cumulative  
16 effects) on salmon and steelhead.  
17

18 Salmon and steelhead abundance naturally alternates between high and low levels on large temporal and  
19 spatial patterns that may last centuries and on more complex ecological scales than can be easily observed  
20 (Rogers et al. 2013). Cumulative effects on salmon and steelhead may be greater than the direct and  
21 indirect effects of each alternative as analyzed in Subsection 4.4, Effects on Salmon and Steelhead and  
22 Their Habitats, under all alternatives. This subsection provides brief overviews of the effects of forest  
23 management, climate changes, development, habitat restoration, hatchery production, and fisheries on  
24 salmon and steelhead.  
25

26 Within the Oregon Coast Region, the effects of forest management on salmon and steelhead have been  
27 widespread across the landscape. Timber harvest, and associated activities such as road building, has  
28 resulted in decreased habitat capacity and productivity of salmon and steelhead (Meehan 1991). Some  
29 species of salmon have been more impacted by forest management than other species that spend a  
30 minimal time rearing as juvenile fish in freshwater (Meehan 1991). ESA-listed coho salmon have been  
31 impacted greatly with the most critical limiting factor/threats being overwinter survival of juvenile coho  
32 salmon (NMFS 2014; NMFS 2015). Future projections suggest salmon and steelhead and their habitat

1 will continue to be impacted by forest management (Spies et al. 2007). However, the magnitude and  
2 severity of those impacts varies greatly depending upon land ownership.

3  
4 Private, industrial timberlands are expected to be harvested in compliance with Oregon Forest Practices  
5 Act, which are less protective of riparian and aquatic habitats than would occur from timber harvest on  
6 federal lands. The improvements to forest management implemented in the early 1990s will continue to  
7 help recover aquatic habitat from the legacy impacts of historical timber harvest (Spies et al. 2007).  
8 However, habitat capacity has been reduced significantly in most freshwater areas, and it is unknown to  
9 what extent this capacity will be restored with continual anthropogenic impacts still occurring across the  
10 landscape.

11  
12 The outlook for sustaining salmon and steelhead populations over the long-term varies by watershed, with  
13 the Rogue and Umpqua watersheds being most vulnerable to human development (Subsection 5.4.2, Land  
14 Development). The watersheds, such as Tahkenitch, Siltcoos, Siuslaw, Tenmile, Cummings, Yachats,  
15 and Alsea basins, have the greatest federal land base and may be less vulnerable to human development in  
16 the future (Figure 23).

17  
18 The effects of climate change on salmon and steelhead are described in general in ISAB (2007), and  
19 would vary among species and among species' life history stages. Effects of climate change may affect  
20 virtually every species and life history type of salmon and steelhead in the cumulative effects analysis  
21 area (Glick et al. 2007; Mantua et al. 2009). Cumulative effects from climate change, particularly changes  
22 in streamflow and water temperatures, would likely impact hatchery-origin and natural-origin salmon and  
23 steelhead life stages in various ways as described below and shown in Table 14. Under all alternatives,  
24 impacts on salmon and steelhead from climate change are expected to be similar, because climate change  
25 would impact fish habitat under each alternative in the same manner.

26  
27 Previous and new developments (such as residential, commercial, transportation, and energy  
28 development); accidental discharges of oil, gas, and other hazardous materials; and the potential for  
29 landowner and developer noncompliance with regulations continue to affect aquatic habitat used by  
30 salmon and steelhead. Although regulatory changes for increased environmental protection (such as local  
31 critical areas ordinances), monitoring, and enforcement have helped reduce impacts of development on  
32 salmon and steelhead in freshwaters, development may continue to reduce salmon and steelhead habitat,  
33 decrease water quality, and contribute to salmon and steelhead mortality. These developments result in  
34 environmental effects such as land conversion, sedimentation, impervious surface water runoff to streams,

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1 changes in stream flow because of increased consumptive uses, shoreline armoring effects, channelization  
2 in lower river areas, barriers to fish passage, and other types of environmental changes that would  
3 continue to affect hatchery-origin and natural-origin salmon and steelhead (Quinn 2010).

4

5

1 Table 14. Examples of potential impacts of climate change by salmon and steelhead life stage under  
 2 all alternatives.

Life Stage	Effects
Egg	1) Increased water temperatures and decreased flows during spawning migrations for some species would increase pre-spawning mortality and reduce egg deposition. 2) Increased maintenance metabolism would lead to smaller fry. 3) Lower disease resistance may lead to lower survival. 4) Changed thermal regime during incubation may lead to lower survival. 5) Faster embryonic development would lead to earlier hatching. 6) Increased mortality for some species because of more frequent winter flood flows as snow level rises. 7) Lower flows would decrease access to or availability of spawning
Spring and Summer Rearing	1) Faster yolk utilization may lead to early emergence. 2) Smaller fry are expected to have lower survival rates. 3) Higher maintenance metabolism would lead to greater food demand. 4) Growth rates would be slower if food is limited or if temperature increases exceed optimal levels; growth could be enhanced where food is available, and temperatures do not reach stressful levels. 5) Predation risk would increase if temperatures exceed optimal levels. 6) Lower flows would decrease rearing habitat capacity. 7) Sea level rise would eliminate or diminish the rearing capacity of tidal wetland habitats for rearing salmon, and would reduce the area of estuarine beaches for spawning by forage fishes.

Life Stage	Effects
Overwinter Rearing	<ol style="list-style-type: none"> <li>1) Smaller size at start of winter is expected to result in lower winter survival.</li> <li>2) Mortality would increase because of more frequent flood flows as snow level rises.</li> <li>3) Warmer winter temperatures would lead to higher metabolic demands, which may also contribute to lower winter survival if food is limited, or higher winter survival if growth and size are enhanced.</li> <li>4) Warmer winters may increase predator activity/hunger, which can also contribute to lower winter survival.</li> </ol>

1 Sources: ISAB (2007), Glick et al. (2007), Beamish et al. (2009), and Beechie et al. (2013).

2

3 The primary cause of these continuing development changes is the continued increase in human  
 4 population in the cumulative effects analysis area (Subsection 5.4.2, Land Development), which also  
 5 leads to fisheries management challenges associated with overfishing. Development would more likely  
 6 affect species that reside in lower river areas (such as floodplains and estuaries) most directly because that  
 7 is where development tends to be concentrated. Effects from development are expected to affect salmon  
 8 and steelhead similarly under all alternatives because preferred development sites would not change by  
 9 alternative scenario.

10

11 Restoration of habitat in the cumulative effects analysis area will improve salmon and steelhead habitat in  
 12 general under all alternatives, with particular benefits to freshwater and estuarine environments  
 13 considered to be important for the survival and reproduction of fish. As a result, habitat restoration would  
 14 be expected to improve fish survival in local areas. However, habitat restoration alone will not  
 15 substantially increase survival and abundance of salmon and steelhead. In addition, habitat restoration is  
 16 dependent on continued state or federal funding, which is difficult to predict. Benefits from habitat  
 17 restoration are expected to affect salmon and steelhead survival similarly under all alternatives.

18

19 The potential benefits of habitat restoration actions within the cumulative effects analysis area are  
 20 difficult to quantify, but are expected to occur in localized areas where the activities occur. These actions  
 21 may not fully mitigate for the impacts of climate change and development on fish and wildlife and their  
 22 associated habitats. However, climate change and development will continue to occur over time and  
 23 affect aquatic habitat, while habitat restoration (which is dependent on funding and is localized in areas  
 24 where agencies and stakeholders' habitat restoration actions occur) is less certain under all alternatives.

1  
2 The effects on natural-origin salmon and steelhead from releases of hatchery fish in the future is expected  
3 to be stable or decrease over time for a variety of reasons (Subsection 5.4.4, Hatchery Production). If  
4 natural-origin populations of salmon and steelhead recover enough to provide fishery opportunities on  
5 healthy runs, many of the existing hatchery programs may be terminated. The mitigation programs in the  
6 Rogue River are not likely to be reduced due to the ongoing impacts of Lost Creek and Applegate dams  
7 and reservoirs to downstream habitats.

8  
9 In summary, to the extent aquatic habitat will continue to degrade over time under all alternatives, the  
10 abundance and productivity of natural-origin salmon and steelhead populations may continue to be  
11 reduced in the future. Hatchery-origin salmon and steelhead may be similarly affected, but likely to lesser  
12 extent.

13  
14 The current impacts from the operation of the hatchery facilities and release of hatchery fish are likely to  
15 continue into the future. Since hatchery production is not likely to increase given current constraints with  
16 funding and hatchery capacity, hatchery impacts will remain constant into the future. However, if  
17 natural-origin salmon and steelhead populations continue to decrease from other factors, then hatchery  
18 impacts could increase (e.g., higher pHOS from having fewer natural-origin fish spawning in the wild).

19  
20 Impacts from commercial and recreational fisheries in freshwater and in the ocean that catch hatchery fish  
21 produced from Oregon Coast hatcheries will likely remain similar to current levels into the future. The  
22 fisheries management structure is based upon the status of natural-origin salmon and steelhead, and not on  
23 the abundance of hatchery fish. Therefore, fisheries will continue to be restricted if natural-origin fish  
24 abundance decreases, and liberalized in years when abundance increases. The harvest of available  
25 hatchery fish will be within the limits established for natural-origin salmon and steelhead, and thus not  
26 likely change substantially in the future.

27  
28 Although none of the alternatives would affect the overall trend in cumulative effects on salmon and  
29 steelhead, Alternative 3 and Alternative 4 could help mitigate some of the negative genetic and ecological  
30 effects on natural-origin steelhead and salmon associated with hatchery programs. That is, because under  
31 Alternative 3 hatchery programs would be terminated, and under Alternative 4 hatchery production would  
32 be reduced. However, since the existing hatchery programs overall result in low impacts on the affected  
33 species populations, reducing or eliminating these hatchery programs would not substantially affect the  
34 adverse risks facing these populations in the future due to other factors (forest management, land

1 development, climate change, fisheries). Substantial improvements to the status of natural-origin salmon  
2 and steelhead within the Oregon Coast Region is not likely if the current hatchery programs were reduced  
3 and/or eliminated. The status of natural-origin populations with and without the presence of hatchery  
4 programs is similar within the Oregon Coast Region. All populations have been reduced substantially  
5 from historical abundance levels.  
6

#### 7 **5.5.4. Other Fish Species and Their Habitats**

8 Subsection 3.5, Other Fish and Their Habitat, describes the baseline conditions of fish species other than  
9 salmon and steelhead. These conditions are the result of many years of forest management, climate  
10 change, land development, habitat restoration, hatchery production, and fisheries. The direct and indirect  
11 effects of the alternatives on other fish species are described in Subsection 4.5, Effects on Other Fish and  
12 Their Habitat.  
13

14 Future actions in the overall cumulative effects analysis area are described in Subsection 5.4, Future  
15 Actions and Conditions. This subsection considers effects that may occur as a result of the alternatives  
16 being implemented at the same time as other anticipated future actions. This subsection discusses the  
17 incremental impacts of the alternatives in addition to past, present, and reasonably foreseeable future  
18 actions (i.e., cumulative effects) on fish species other than salmon and steelhead.  
19

20 Other fish species that have a relationship to salmon and steelhead include rainbow trout, coastal cutthroat  
21 trout, sturgeon, lamprey, forage fish, groundfish, and other resident freshwater fish (Subsection 3.5, Other  
22 Fish and Their Habitats). Similar to salmon and steelhead species, these fish species require and use a  
23 diversity of habitats. However, similar to effects described above for salmon and steelhead, these other  
24 fish species, including bull trout may also be affected by climate change and development because of the  
25 overall potential for loss or degradation of aquatic habitat or the inability to adapt to warmer water  
26 temperatures. In addition, climate change and development may attract non-native aquatic plants that  
27 may, over time, out-compete native aquatic plants that provide important habitat to native fish (Patrick et  
28 al. 2012).  
29

30 As discussed in Subsection 5.4.3, Habitat Restoration, the extent to which habitat restoration actions may  
31 mitigate impacts from climate change and development is difficult to predict. These actions may not fully  
32 mitigate for the effects of climate change and development.  
33

1 As discussed in Subsection 5.4.4, Hatchery Production, changes in hatchery programs over time may  
2 affect other fish species that have a relationship to salmon and steelhead. For example, reductions in  
3 hatchery production or terminations of hatchery programs may decrease the prey base available for other  
4 fish species (like cutthroat trout) that use salmon and steelhead as a food source.

5  
6 In summary, cumulative effects from forest management, climate change, development, habitat  
7 restoration, and hatchery production on other fish species would likely result in a decrease in the  
8 abundance of those fish species in the analysis area. Cumulative effects on fish species that compete,  
9 prey on, or are prey items for salmon and steelhead may be greater than the direct and indirect effects  
10 described under Subsection 4.5, Other Fish and Their Habitats. None of the alternatives would affect the  
11 overall trend in cumulative effects on other fish species because the range of production levels under the  
12 alternatives would be a small fraction of the total salmon and steelhead in the analysis area that these  
13 other fish species could compete with, prey on, or be prey items for.

#### 14 15 **5.5.5. Wildlife**

16 Subsection 3.6, Wildlife, describes the baseline conditions for wildlife. These conditions represent the  
17 effects of many years of forest management, climate change, development, habitat restoration, and  
18 hatchery production. The expected direct and indirect effects of the alternatives on wildlife are described  
19 in Subsection 4.6, Effects on Wildlife.

20  
21 Future actions are described in Subsection 5.4, Future Actions and Conditions. This subsection considers  
22 potential effects that may occur as a result of implementing any one of the alternatives at the same time as  
23 other anticipated actions. This subsection discusses the incremental impacts of the alternatives in addition  
24 to past, present, and reasonably foreseeable future actions (i.e., cumulative effects) on wildlife.

25  
26 The cumulative effects on wildlife from the alternatives varies depending upon the specific alternative.  
27 Alternative 1 and Alternative 2 are expected to provide benefits to nearly all wildlife species because  
28 hatchery fish are an important prey item for wildlife. These benefits would help offset some of the  
29 impacts expected in the future due to forest management and land development and the resultant loss in  
30 natural production of salmonids. Alternative 3 and Alternative 4, which would reduce hatchery  
31 production and the number of fish released, would result in negligible, negative impacts on wildlife  
32 species from the loss of salmon and steelhead as a potential food source. When combined with future

1 forest management and land development, Alternative 3 and Alternative 4 would have the greatest  
2 negative effects on wildlife.

3

#### 4 **5.5.6. Socioeconomics**

5 Subsection 3.7, Socioeconomics, describes the baseline conditions for socioeconomics. These conditions  
6 represent the effects of many years of forest management, climate change, development, habitat  
7 restoration, and hatchery production. The expected direct and indirect effects of the alternatives on  
8 socioeconomics are described in Subsection 4.7, Effects on Socioeconomics.

9

10 Future actions are described in Subsection 5.4, Future Actions and Conditions. This subsection considers  
11 potential effects that may occur as a result of implementing any one of the alternatives at the same time as  
12 other anticipated actions. This subsection discusses the incremental impacts of the alternatives in addition  
13 to past, present, and reasonably foreseeable future actions (i.e., cumulative effects) on socioeconomic  
14 resources.

15

16 Although unquantifiable, climate change and development actions, and changes in hatchery production  
17 and fisheries may reduce the number of salmon and steelhead available for harvest over time as described  
18 in Subsection 5.5.3, Salmon and Steelhead and Their Habitats. This, in turn, may reduce angler  
19 expenditure and economic revenue relative to conditions considered in Subsection 4.7, Effects on  
20 Socioeconomics. Likewise, it may reduce the number of steelhead available to the public as a food  
21 source and may increase reliance on other consumer goods or increase travel costs to participate in other  
22 fisheries.

23

24 The potential benefits of habitat restoration actions within the cumulative effects analysis area are  
25 difficult to quantify. These actions may not fully mitigate for the impacts of climate change and  
26 development.

27

28 As discussed in Subsection 5.4.4, Hatchery Production, and Subsection 5.4.5, Fisheries, changes in  
29 hatchery programs and fisheries may occur over time. Changes in hatchery programs may affect the  
30 socioeconomic effects from hatchery production of salmon and steelhead. For example, reductions in  
31 hatchery production or terminations of hatchery programs may decrease the number of fish available for  
32 harvest, decrease associated angler expenditures and revenues generated from fishing, and reduce the  
33 number of steelhead available to the general public.

1  
2 In summary, it is likely that cumulative effects from forest management, climate change, development,  
3 and hatchery production would decrease the number of fish available for harvest and reduce angler  
4 expenditure and economic revenue relative to conditions considered in Subsection 4.7, Socioeconomics.  
5 However, none of the alternatives would affect the overall trend in cumulative effects on socioeconomics  
6 because the range of production levels under the alternatives would result in a small fraction of the total  
7 harvestable salmon and steelhead in the analysis area, and, therefore, would provide a small fraction of  
8 the overall economic benefits derived from salmon and steelhead harvest in the analysis area  
9

### 10 **5.5.7. Environmental Justice**

11 Subsection 3.8, Environmental Justice, describes environmental justice communities and counties of  
12 concern in the analysis area. Environmental justice user groups and communities of concern within the  
13 cumulative effects analysis area include people that fish for salmon and steelhead and low income or  
14 minority communities. The expected direct and indirect effects of the alternatives on environmental  
15 justice are described in Subsection 4.8, Effects on Environmental Justice.  
16

17 Future actions are described in Subsection 5.4, Future Actions and Conditions. This subsection considers  
18 potential effects that may occur as a result of implementing any one of the alternatives at the same time as  
19 other anticipated actions. This subsection discusses the incremental impacts of the alternatives in addition  
20 to past, present, and reasonably foreseeable future actions (i.e., cumulative effects) on environmental  
21 justice user groups and communities of concern.  
22

23 Forest management, climate change and development actions, and changes in hatchery production and  
24 fisheries may reduce the number of salmon and steelhead available for harvest over time as described in  
25 Subsection 5.5.3, Salmon and Steelhead and Their Habitats. This, in turn, may reduce fishing opportunity  
26 in the analysis area relative to conditions considered in Subsection 4.8, Effects on Environmental Justice.  
27

28 The potential benefits of habitat restoration actions within the cumulative effects analysis area are  
29 difficult to quantify. These actions may not fully mitigate for the impacts of climate change and  
30 development on the abundance of fish that would be available for commercial or recreational harvest.  
31

1 As discussed in Subsection 5.4.3, Hatchery Production, and Subsection 5.4.4, Fisheries, changes in  
2 hatchery programs and fisheries may occur over time. Changes in hatchery programs may affect the  
3 number of salmon and steelhead available for harvest by environmental justice communities.  
4

5 In summary, it is likely that cumulative effects from climate change, development, and hatchery  
6 production would decrease the number of fish available for harvest relative to conditions considered in  
7 Subsection 4.8, Effects on Environmental Justice. However, none of the alternatives would affect the  
8 overall trend in cumulative effects on environmental justice because the range of production levels under  
9 the alternatives would result in a small fraction of the total harvestable salmon and steelhead in the  
10 analysis area available to environmental justice communities.  
11

## 12 **5.6. Summary of Effects**

13 Table 15 summarizes the combined effects of past, present, and reasonably foreseeable actions, other than  
14 the Proposed Action and alternatives (summarized above), affecting the environmental resources reviewed  
15 in this DEIS, affected by forest management, climate change, human development, habitat restoration,  
16 hatchery production, and fisheries.

17 Table 16 summarizes the conclusions made above on the impacts of past, present, and reasonably  
18 foreseeable actions when combined with the impacts of the Proposed Action. Definitions for effects terms  
19 are the same as described in Subsection 3, Affected Environment, and Subsection 4, Environmental  
20 Consequences. The relative magnitude and direction of impacts is described using the following terms:

- 21       Undetectable:   The impact would not be detectable.  
22       Negligible:       The impact would be at the lower levels of detection, and could be either  
23                               positive or negative.  
24       Low:                The impact would be slight, but detectable, and could be either positive or  
25                               negative.  
26       Moderate:         The impact would be readily apparent, and could be either positive or negative.  
27       High:               The impact would be greatly positive or severely negative.

1

2 Table 15. Summary of effects of past, present, and reasonably foreseeable future actions on the affected  
 3 resources evaluated in this DEIS.

Affected Resource	Past Actions	Present Actions	Reasonable Foreseeable Future Actions	Past, Present, and Reasonably Foreseeable Future Actions
Water Quantity	Negligible to low negative due to water withdrawals from human development	Negligible to low negative	Low negative	Low negative
Water Quality	Moderate	Moderate	Moderate	Moderate
Salmon and Steelhead and Their Habitat	Moderate to high negative due to human development, past fishery, hatcheries, and habitat management practices	Mixed (negligible to moderate negative, to low positive) due to ESA compliance and improved fishery, hatcheries, habitat management practices, and habitat restoration, depending on population	Mixed (moderate negative to low positive), depending on population	Mixed (moderate negative to low positive), depending on population
Other Fish and Their Habitats	Mixed (negligible to low negative, to negligible positive) depending on species, due to human development, past fishery, hatcheries,	Mixed (negligible negative to negligible positive) depending on species	Negligible to low negative depending on species	Negligible to low negative depending on species

Affected Resource	Past Actions	Present Actions	Reasonable Foreseeable Future Actions	Past, Present, and Reasonably Foreseeable Future Actions
	and habitat management practices			
Wildlife	Mixed (negligible to low negative, to low positive) due to habitat degradation and hatchery-origin salmon and steelhead as a food source	Low positive	Negligible to low positive	Low positive
Socioeconomics	Moderate positive from benefits to recreational fisheries and tribal fisheries, although some have been reduced in recent years as numbers of fish available to harvest have declined	Low positive due to declines in harvest opportunities	Low positive	Low positive
Environmental Justice	Low to moderate negative due to reductions in fish available for use by communities of concern and populations of concern such as treaty Indian tribes	Low negative to low positive	Negligible negative	Low negative

1

2 Table 16. Summary of the cumulative effects of Alternative 2, Proposed Action/Preferred Alternative.

<b>Affected Resource</b>	<b>Baseline</b>	<b>Past, Present, and Reasonably Foreseeable Future Actions</b>	<b>Proposed Action</b>	<b>Cumulative Effects of the Proposed Action</b>
Water Quantity	Mixed (negligible negative to negligible positive)	Low negative	Negligible negative	None
Water Quality	Moderate	Moderate	Moderate	Moderate
Salmon and Steelhead and Their Habitat	Mixed (negligible to moderate negative, to low positive) due to ESA compliance and improved fishery, hatchery, habitat management practices, and habitat restoration, depending on population	Mixed (moderate negative to low positive), depending on population	Negligible negative	None
Other Fish and Their Habitats	Mixed (negligible negative to negligible positive) depending on species	Negligible to low negative depending on species	Mixed (negligible negative to negligible positive) depending on species	None
Wildlife	Low negative	Low positive	Negligible positive	None

Section 5 – Cumulative Impacts

<b>Affected Resource</b>	<b>Baseline</b>	<b>Past, Present, and Reasonably Foreseeable Future Actions</b>	<b>Proposed Action</b>	<b>Cumulative Effects of the Proposed Action</b>
Socioeconomics	Moderate positive	Low positive	Moderate positive	None
Environmental Justice	Low negative to low positive	Low negative	Negligible positive	None

1  
2

1    **6.     LIST OF PERSONS AND AGENCIES CONTACTED AND CONSULTED**

2    The following were consulted during the development and assessment described herein:

- 3       • Oregon Department of Fish and Wildlife  
4       • Coquille Indian Tribe  
5       • U.S. Fish and Wildlife Service  
6       • Environmental Protection Agency

7  
8    The following were contacted during the planning stages of the DEIS but did not participate directly in  
9    the assessment described herein:

- 10       • The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians  
11       • The Confederated Tribes of Grand Ronde  
12       • Cow Creek Band of Umpqua Tribe of Indians  
13       • Confederated Tribes of Siletz Indians

14  
15  
16  
17

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1 **8. DISTRIBUTION LIST**

2 ***State Agencies***

3 Oregon Department of Environmental Quality

4 Oregon Department of Fish and Wildlife

5

6 ***Federal Agencies***

7 Army Corps of Engineers

8 Bureau of Land Management

9 Environmental Protection Agency

10 Forest Service

11

12 ***Oregon Coast Native American Tribes***

13 The Confederated Tribes of Coos, Lower Umpqua, and Siuslaw Indians

14 The Confederated Tribes of Grand Ronde

15 Confederated Tribes of Siletz Indians

16 Coquille Indian Tribe

17 Cow Creek Band of Umpqua Tribe of Indians

18

19 ***Organizations and Associations***

20 Coastal Conservation Association

21 Kalamiosis Wilderness

22 Native Fish Society

23 Northwest Sportfishing Industry Association

24 Trout Unlimited

25

26 ***Individuals***

27 (An extensive distribution list of individuals were notified by email that contained an electronic link to the  
28 DEIS.)

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1 **APPENDIX A**

2 Table 1. List of the 10 hatchery facilities and associated hatchery programs and management  
 3 plans (HGMPs).

<b>Hatchery Facility (primary)</b>	<b>Hatchery Program</b>	<b>HGMP Reference<sup>1</sup></b>
Cole Rivers Hatchery	Rogue River Spring Chinook	ODFW 2016
	Rogue River Summer Steelhead	ODFW 2016
	Rogue/Applegate River Winter Steelhead	ODFW 2016
Indian Hatchery	Indian Creek STEP Fall Chinook	ODFW 2016
Elk Hatchery	Elk River Fall Chinook	ODFW 2016
	Chetco River Fall Chinook	ODFW 2016
	Chetco River Winter Steelhead	ODFW 2016
Bandon Hatchery	Coquille River Winter Steelhead	ODFW 2016
	Coquille River Fall Chinook	ODFW 2016
	Coos River Fall Chinook	ODFW 2016
	Coos River Winter Steelhead	ODFW 2016
	Tenmile Lakes Winter Steelhead	ODFW 2016
	Tenmile Lakes Rainbow Trout	ODFW 2016
Rock Hatchery	North Umpqua River Spring Chinook	ODFW 2016
	North Umpqua River Summer Steelhead	ODFW 2016
	Calapooya Creek Fall Chinook	ODFW 2016
	Lower Umpqua River Fall Chinook	ODFW 2016
	Umpqua River Coho <sup>3</sup>	ODFW 2016
	South Umpqua River Winter Steelhead	ODFW 2016
	Munsel Creek Coho (STEP)	ODFW 2016
Willamette <sup>2</sup>	Siuslaw River Winter Steelhead	ODFW 2016
Alsea Hatchery	Alsea Hatchery/Lakes Rainbow Trout	ODFW 2016
	Alsea River Winter Steelhead	ODFW 2016
	Yaquina Bay Fall Chinook	ODFW 2016
	Siletz River Winter Steelhead	ODFW 2016
Salmon Hatchery	Siletz River Summer Steelhead	ODFW 2016
	Salmon River Fall Chinook	ODFW 2016
Cedar Hatchery	Nestucca River Summer Steelhead	ODFW 2016
	Nestucca River Spring Chinook	ODFW 2016
	Little Nestucca River Spring Chinook	ODFW 2016

	Nestucca River STEP Fall Chinook	ODFW 2016
	Nestucca River Winter Steelhead	ODFW 2016
Trask Hatchery	Wilson River Winter Steelhead	ODFW 2016
	Trask River Coho	ODFW 2016
	Trask River Fall Chinook	ODFW 2016
	Trask River Spring Chinook	ODFW 2016
	Wilson River Winter Steelhead	ODFW 2016
	Trask River Spring Chinook (Whiskey Creek STEP)	ODFW 2016
Nehalem Hatchery	North Fork Nehalem Coho	ODFW 2016
	Nehalem River Winter Steelhead	ODFW 2016
	Yaquina Bay Spring Chinook	ODFW 2016
	Coos Bay Spring Chinook	ODFW 2016
Oregon Hatchery Research Center	Specific research projects. Varies depending upon project and funding.	ODFW 2012
<sup>1</sup> HGMPs are available online at: <a href="http://www.dfw.state.or.us/fish/HGMP/final.asp">http://www.dfw.state.or.us/fish/HGMP/final.asp</a> (accessed August 5, 2016).		
<sup>2</sup> Willamette Hatchery is located in the Willamette Basin and not within the project area, and is used for other programs much larger than those considered here. The effects of this hatchery facility will be assessed by NMFS with other HGMPs from the Willamette Basin.		
<sup>3</sup> The Umpqua hatchery coho program is only the program where hatchery fish are part of an ESA-listed ESU. All of the other programs rear non-listed fish.		

1  
2

1 Table 2. Release timing and size at release of hatchery fish from the hatchery programs  
 2 along the Oregon Coast.

<b>Hatchery Program</b>	<b>Time of Release of Hatchery Fish</b>	<b>Hatchery Fish Size at Release (fish per pound)</b>
Rogue River Spring Chinook	mid-Aug to mid-Oct	6.5-13
Rogue River Summer Steelhead	late April	4.5
Rogue/Applegate River Winter Steelhead	April	4
Indian Creek STEP Fall Chinook	Feb-Aug	900, 26, 10
Elk River Fall Chinook	Sept-Nov	12
Chetco River Fall Chinook	mid-Oct	12
Chetco River Winter Steelhead	late Mar-early April	6
Coquille River Winter Steelhead	late April	5.5
Coquille River Fall Chinook	May, Aug-Sept	75, 13
Coos River Fall Chinook	May	75
Coos River Winter Steelhead	late March to April	5.5
Tenmile Lakes Winter Steelhead	mid-April	6.7
Tenmile Lakes Rainbow Trout	spring/summer	> 2
North Umpqua River Spring Chinook	Oct, Feb	6-8
North Umpqua River Summer Steelhead	early March, mid April	5-6
Calapooya Creek Fall Chinook	May-June	100
Lower Umpqua River Fall Chinook	October	10
Umpqua River Coho <sup>3</sup>	April, June	10
South Umpqua River Winter Steelhead	Feb, April	5-6

<b>Hatchery Program</b>	<b>Time of Release of Hatchery Fish</b>	<b>Hatchery Fish Size at Release (fish per pound)</b>
Siuslaw River Winter Steelhead	mid-April	6
Alsea Hatchery/Lakes Rainbow Trout	spring/summer	> 2
Alsea River Winter Steelhead	April	6
Yaquina Bay Fall Chinook	mid-Sept	14
Siletz River Winter Steelhead	April	6
Siletz River Summer Steelhead	early April	6
Salmon River Fall Chinook	late Aug-early Sept	14
Nestucca River Summer Steelhead	early April	6
Nestucca River Spring Chinook	late July	12
Nestucca River STEP Fall Chinook	mid September	10
Nestucca River Winter Steelhead	April	6-7
Wilson and Kilchis River Winter Steelhead	early April	6
Trask River Coho	mid April	15
Trask River Fall Chinook	late August	19
Trask River Spring Chinook	late July	12
Wilson River Winter Steelhead	early April	6
Trask/Wilson River Spring Chinook (Whiskey Creek STEP)	late July	12
North Fork Nehalem Coho	early April	15

<b>Hatchery Program</b>	<b>Time of Release of Hatchery Fish</b>	<b>Hatchery Fish Size at Release (fish per pound)</b>
Nehalem River Winter Steelhead	early April	6
Oregon Hatchery Research Center. Only specific research projects. Not a production facility. Research varies depending upon project and funding.	Depends upon research project	Depends upon research project

1