

**4(d) Rule Limit 5
Evaluation and Recommended Determination**

Title: Hatchery and Genetic Management Plans for Oregon Coast Hatchery
Salmon and Steelhead

Plans Submitted by: Oregon Department of Fish and Wildlife

ESU/DPS: Oregon Coast Coho Salmon
Southern Oregon/Northern California Coast Coho Salmon

4(d) Rule Limit: ESA 4(d) Rule Limit 5

**NMFS Tracking
Number:** WCR-2012-9539

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1 EVALUATION

NOAA's National Marine Fisheries Service (NMFS) issued a final Endangered Species Act (ESA) 4(d) rule adopting regulations (50 CFR 223.203) to conserve listed salmon and steelhead (70 FR 37160 and 73 FR 55451; NMFS and NOAA 2005; NMFS & NOAA 2008).

The 4(d) rule exempts the take of salmon and steelhead listed as threatened species under the ESA if the entity follows a Hatchery and Genetics Management Plan (HGMP) that meets the 4(d) rule criteria and is approved by NMFS (July 10, 2000, 65 FR 42422, amended June 28, 2005, 70 FR 37160). Under limit 5 of the 4(d) rule, ESA section 9 take prohibitions for listed species do not apply to hatchery activities described in an HGMP provided the criteria in section 223.203(b)(5) of the 4(d) rule for salmon and steelhead are met. These criteria are specified and evaluated below.

The Oregon Department of Fish and Wildlife (ODFW) submitted HGMPs for all of the hatchery facilities currently in operation along the entire Oregon Coast region (Table 1; Figure 1). The applicants have provided the HGMPs for review and determination by NMFS pursuant to 4(d) rule limit 5. Each HGMP describes the proposed activities for each hatchery program (and associated hatchery facilities).

Table 1. Proposed hatchery programs for Oregon Coast salmon and steelhead. HGMPs can be found at ODFW (2017).

Hatchery Facility (primary)	Hatchery Program	HGMP Reference¹
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
	Lower Umpqua River Fall Chinook	ODFW 2017
	Umpqua River Coho ³	ODFW 2016
	South Umpqua River Winter Steelhead	ODFW 2016
Munsel	Munsel Creek Coho (STEP)	ODFW 2016
Willamette ²	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 (inc Necanicum)	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
¹ HGMPs are available online at: http://www.dfw.state.or.us/fish/HGMP/final.asp (accessed September 7, 2017).		
² 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.		
³ 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.		



Figure 1. Oregon Coast hatchery facilities associated with the proposed continued operation of salmon and steelhead hatchery programs.

1.1 5(i)(A) The HGMP has clearly stated goals, performance objectives, and performance indicators that indicate the purpose of the program, its intended results, and measurements of its performance in meeting those results.

Each of the HGMPs has clearly stated its goal, performance objectives, and methods for measuring the progress toward achieving those objectives. The general program goals described in section 1.7 of each HGMP for propagating hatchery fish in the Oregon Coast region are to:

- Provide harvest opportunities for hatchery fish in sport and commercial fisheries in the ocean and freshwater
- Mitigate lost natural-origin fish production

Performance objectives derived from the Northwest Power Planning Council Artificial Production Review (Northwest Power Planning Council 2001), and performance indicators that would be used to gauge compliance with each objective, are described in section 1.10 of each HGMP. Evaluation and monitoring to ensure standards and indicators are met is further described in section 1.8 of this document and are summarized in Table 2. HGMP implementation would generally be designed to determine:

1. Program consistency with proposed hatchery actions and intended results (e.g., juvenile fish release and adult return levels)
2. Measurement of the program’s success or failure in attaining results
3. Effects of the program on listed natural-origin coho salmon along the Oregon Coast region.

Table 2. Typical HGMP program performance standards and indicators.

Standard	Indicator
Provide adult hatchery produced salmon and steelhead for harvest in such a way that impacts to wild salmon and steelhead populations will be minimized.	<ul style="list-style-type: none"> • Number of hatchery salmon and steelhead caught, and number of angler days associated with the programs. • Estimated number of wild coho salmon caught and released during fisheries • All salmon and steelhead smolts will be externally marked.
The life history characteristics of the hatchery broodstock will be managed to maintain appropriate genetic and phenotypic characteristics.	<ul style="list-style-type: none"> • Number of hatchery fish spawned each year by gender. • Number of wild fish spawned each year by gender.
The criterion in the Native Fish Conservation Policy for reproductive independence (at least 90% of natural spawners are naturally produced and not hatchery produced fish) will be met.	<ul style="list-style-type: none"> • Estimated abundance of naturally spawning hatchery and wild fish
The hatchery programs will be operated in compliance with ODFW’s Hatchery	<ul style="list-style-type: none"> • Number of broodstock sampled and pathogens observed.

Management Policy and the IHOT fish health guidelines.	<ul style="list-style-type: none"> • Rearing survival rates, egg-fry, fry-smolt. Results of fish health examinations. • Number of juveniles sampled and pathogens observed immediately prior to release.
Hatchery facilities water withdrawals will comply with NOAA juvenile screening criteria.	<ul style="list-style-type: none"> • Screens inspected and are either in, or are brought into, compliance.
Releases of hatchery fish will limit impacts to naturally produced juvenile salmonids through control of hatchery release numbers and by minimizing spatial and temporal overlap with naturally produced juvenile salmonids.	<ul style="list-style-type: none"> • Number of hatchery fish released. • Location of release. • During of release.
Estimated harvest benefits will equal or exceed hatchery production costs for each program, based on the benefit-cost model in ODFW (1999) or an updated version of that model.	<ul style="list-style-type: none"> • Annual hatchery budget expenditures. • Estimated harvest benefits.

1.2 5(i)(B) The HGMP utilizes the concepts of viable and critical salmonid population thresholds, consistent with the concepts contained in the technical document entitled “Viable Salmonid Populations.”

HGMPs proposed for consideration under the 4(d) rule must use the concepts of viable and critical thresholds as defined in the NMFS Viable Salmonid Population (VSP) document (McElhany et al. 2000). Application of these VSP concepts is needed to adequately assess and limit the take of listed salmonids for the protection of the species. This is accomplished in section 2.2.2 of each HGMP, which describes the status of the listed coho salmon relative to “critical” and “viable” population thresholds along the Oregon Coast. All of the programs are here being evaluated for their effects on listed coho salmon. Most of the programs propagate non-listed salmon and steelhead and, as described in the HGMPs and NMFS’ analyses, impacts are primarily ecological effects (and not genetic).

For the coho salmon hatchery programs along the Oregon Coast, critical and viable thresholds primarily relate to the collection of natural-origin coho salmon into hatchery broodstocks. Management is specified to avoid taking natural-origin coho salmon when the returns are at low levels (near critical thresholds) and allow some natural-origin coho salmon to be taken for broodstock integration when returns exceed viable thresholds. This management scheme ensures hatchery impacts will not substantially impact the survival and recovery of the affected population(s). The specific abundance criteria for collection of natural-origin coho salmon is specified in the specific coho salmon HGMPs.

For the other Chinook salmon and steelhead hatchery programs, critical and viable threshold levels are also specified for listed coho salmon. The primary concerns of these programs on listed coho salmon relate primarily to ecological interactions, which are evaluated in the FEIS and Biological Opinion for these HGMPs.

1.3 5(i)(C) Taking into account health, abundances, and trends in the donor population, broodstock collection programs reflect appropriate priorities.

Each of the HGMPs uses appropriate broodstock collection strategies and programs. Natural-origin fish from only three coho salmon donor populations are proposed to be taken for broodstock out of a total of 56 coho salmon populations along the Oregon Coast. For each of the three coho salmon HGMPs, criteria are specified to allow the take of natural fish for broodstock purposes while minimizing impacts on the donor population. Under no circumstances would more than 2% of the donor population's spawners be collected for broodstock. In most cases, 100% of the broodstock can be natural-origin fish while only impacting 1% of the donor population (fully analyzed in the Biological Opinion). There are also minimum spawning escapements that must be exceeded before any natural-origin coho salmon can be taken for broodstock purposes in order to avoid impacts associated with the population being below "critical" abundance thresholds.

The remaining programs all collect returning hatchery fish for broodstock as first priority. There are no conservation or supplementation objectives specified for any of the hatchery programs on the Oregon Coast.

1.4 5(i)(D) The HGMP includes protocols to address fish health, broodstock collection and spawning, rearing and release of juveniles, disposition of hatchery adults, and catastrophic risk management.

The proposed HGMPs include protocols, or "best management practices" (BMPs), for fish health, broodstock collection, broodstock spawning, rearing and release of juveniles, disposition of hatchery adults, and catastrophic risk management. These practices, when implemented, would be appropriate for the purpose of adequately limiting the risk of substantial direct and incidental adverse effects on listed coho salmon along the Oregon Coast.

Fish Health (Sections 7, 9, and 10 of each HGMP): All of the hatchery programs would be operated in compliance with ODFW's fish health policies and procedures. The policies are designed to limit the spread of fish pathogens between and within watersheds by regulating the transfers of eggs and fish. The policies also outline standard fish health diagnosis, maintenance, and hatchery sanitation protocols to reduce the risk of pathogen amplification and transmission within the hatchery and to fish in the natural environment during broodstock collection and mating as well as fish incubation, rearing, and release. Fish health specialists and pathologists from ODFW and Oregon State University would provide fish health management support and diagnostic fish health services.

Broodstock Collection and Spawning (HGMP sections 5, 6, 7 and 8): Each of the HGMPs explicitly describes the location and protocols for broodstock collection and spawning. Depending upon the type of program, natural-origin fish may be used for broodstock. In these programs, broodstock is collected over the course of the run to minimize the risk of intentional artificial trait selection and to mimic the natural, integrated population to the extent possible. The specific locations for broodstock collection are specified in Section 5 of the HGMPs. For most programs, all listed coho salmon that may be incidentally encountered are released unharmed. The transportation and holding details for broodstock and the spawning protocols are specifically described for each program in sections 7 and 8 of the HGMPs. The BMPs for broodstock spawning typically implement pairwise spawning (1 x 1). No fertility or genetic diversity problems are noted in the HGMPs.

Rearing and Release of Juveniles (HGMP sections 9 and 10): For this evaluation, there are two primary concerns for the effects of the hatchery programs on listed coho salmon: 1) proper care and survival of listed coho salmon while in the hatchery, and 2) the effects on listed coho salmon from the release of non-listed, hatchery fish (Chinook salmon and steelhead). These effects are fully evaluated in the Biological Opinion, but the appropriate sections in the HGMP describing the rearing and release of hatchery fish are highlighted below.

Listed fish are only being reared and released from the Cow Creek coho salmon program. However, listed, natural-origin coho salmon may be taken for broodstock for the Trask and N.F. Nehalem coho salmon programs in the future once the HGMPs are approved under the ESA. Therefore, all of the hatchery coho salmon programs will likely rear listed coho salmon in the future. The history for these coho salmon programs show high survival of coho salmon while in the hatchery. The hatchery coho salmon released are healthy, high quality smolts ready to emigrate to the ocean.

For the Chinook salmon and steelhead hatchery programs, the number, size, and locations where hatchery fish are released is described in section 10 of the HGMPs (Figure 2). The Biological Opinion evaluates the ecological interactions between hatchery fish and natural-origin coho salmon throughout the Oregon Coast region.

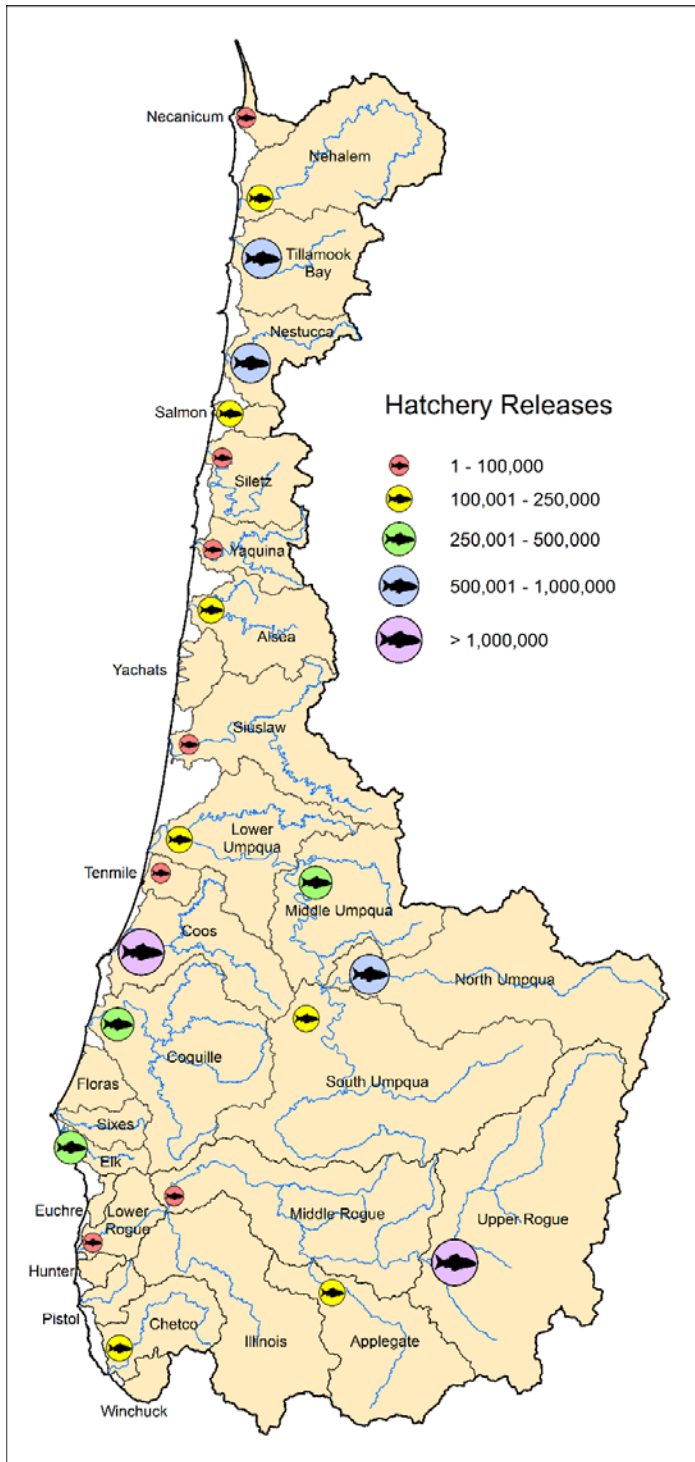


Figure 2. Location and release numbers for hatchery programs along the Oregon Coast. Figure taken from ODFW (2014).

Disposition of Hatchery Adults (HGMP section 7.5): Spawned hatchery carcasses for the segregated programs are either sold to a contracted fish buyer, provided to food banks, or outplanted as carcasses for nutrient enhancement. Fish treated for pathogens or otherwise unfit for human consumption are buried in approved land-fills. Surplus adults returning to the hatchery are disposed of in the same manner. No live hatchery fish are intentionally released for supplementation purposes.

Catastrophic Risk Management (HGMP section 5.8): All facilities adhere to ODFW Fish Health Management policies and IHOT guidelines and apply BMPs to reduce the risk of catastrophic loss of fish under propagation. ODFW's goal is to minimize losses of hatchery fish to the extent possible, including catastrophic losses. Losses cost ODFW money, therefore there is a desire to minimize fish losses.

1.5 5(i)(E) The HGMP evaluates, minimizes, and accounts for the propagation programs' genetic and ecological effects on natural populations, including disease transfer, competition, predation, and genetic introgression caused by straying of hatchery fish.

The Oregon Coast HGMPs provide evaluations of potential genetic and ecological effects on listed coho salmon in section 2 and risk minimization measures in sections 6-10 of each HGMP.

Genetic effects: The hatchery coho salmon programs in operation along the Oregon Coast region are closely scrutinized in the HGMPs and NMFS' analyses because hatchery coho salmon can spawn and interbreed with natural-origin coho salmon and thus affect the genetic integrity of the natural populations. The three hatchery coho salmon programs currently in operation along the Oregon Coast occur in S. Umpqua, Tillamook, and Nehalem population areas. All three programs propose to be managed as integrated with the local natural population. The programs provide fish for fisheries augmentation. The program operators will use up to 100% natural-origin coho salmon for broodstock when specific conditions are met (evaluated in the HGMPs and Biological Opinion). The intent of management of these programs is to have few returning fish in excess of broodstock needs and minimize the number of hatchery coho salmon spawning in the wild (0 to 10% pHOS). Those that do spawn in the wild are expected to have lower reproductive success relative to the natural-origin fish because of hatchery-induced genetic effects. Hatchery coho salmon may also be less successful than natural-origin fish due to other aspects of domestication and the location of the hatchery facility that influences where hatchery fish spawn. To the extent they do reproduce and contribute to the next generation of natural-origin fish, however, they pose adverse genetic effects to natural populations. The Biological Opinion fully evaluates the genetic effects on natural-origin coho salmon from hatchery coho salmon spawning naturally. Observed levels in all populations have been far below 10% pHOS over the last decade; with most populations having zero hatchery coho salmon on the spawning grounds.

Ecological effects: The primary ecological risks to natural-origin salmon and steelhead populations posed by salmon and steelhead hatchery programs are increased pathogen transfer,

competition, and predation (NMFS 2012). As noted in the HGMPs and earlier in this document, all hatchery actions would be implemented in accordance with ODFW's Fish Health management policies, as a means to account for and minimize the risks of pathogen amplification and transmission.

All of the HGMPs also evaluate the risks of competition and predation, and have incorporated measures to minimize risks associated with program implementation on ESA-listed coho salmon. This is fully evaluated in the Biological Opinion and FEIS.

1.6 5(i)(F) The HGMP describes interrelationships and interdependencies with fisheries management.

Each of the HGMPs describes its relationship to fisheries management in section 3.3. The HGMPs propagating coho salmon and Chinook salmon are the principal hatchery programs that are related to fisheries management for ESA-listed coho salmon in ocean and freshwater fisheries. Steelhead are not encountered to any measurable degree in ocean salmon fisheries and are rarely encountered in the estuarine fisheries targeting salmon. Impacts from all fisheries on listed coho salmon are governed by Amendment 13 to the Pacific Salmon Plan. Overall impacts are established pre-season with all fisheries managed as to not exceed the specified impact limits. The track record for successful implementation of this management framework has been good over the last 20 years of implementation. The fall Chinook salmon and coho salmon hatchery programs are the principal programs affecting fisheries management in freshwater. Impacts from fisheries targeting these programs are coordinated in pre-season management planning by ODFW and PFMC.

1.7 5(i)(G) Adequate artificial propagation facilities exist to properly rear progeny of naturally spawned broodstock, to maintain population health and diversity, and to avoid hatchery-influenced selection and domestication.

Three programs propagate ESA-listed coho salmon and utilize multiple facilities to properly rear progeny. As described in sections 4 and 5 of the coho salmon HGMPs, the hatchery facilities used to implement the programs have adequate surface and groundwater sources, fish trapping and holding facilities, egg incubation and fish rearing vessels, and fish release facilities to ensure proper rearing. As mentioned previously, fish health is maintained throughout rearing by adhering to fish health policies and using pathogen-free water sources when possible. Existing data and information provided in the HGMPs demonstrate high egg-to-smolt-release survival rates, consistent with goal rates identified for well-run hatchery programs (Fuss and Ashbrook 1995). Minimization of catastrophic loss and genetic risks associated with these programs were addressed in sections 1.4 and 1.5, respectively, of this document.

1.8 5(i)(H) Adequate monitoring and evaluation exist to detect and evaluate the success of the hatchery program and any risks potentially impairing the recovery of the listed ESU.

Monitoring and evaluation actions to identify the performance of each program and hatchery-related effects on ESA-listed coho salmon are also proposed. These actions are summarized in section 1.10 of each HGMP, and are further described in section 11 of each HGMP. Monitoring and evaluation actions that would be implemented include:

- Spawning ground/redd surveys and hatchery escapement to determine total escapement and percent of hatchery-origin spawners spawning naturally (possible for marked fish only)
- The number and distribution of marked, unmarked, and otolith-marked fish to determine the status of the natural- and hatchery-origin salmon returns and harvest relative to goal levels
- Abundance, timing, age class, sex ratio, and fish health condition data collected for broodstock to assess run traits of the target populations
- Water withdrawal and effluent discharge to ensure compliance with permitted levels
- Monitoring of broodstock collection, egg take, fish survival rates, and smolt release levels for each program to determine compliance with program goals
- Fish health monitoring and reporting in compliance with fish health policies

1.9 5(i)(I) The HGMP provides for evaluating monitoring data and making any revisions of assumptions, management strategies, or objectives that data show are needed.

Under the HGMPs (section 1.10), data collected relating to hatchery program performance and effects would be evaluated by ODFW to determine whether performance standards were met. Hatchery operation plans for the programs assembled by ODFW will be jointly reviewed by NMFS to document program results, and to determine if adjustments to the programs assumptions and management strategies are warranted. Any changes would be incorporated into annual operations plans. The applicant indicates in the HGMPs the funding and staff that would be committed to monitor and evaluate the programs. Additional periodic review will be conducted by ODFW and NMFS to ensure the scope and magnitude of impacts are consistent with the Biological Opinion's Incidental Take Statement.

1.10 5(i)(J) NMFS provides written concurrence of the HGMP which specifies the implementation and reporting requirements.

NMFS intends to provide a written concurrence letter to ODFW approving the Oregon Coast HGMPs once the appropriate NEPA and ESA analysis documents are signed. This letter will also include any necessary implementation and reporting requirements.

1.11 5(i)(K) The HGMP is consistent with plans and conditions set within any Federal court proceeding with continuing jurisdiction over tribal harvest allocations.

There are no Federal court proceedings governing Tribal harvest allocations for the Oregon Coast region.

2 PUBLIC REVIEW AND COMMENTS

As required in (5)(iv) of section 223.203 of the 4(d) rule for salmon and steelhead, NMFS provided for public review and comment on all of the HGMPs. Comments were considered and addressed by ODFW in the relevant final drafts of the HGMPs as appropriate.

3 RECOMMENDED DETERMINATION

NMFS has reviewed the HGMPs and evaluated them together against the requirements of the 4(d) rule. Based on this review and evaluation, NMFS' recommended determination is that activities implemented as described would not appreciably reduce the likelihood of survival and recovery of SONCC or Oregon Coast coho salmon. If the Regional Administrator concurs with this determination, take prohibitions would not apply to activities implemented in accordance with the Oregon Coast HGMPs for hatchery salmon, steelhead, and trout. In addition, the hatchery programs would operate in conjunction with on-going habitat restoration and harvest management actions, implemented consistent with recovery plan objectives for listed species, until natural-origin salmon populations that would sustain fisheries are restored.

4 REEVALUATION CRITERIA

NMFS will reevaluate this determination if: (1) the actions described by the HGMPs are modified in a way that causes an effect on the listed species that was not previously considered in NMFS' evaluation; (2) new information or monitoring reveals effects that may affect listed species in a way not previously considered; or (3) a new species is listed or critical habitat is designated that may affect NMFS' evaluation of the HGMPs.

5 REFERENCES

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