

This listing of treaties, plans and documents that either guide or incorporate hatchery management are essential to understanding the complex and delicate balance of Pacific Salmon management. (Headings are linked to appropriate web sites).

[Puget Sound Salmon Management Plan:](#)

Under the Endangered Species Act (ESA), a recovery plan must have quantitative recovery criteria and goals, identify threats to survival, site specific management strategies and actions necessary to address the threats, cost estimates of the actions, and a schedule for implementation. A monitoring and adaptive management program should also be included. In addition to the general requirements, this plan was directed by the recovery criteria developed by the group of scientists appointed by NOAA Fisheries, the Puget Sound Technical Recovery Team (TRT).

[Recovery Plan for Puget Sound Chinook Salmon:](#)

The long-term goal of this recovery plan is to achieve self-sustaining levels of Puget Sound Chinook numbers, distribution and diversity. Plan contributors will strive to achieve this goal in the context of a rapidly growing human population; well over a million people are expected to settle around the Sound in the next fifteen years. (NOAA Fisheries, 2007).

[Pacific Salmon Treaty \(PST\):](#)

The PST is critical to meeting the provisions of the federal ESA, addressing tribal fishing rights and maintaining sustainable U.S. fisheries that provide 26,700 full time equivalent jobs and \$3.4 billion in economic value annually. The treaty, signed by United States and Canada in 1985, provides a framework for the two countries and their domestic management authorities to cooperate on the management of Pacific salmon. This reflects that Pacific salmon are highly migratory, often spending years at sea and travelling thousands of miles and multiple fishery management jurisdictions before returning to their native rivers to spawn. The PST is revisited roughly every 10 years to reflect current conditions and address new challenges.

The Pacific Salmon Treaty Act of 1985 names 25 directly affected tribes and provides for tribal representatives at all levels within the Pacific Salmon Commission forum. This tribal participation is essential to ensure that the PST is implemented in a manner consistent with the reserved rights of the tribes and to provide for an equitable sharing of harvest impacts. The western Washington Tribes are responsible, with the Columbia River Tribes, the states of Alaska, Washington, Oregon, and Idaho, for the stock and fishery assessments required for the implementation of the PST. (Bowhay, 2023).

[HGMP Template](#) (NOAA Fisheries)

(attached)

Pacific Coast Fisheries Management Plan (Pacific Fishery Management Council, 2022)

This document is the Pacific Coast Salmon Fishery Management Plan, a fishery management plan (FMP) of the Pacific Fishery Management Council (Council or PFMC) as revised and updated for implementation in 2022 and beyond. It guides management of commercial and recreational salmon fisheries off the coasts of Washington, Oregon, and California.

1 WHAT THE PLAN COVERS

1.1 STOCK CLASSIFICATION

1.2 CHANGES OR ADDITIONS

2 ACHIEVING OPTIMUM YIELD

3 CONSERVATION

3.1 STATUS DETERMINATION CRITERIA

3.2 SALMON STOCK CONSERVATION OBJECTIVES

3.3 HARVEST CONTROLS

3.4 MANAGEMENT FOR HATCHERY AND ESA-LISTED STOCKS

3.5 BYCATCH

4 HABITAT AND PRODUCTION

5 HARVEST

6 MEASURES TO MANAGE THE HARVEST

7 DATA NEEDS, DATA COLLECTION METHODS, AND REPORTING REQUIREMENTS

8 SCHEDULE AND PROCEDURES FOR ANALYZING THE EFFECTIVENESS OF THE SALMON FMP

9 SCHEDULE AND PROCEDURES FOR PRESEASON MODIFICATION OF REGULATIONS

10 INSEASON MANAGEMENT ACTIONS AND PROCEDURES

11 SCHEDULE AND PROCEDURES FOR FMP AMENDMENT AND EMERGENCY REGULATIONS

Salmon and Steelhead Hatcheries on the West Coast:

Hatcheries, or artificial propagation, are one tool to help support wild populations and provide fish for harvest. When using this approach we carefully consider interactions between hatchery and natural-origin fish in the context of our overall goals for threatened or endangered fish. NOAA Fisheries on the West Coast works with applicants and other parties to balance conservation goals with the fulfillment of treaty Indian fishing rights and other applicable laws and policies. (NOAA Fisheries).

...

The ESA provides several mechanisms for authorizing hatchery operations and salmon fisheries. Not all are "permits," though each mechanism requires compliance with section 7 of the ESA. Some Federal actions, such as ESA Section 4(d) authorizations or ESA section 10 permits, may require additional analysis under the National Environmental Policy Act (NEPA). (NOAA Fisheries).

Pacific Salmon and Steelhead (NOAA Fisheries)

Pacific salmon and steelhead have a dynamic life cycle that includes time in fresh and saltwater habitats. These fish are born in freshwater streams and rivers, migrate to

coastal estuaries, then enter the ocean where they mature. They usually return as adults to the same streams where they were born to spawn and begin the cycle again.

NOAA Fisheries manages and protects several species of fish in the Salmonidae family in both the [Atlantic](#) and Pacific. Some are threatened or endangered and protected under the [Endangered Species Act](#). Others are targeted by commercial and recreational fisheries and are managed under the [Magnuson-Stevens Act](#) to maintain healthy, sustainable population levels.

Pacific salmon and steelhead include the following species:

Chinook Salmon

- [ESA-protected Chinook salmon](#)
- [MSA-managed Chinook salmon fisheries](#)

Chum Salmon

- [ESA-protected chum salmon](#)
- [MSA-managed chum salmon fisheries](#)

Coho Salmon

- [ESA-protected coho salmon](#)
- [MSA-managed coho salmon fisheries](#)

Sockeye Salmon

- [ESA protected sockeye salmon](#)
- [MSA-managed sockeye salmon fisheries](#)

Pink Salmon

- [MSA-managed pink salmon fisheries](#)

Steelhead Trout

- [ESA-protected steelhead trout](#)

ATTACHMENTS

HGMP Template

HATCHERY AND GENETICS MANAGEMENT PLAN (HGMP)

Hatchery Program:

Species or

Hatchery Stock:

Agency/Operator:

Watershed and Region:

Date Submitted:

Date Last Updated:

Section 1. GENERAL PROGRAM DESCRIPTION

1.1. Name of hatchery or program.

1.2. Species and population (or stock) under propagation, and ESA status.
State common and scientific names.

1.3. Responsible organization and individuals
Indicate lead contact and on-site operations staff lead.

Name (and title):

Agency or Tribe:

Address:

Telephone:

Fax:

Email:

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

1.4. Funding source, staffing level, and annual hatchery program operational costs.

1.5. Location(s) of hatchery and associated facilities.
Include name of stream, river kilometer location, basin name, and state. Also include watershed code (e.g. WRIA number), regional mark processing center code, or other sufficient information for GIS entry. See "Instruction E" for guidance in responding.

1.6. Type of program.
Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest (see Attachment 1 - Definitions" section for guidance).

1.7. Purpose (Goal) of program.

Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research (for Columbia Basin programs, use NPPC document 99-15 for guidance in providing these definitions of "Purpose"). Provide a one sentence statement of the goal of the program, consistent with the term selected and the response to Section 1.6. Example: "The goal of this program is the restoration of spring chinook salmon in the White River using the indigenous stock".

1.8. Justification for the program.

Indicate how the hatchery program will enhance or benefit the survival of the listed natural population (integrated or isolated recovery programs), or how the program will be operated to provide fish for harvest while minimizing adverse effects on listed fish (integrated or isolated harvest programs).

1.9. List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

Example: " (1) Conserve the genetic and life history diversity of Upper Columbia River spring chinook populations through a 12 year duration captive broodstock program; (2) Augment, restore and create viable naturally spawning populations using supplementation and reintroduction strategies; (3) Provide fish to satisfy legally mandated harvest in a manner which minimizes the risk of adverse effects on listed wild populations; (4)....".

1.10. List of program "Performance Indicators", designated by "benefits" and "risks."

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand

as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential "Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1. "Performance Indicators" addressing benefits.

(e.g. "Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.").

1.10.2. "Performance Indicators" addressing risks.

(e.g. "Evaluate predation effects on listed fish resulting from hatchery fish releases.").

1.11. Expected size of program.

In responding to the two elements below, take into account the potential for increased fish production that may result from increased fish survival rates effected by improvements in hatchery rearing methods, or in the productivity of fish habitat.

1.11.1. Proposed annual broodstock collection level (maximum number of adult fish).

1.11.2. Proposed annual fish release levels (maximum number) by life stage and location. (Use standardized life stage definitions by species presented in Attachment 2).

| Life Stage | Release Location | Annual Release Level |
|------------|------------------|----------------------|
| Eyed Eggs | | |

| Life Stage | Release Location | Annual Release Level |
|------------|------------------|----------------------|
| Unfed Fry | | |
| Fry | | |
| Fingerling | | |
| Yearling | | |

1.12. Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.
Provide estimated smolt-to-adult survival rate, total adult production number, and escapement number (to the hatchery and natural areas) data available for the most recent twelve years (roughly three fish generations), or for the number of years of available and dependable information. Indicate program goals for these parameters.

1.13. Date program started (years in operation), or is expected to start.

1.14. Expected duration of program.

1.15. Watersheds targeted by program.
Include WRIA or similar stream identification number for desired watershed of return.

1.16. Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

Section 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-LISTED SALMONID SPECIES AND NON-SALMONID SPECIES ARE ADDRESSED IN ADDENDUM A)

2.1. List all ESA permits or authorizations in hand for the hatchery program.

2.2. Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1. Description of NMFS ESA-listed salmonid population(s) affected by the program.

Include information describing: adult age class structure, sex ratio, size range, migrational timing, spawning range, and spawn timing; and juvenile life history strategy, including smolt emigration timing. Emphasize spatial and temporal distribution relative to hatchery fish release locations and weir sites

- Identify the NMFS ESA-listed population(s) that will be directly affected by the program.

(Includes listed fish used in supplementation programs or other programs that involve integration of a listed natural population. Identify the natural population targeted for integration).

- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.

(Includes ESA-listed fish in target hatchery fish release, adult return, and broodstock collection areas).

2.2.2. Status of NMFS ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to “critical” and “viable” population thresholds (see definitions in “Attachment 1”).

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data. (Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

2.2.3. Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take (see “Attachment 1” for definition of “take”).

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

(e.g. “Broodstock collection directed at sockeye salmon has a “high” potential to take listed spring chinook salmon, through migrational delay, capture, handling, and upstream release, during trap operation at Tumwater Falls Dam between July 1 and October 15. Trapping and handling devices and methods may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation”).

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Complete the appended “take table” (Table 1) for this purpose. Provide a range of potential take numbers to account for alternate or “worst case” scenarios.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

(e.g. “The number of days that steelhead are trapped at Priest Rapids Dam will be reduced if the total mortality of handled fish is projected inseason to exceed the 1988-99 maximum observed level of 100 fish.”)

Section 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

- 3.1. Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review Report and Recommendations - NPPC document 99-15*). Explain any proposed deviations from the plan or policies. (e.g. “The hatchery program will be operated consistent with the ESU-wide plan, with the exception of age class at release. Fish will be released as yearlings rather than as sub-yearlings as specified in the ESU-wide plan, to maximize smolt-to-adult survival rates given extremely low run sizes the past four years.”).**

- 3.2. List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.***

- 3.3. Relationship to harvest objectives.**

Explain whether artificial production and harvest management have been integrated to provide as many benefits and as few biological risks as possible to the listed species. Reference any harvest plan that describes measures applied to integrate the program with harvest management.

 - 3.3.1. Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available. *Also provide estimated future harvest rates on fish propagated by the program, and on listed fish that may be taken while harvesting program fish .***

- 3.4. Relationship to habitat protection and recovery strategies.**

Describe the major factors affecting natural production (if known). Describe any habitat protection efforts, and expected natural production benefits over the short- and long-term. For Columbia Basin programs, use NPPC document 99-15, section II.C. as guidance in indicating program linkage with assumptions regarding habitat conditions.

3.5. Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]

Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program; and (4) be positively impacted by program. Give most attention to interactions between listed and “candidate” salmonids and program fish.

Section 4. WATER SOURCE

4.1. Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

For integrated programs, identify any differences between hatchery water and source, and “natal” water used by the naturally spawning population. Also, describe any methods applied in the hatchery that affect water temperature regimes or quality. Include information on water withdrawal permits, National Pollutant Discharge Elimination System (NPDES) permits, and compliance with NMFS screening criteria.

4.2. Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

(e.g. “Hatchery intake screens conform with NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.”).

Section 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see “Guidelines for Providing Responses” Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

- 5.1. Broodstock collection facilities (or methods).**
- 5.2. Fish transportation equipment (description of pen, tank truck, or container used).**
- 5.3. Broodstock holding and spawning facilities.**
- 5.4. Incubation facilities.**
- 5.5. Rearing facilities.**
- 5.6. Acclimation/release facilities.**
- 5.7. Describe operational difficulties or disasters that led to significant fish mortality.**
- 5.8. Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**
(e.g. "The hatchery will be staffed full-time, and equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure.").

Section 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

- 6.1. Source.**
List all historical sources of broodstock for the program. Be specific (e.g., natural spawners from Bear Creek, fish returning to the Loon Creek Hatchery trap, etc.).
- 6.2. Supporting information.**
 - 6.2.1. History.**
Provide a brief narrative history of the broodstock sources. For listed natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.2 if appropriate). For existing hatchery stocks, include information on how and when they were

founded, sources of broodstock since founding, and any purposeful or inadvertent selection applied that changed characteristics of the founding broodstock.

6.2.2. Annual size.

Provide estimates of the proportion of the natural population that will be collected for broodstock. Specify number of each sex, or total number and sex ratio, if known. For broodstocks originating from natural populations, explain how their use will affect their population status relative to critical and viable thresholds.

6.2.3. Past and proposed level of natural fish in broodstock.

If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the broodstock annually.

6.2.4. Genetic or ecological differences.

Describe any known genotypic, phenotypic, or behavioral differences between current or proposed hatchery stocks and natural stocks in the target area.

6.2.5. Reasons for choosing.

Describe any special traits or characteristics for which broodstock was selected.

6.3. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects on listed natural fish that may occur as a result of broodstock selection practices.

(e.g. "The risk of among population genetic diversity loss will be reduced by selecting the indigenous Chinook salmon population for use as broodstock in the supplementation program.").

Section 7. BROODSTOCK COLLECTION

7.1. Life-history stage to be collected (adults, eggs, or juveniles).

7.2. Collection or sampling design.

Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source.

7.3. Identity.

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

7.4. Proposed number to be collected:

7.4.1. Program goal (assuming 1:1 sex ratio for adults)

7.4.2. Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

| Year | Adults | | | Eggs | Juveniles |
|------|---------|-------|-------|------|-----------|
| | Females | Males | Jacks | | |
| 1988 | | | | | |
| 1989 | | | | | |
| 1990 | | | | | |
| 1991 | | | | | |
| 1992 | | | | | |
| 1993 | | | | | |
| 1994 | | | | | |
| 1995 | | | | | |
| 1996 | | | | | |
| 1997 | | | | | |
| 1998 | | | | | |
| 1999 | | | | | |

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

- 7.5. Disposition of hatchery-origin fish collected in surplus of broodstock needs.**
Describe procedures for remaining within programmed broodstock collection or allowable upstream hatchery fish escapement levels, including culling.
- 7.6. Fish transportation and holding methods.**
Describe procedures for the transportation (if necessary) and holding of fish, especially if captured unripe or as juveniles. Include length of time in transit and care before and during transit and holding, including application of anesthetics, salves, and antibiotics.
- 7.7. Describe fish health maintenance and sanitation procedures applied.**
- 7.8. Disposition of carcasses.**
Include information for spawned and unspawned carcasses, sale or other disposal methods, and use for stream reseeded.
- 7.9. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects on listed natural fish resulting from the broodstock collection program.**
(e.g. "The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines").

Section 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

- 8.1. Selection method.**
Specify how spawners are chosen (e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, or prioritized based on hatchery or natural origin).
- 8.2. Males.**
Specify expected use of backup males, precocious males (jacks), and repeat spawners.

8.3. Fertilization.

Describe spawning protocols applied, including the fertilization scheme used (such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or factorial matings). Explain any fish health and sanitation procedures used for disease prevention.

8.4. Cryopreserved gametes.

If used, describe number of donors, year of collection, number of times donors were used in the past, and expected and observed viability.

8.5. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects on listed natural fish resulting from the mating scheme.

(e.g. “A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program”).

Section 9. INCUBATION AND REARING

Specify any management *goals* (e.g. “egg to smolt survival”) that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1. Incubation:

9.1.1. Number of eggs taken and survival rates to eye-up and/or ponding.

Provide data for the most recent twelve years (1988-99), or for years dependable data are available.

9.1.2. Cause for, and disposition of surplus egg takes.

Describe circumstances where extra eggs may be taken (e.g. as a safeguard against potential incubation losses), and the disposition of surplus fish safely carried through to the eyed eggs or fry stage to prevent exceeding of programmed levels.

9.1.3. Loading densities applied during incubation.

Provide egg size data, standard incubator flows, standard loading per Heath tray (or other incubation density parameters).

9.1.4. Incubation conditions.

Describe monitoring methods, temperature regimes, minimum dissolved oxygen criteria (influent/effluent), and silt management procedures (if applicable), and any other parameters monitored.

9.1.5. Ponding.

Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced.

9.1.6. Fish health maintenance and monitoring.

Describe fungus control methods, disease monitoring and treatment procedures, incidence of yolk-sac malformation, and egg mortality removal methods.

9.1.7. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish during incubation.

(e.g. "Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.")

9.2. Rearing:

9.2.1. Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

9.2.2. Density and loading criteria (goals and actual levels).

Include density targets (lbs fish/gpm, lbs fish/ft3 rearing volume, etc).

9.2.3. Fish rearing conditions

(Describe monitoring methods, temperature regimes, minimum dissolved oxygen, carbon dioxide, total gas pressure criteria (influent/effluent if available), and standard pond management procedures applied to rear fish).

9.2.4. Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

9.2.5. Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Contrast fall and spring growth rates for yearling smolt programs. If available, indicate hepatosomatic index (liver weight/body weight) and body moisture content as an estimate of body fat concentration data collected during rearing.

9.2.6. Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

9.2.7. Fish health monitoring, disease treatment, and sanitation procedures.

9.2.8. Smolt development indices (e.g. gill ATPase activity), if applicable.

9.2.9. Indicate the use of "natural" rearing methods as applied in the program.

9.2.10. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish under propagation. (e.g. *"Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and to minimize the risk of domestication effects that may be imparted through rearing to yearling size."*)

Section 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.

10.1. Proposed fish release levels. (Use standardized life stage definitions by species presented in Attachment 2. “Location” is watershed planted (e.g. “Elwha River”).)

| Age Class | Maximum Number | Size (fpp) | Release Date | Location |
|------------|----------------|------------|--------------|----------|
| Eggs | | | | |
| Unfed Fry | | | | |
| Fry | | | | |
| Fingerling | | | | |
| Yearling | | | | |

10.2. Specific location(s) of proposed release(s).

Stream, river, or watercourse: *(include name and watershed code (e.g. WRIA) number)*

Release point: *(river kilometer location, or latitude/longitude)*

Major watershed: (e.g. “Skagit River”)

Basin or Region: (e.g. “Puget Sound”)

10.3. Actual numbers and sizes of fish released by age class through the program.

For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in Attachment 2. Cite the data source for this information.

| Release year | Eggs/ Unfed Fry | Avg size | Fry | Avg size | Fingerling | Avg size | Yearling | Avg size |
|--------------|--------------------|----------|-----|----------|------------|----------|----------|----------|
| 1988 | | | | | | | | |
| 1989 | | | | | | | | |
| 1990 | | | | | | | | |
| 1991 | | | | | | | | |
| 1992 | | | | | | | | |
| 1993 | | | | | | | | |
| 1994 | | | | | | | | |

| Release year | Eggs/ Unfed Fry | Avg size | Fry | Avg size | Fingerling | Avg size | Yearling | Avg size |
|--------------|--------------------|----------|-----|----------|------------|----------|----------|----------|
| 1995 | | | | | | | | |
| 1996 | | | | | | | | |
| 1997 | | | | | | | | |
| 1998 | | | | | | | | |
| 1999 | | | | | | | | |
| Average | | | | | | | | |

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

10.4. Actual dates of release and description of release protocols.

Provide the recent five year release date ranges by life stage produced (mo/day/yr).

Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants.

10.5. Fish transportation procedures, if applicable.

Describe fish transportation procedures for off-station release. Include length of time in transit, fish loading densities, and temperature control and oxygenation methods.

10.6. Acclimation procedures (methods applied and length of time).

10.7. Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

10.8. Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

10.9. Fish health certification procedures applied pre-release.

10.10. Emergency release procedures in response to flooding or water system failure.

10.11. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish resulting from fish releases.
(e.g. “All yearling coho salmon will be released in early June in the lower mainstem of the Green River to minimize the likelihood for interaction, and adverse ecological effects, to listed natural chinook salmon juveniles, which rear in up-river areas and migrate seaward as sub-yearling smolts predominately in May”).

Section 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how “Performance Indicators” listed in Section 1.10 will be monitored. Results of “Performance Indicator” monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet “Performance Standards”.

11.1. Monitoring and evaluation of “Performance Indicators” presented in Section 1.10.

11.1.1. Describe plans and methods proposed to collect data necessary to respond to each “Performance Indicator” identified for the program.

11.1.2. Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

11.2. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects on listed fish resulting from monitoring and evaluation activities.

(e.g. “The Wenatchee River smolt trap will be continuously monitored, and checked every eight hours, to minimize the duration of holding and risk of harm to listed spring chinook and steelhead that may be incidentally captured during the sockeye smolt emigration period.”)

Section 12. RESEARCH

*Provide the following information for any research programs conducted in **direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish. If applicable, correlate with research***

*indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in **Table 1**.*

12.1. Objective or purpose.

Indicate why the research is needed, its benefit or effect on listed natural fish populations, and broad significance of the proposed project.

12.2. Cooperating and funding agencies.

12.3. Principle investigator or project supervisor and staff.

12.4. Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5. Techniques: include capture methods, drugs, samples collected, tags applied.

12.6. Dates or time period in which research activity occurs.

12.7. Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8. Expected type and effects of take and potential for injury or mortality.

12.9. Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached “take table” (Table 1).

12.10. Alternative methods to achieve project objectives.

12.11. List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12. Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

(e.g. "Listed coastal cutthroat trout sampled for the predation study will be collected in compliance with NMFS Electrofishing Guidelines to minimize the risk of injury or immediate mortality.").

Section 13. ATTACHMENTS AND CITATIONS

Include all references cited in the HGMP. In particular, indicate hatchery databases used to provide data for each section. Include electronic links to the hatchery databases used (if feasible), or to the staff person responsible for maintaining the hatchery database referenced (indicate email address). Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, benefit/risk assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.

Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

“I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973.”

Name, Title, and Signature of Applicant:

Certified by _____ Date: _____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

| | | | | |
|--|---|----------------|-------|---------|
| Listed species affected: _____ ESU/Population: _____ | | | | |
| Activity: _____ | | | | |
| Location of hatchery activity: _____ Dates of activity: _____ Hatchery program operator: _____ | | | | |
| | Annual Take of Listed Fish By Life Stage (<i>Number of Fish</i>) | | | |
| Type of Take | Egg/Fry | Juvenile/Smolt | Adult | Carcass |
| Observe or harass a) | | | | |
| Collect for transport b) | | | | |
| Capture, handle, and release c) | | | | |
| Capture, handle, tag/mark/tissue sample, and release d) | | | | |
| Removal (e.g. broodstock) e) | | | | |
| Intentional lethal take f) | | | | |
| Unintentional lethal take g) | | | | |
| Other Take (specify) h) | | | | |

- a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
- c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

- e. Listed fish removed from the wild and collected for use as broodstock.
- f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
- h. Other takes not identified above as a category.

Instructions:

- 1. An entry for a fish to be taken should be in the take category that describes the greatest impact.*
- 2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
- 3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as “fishery enhancement”.

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: compensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project *primarily* designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as “supplementation”.

Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project *primarily* designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR)*.

Natural-origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery,

natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see "Population").

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

(generally from Washington Department of Fish and Wildlife, November 1999)

| | Species/Age Class | Size Criteria | |
|---|-------------------------------|----------------------|-------------|
| | | Number of fish/pound | Grams/fish |
| X | Chinook Yearling | <=20 | >=23 |
| X | Chinook (Zero) Fingerling | >20 to 150 | 3 to <23 |
| X | Chinook Fry | >150 to 900 | 0.5 to <3 |
| X | Chinook Unfed Fry | >900 | <0.5 |
| X | Coho Yearling ¹ | <20 | >=23 |
| X | Coho Fingerling | >20 to 200 | 2.3 to <23 |
| X | Coho Fry | >200 to 900 | 0.5 to <2.3 |
| X | Coho Unfed Fry | >900 | <0.5 |
| X | Chum Fed Fry | <=1000 | >=0.45 |
| X | Chum Unfed Fry | >1000 | <0.45 |
| X | Sockeye Yearling ² | <=20 | >=23 |
| X | Sockeye Fingerling | >20 to 800 | 0.6 to <23 |
| X | Sockeye Fall Releases | <150 | >2.9 |
| X | Sockeye Fry | > 800 to 1500 | 0.3 to <0.6 |
| X | Sockeye Unfed Fry | >1500 | <0.3 |
| X | Pink Fed Fry | <=1000 | >=0.45 |
| X | Pink Unfed Fry | >1000 | <0.45 |
| X | Steelhead Smolt | <=10 | >=45 |
| X | Steelhead Yearling | <=20 | >=23 |
| X | Steelhead Fingerling | >20 to 150 | 3 to <23 |
| X | Steelhead Fry | >150 | <3 |
| X | Cutthroat Trout Yearling | <=20 | >=23 |
| X | Cutthroat Trout Fingerling | >20 to 150 | 3 to <23 |
| X | Cutthroat Trout Fry | >150 | <3 |
| X | Trout Legals | <=10 | >=45 |
| X | Trout Fry | >10 | <45 |

¹Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.

² Sockeye yearlings defined as meeting size criteria and 1 year old.