HATCHERY AND GENETICS MANAGEMENT PLAN (HGMP)

Hatchery Program:	Big Creek Chum
Species or Hatchery Stock:	Chum, Stock 13
Agency/Operator:	Oregon Department of Fish and Wildlife
Watershed and Region:	Lower Columbia, North Coast
Date Submitted:	January 23, 2013 August 23, 2016 December 30, 2024
Date Last Updated:	December 30, 2024

Section 1. General Program Description

1.1. Name of hatchery or program.
Big Creek Chum Program (Stock 13).

1.2. Species and population (or stock) under propagation, and ESA status.
Big Creek Chum (*Oncorhynchus keta)*
Columbia River Chum ESU – Threatened

1.3. Responsible organization and individuals

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Name (and title): Ross McDorman, Big Creek and Klaskanine Hatchery Manager
Agency or Tribe: Oregon Department of Fish and Wildlife

This program shall be implemented according to the Incidental Take Statement, Terms and Conditions, and Hatchery Operation Framework of the NMFS Mitchell Act Biological Opinion. Any deviation from the biological opinion must be approved by NMFS.

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1.4. Funding source, staffing level, and annual hatchery program operational costs.
The facilities utilized for this program are funded through the Mitchell Act.

1.5. Location(s) of hatchery and associated facilities.
Big Creek Hatchery – Big Creek, RM 3.3 (46.1460, -123.5806)
Big Creek Watershed, Oregon

Klaskanine Hatchery – North Fork Klaskanine, RM 2.25 (46.0890, -123.7174)
North Fork Klaskanine Watershed, Oregon

Gnat Creek Hatchery – Gnat Creek, RM 2.25 (46.18056, -123.5328)
Gnat Creek Watershed, Oregon

1.6. Type of program.
Integrated Recovery

1.7. Purpose (Goal) of program.
Restoration – The goal of the project is to restore self-sustaining natural populations of Chum Salmon on the Oregon side of the lower Columbia River.

1.8. Justification for the program.
The program releases adipose-intact juveniles to produce adult for broodstock and natural spawning.

1.9. List of program "Performance Standards".
Please refer to sections 1.10.1 and 1.10.2 below.

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

1.10.1. "Performance Indicators" addressing benefits.

Table 1.10.1 Performance indicators addressing benefits.

Performance Standard	Performance Indicator	Monitoring and Evaluation
Achieve genetic and life history conservation	Integrate natural origin broodstock	Record the number of natural origin broodstock incorporated annually

Contribution of fish carcasses to ecosystem	Develop plan for carcass outplants	Record carcass outplants
Achieve within-hatchery performance standards	Achievement of IHOT standards	Adhere to IHOT standards
Restore and create viable naturally spawning populations.	Increase number of adult fish and natural spawning	Record adult returns and outplants.

1.10.2. "Performance Indicators" addressing risks.

Table 1.10.2 Performance indicators addressing risks

Performance Standard	Performance Indicator	Monitoring and Evaluation
Do not exceed the carrying capacity of habitat	Developed an appropriate production and RM&E plan	Please see Sections 10 and 12.
Potentially unpredictable egg supply	Egg take	Record broodstock metrics.
Not achieving within-hatchery performance standards	Achievement of IHOT standards	Adhere to IHOT standards.
Evaluate habitat use and potential detrimental ecological interactions.	Developed an appropriate RM&E plan	Please see Section 12.
Avoid disease transfer from hatchery to wild fish and vice versa.	Application of fish health standards	Adhere to fish health standards and policies

1.11. Expected size of program.

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

Up to 676 pairs are necessary during peak production years.

1.11.2. Proposed annual fish release levels (maximum number) by life stage and location.

Table 1.11.2 Proposed annual fish release levels

Life Stage	Release Location	Annual Release Level
Fry	Big Creek and Clatskanie River and tributaries	1,690,000[1]

[1]The program may exceed the authorized goal by 5% annually (1,774,500) and 2% over any 5-year period (1,723,800) to account for variation during rearing.

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1.12. Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.
These data are currently unavailable.

1.13. Date program started (years in operation), or is expected to start.
Started in 2010 with the first release in 2011.

1.14. Expected duration of program.
The program will be evaluated every 6-8 years.

1.15. Watersheds targeted by program.
Lower Columbia.

1.16. Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.
Alternative 1 – Reduce program size (Not preferred)
Deceased releases could potentially decrease financial commitment and impacts to listed species. This alternative is not preferred due to the negative impact on recovery efforts.

Alternative 2 - Allow natural colonization (Not preferred)
Avoidance of hatchery intervention could potentially decrease financial commitment and impacts to listed species. This alternative is not preferred due to the lack of natural colonization in available habitat within the Oregon portion of the lower Columbia River, despite the presence of other Chum populations on the Washington side.

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.
This program was evaluated under the Mitchell Act Biological Opinion signed on 1/15/2017. NMFS issued an ESA 4(d) Rule Limit 5 Take Exemption in response to a revised HGMP on 1/17/2018. This 2024 version is intended as re-submission for reinitiation of consultation.

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.

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

Table 2.2.1.1 NMFS ESA-listed populations directly affected by the program.

Life Stage	Activity	Affected NMFS ESA-listed Population
Adult	Broodstock	Columbia River Chum Salmon

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

Table 2.2.1.2 NMFS ESA-listed populations incidentally affected by the program.

Life Stage	Activity	Affected NMFS ESA-listed Population
Adult	Trap Operations	Columbia River Chum Salmon
		Lower Columbia Chinook Salmon
		Lower Columbia River Coho Salmon
Juvenile	Smolt Trap Operation	Columbia River Chum Salmon
		Lower Columbia Chinook Salmon
		Lower Columbia River Coho Salmon
	Ecological Competition	Columbia River Chum Salmon
		Lower Columbia Chinook Salmon
		Lower Columbia River Coho Salmon
		Lower Columbia River Steelhead
		Middle Columbia River Steelhead
		Upper Columbia River Spring-run Chinook
		Upper Columbia River Steelhead
		Upper Willamette Chinook Salmon
		Upper Willamette Steelhead
		Snake River Spring/Summer-run Chinook Salmon
		Snake River Fall-run Chinook Salmon
		Snake River Sockeye Salmon
		Snake River Basin Steelhead

2.2.2. Status of NMFS ESA-listed salmonid population(s) affected by the program. Due to the low likelihood that listed populations will be affected through ecological competition, only assessments of listed populations affected by the adult and smolt traps are presented here.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

Table 2.2.2.1 Description of listed population thresholds.

Affected NMFS ESA-listed Populations	Status
Columbia River Chum Salmon	Functionally extirpated
Lower Columbia Chinook Salmon	Moderate extinction risk.
Lower Columbia River Coho Salmon	Moderate extinction risk.

- 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.
Productivity assessments are described in the Lower Columbia River Conservation and Recovery Plan for Oregon Populations of salmon and steelhead (ODFW 2010).

- 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.

Table 2.2.2.2. Abundance estimates of listed natural origin Big Creek fall Chinook and Coho. Data for Chum are unavailable.

Year	Fall Chinook	Coho
2012	55	409
2013	0	223
2014	41	606
2015	0	88
2016	45	198
2017	0	263
2018	116	49
2019	19	441
2020	21	425
2021	304	460
2022	522	509
2023	81	498

Data Source: ODFW Salmon and Steelhead Recovery Tracker

- 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.
Table 2.2.2.3. Annual estimates of pHOS for Big Creek fall Chinook. Data for Chum and Coho are unavailable.

Year	Fall Chinook
2012	0.95
2013	1.00
2014	0.98
2015	1.00

2016	0.92
2017	1.00
2018	0.99
2019	0.98
2020	0.98
2021	0.95
2022	0.64
2023	0.89

Data Source: ODFW Salmon and Steelhead Recovery Tracker

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

- 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.
Listed Chum will be taken for incorporation into broodstock. Broodstock collection and smolt traps also have potential to take listed Chinook and Coho through migration delay, capture, handling, and release during operation.

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

Table 2.2.3.1 Number of listed natural origin fall Chinook and Coho captured associated with all programs at Big Creek Hatchery from Jan. 1 – Dec. 31. Screw trap data are unavailable.

Calendar Year	Chum		Fall Chinook		Coho	
	Capture	Mortality	Capture	Mortality	Capture	Mortality
2015	87	2	0	0	88	0
2016	42	3	26	0	226	0
2017	57	3	40	0	293	0
2018	63	1	21	0	80	0
2019	43	3	22	0	452	0
2020	955	17	23	9	507	2
2021	1419	84	104	0	515	0
2022	1599	4	50	0	545	9
2023	770	3	69	0	558	0
2024	946	12	104	3	462	0

Data Source: HMS

- 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).
The values below represent all take for Big Creek Hatchery and the smolt trap from Jan. 1 – Dec. 31 due to overlapping broodstock collection and monitoring seasons.

Table 2.2.3.2 Estimates annual take levels of listed natural origin Chum

Listed Species: Chum	**ESU:** Columbia River		**Activity:** Trapping	
Location: Lower Columbia Basin	**Dates:** Jan 1 – Dec 31		**Operator:** ODFW	
	Annual Take of Listed Fish by Life Stage			
Type of Take	**Egg/Fry**	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass				
Collect for transport				
Capture, handle, and release				
Capture, handle, tag/mark/tissue sample, and release		50,000	2,505	
Removal (e.g. broodstock)			1,352	
Intentional lethal take				
Unintentional lethal take		≤ 3,250	≤ 76	
Other Take (specify)				

Table 2.2.3.3 Estimates annual take levels of listed natural origin Chinook

Listed Species: Chinook	**ESU:** Lower Columbia River		**Activity:** Trapping	
Location: Lower Columbia Basin	**Dates:** Jan 1 – Dec 31		**Operator:** ODFW	
	Annual Take of Listed Fish by Life Stage			
Type of Take	**Egg/Fry**	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass				
Collect for transport				
Capture, handle, and release				
Capture, handle, tag/mark/tissue sample, and release		50,000	2,005	
Removal (e.g. broodstock)				
Intentional lethal take				
Unintentional lethal take		≤ 1,500	≤ 7	
Other Take (specify)				

Table 2.2.3.4 Estimates annual take levels of listed natural origin Coho

Listed Species: Coho	**ESU:** Columbia River	**Activity:** Trapping
Location: Lower Columbia Basin	**Dates:** Jan 1 – Dec 31	**Operator:** ODFW

Type of Take	Annual Take of Listed Fish by Life Stage			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass				
Collect for transport				
Capture, handle, and release				
Capture, handle, tag/mark/tissue sample, and release		150,000	705	
Removal (e.g. broodstock)				
Intentional lethal take				
Unintentional lethal take		≤ 4,150	≤ 22	
Other Take (specify)				

- 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.

Facility operations and fish handling procedures will be modified immediately if listed fish mortality related to operation is identified in or near the trap. This may include, but is not limited to, additional staff training or review of proper procedures, trap modifications, cessation of trapping, modified operation by hatchery personnel, etc.

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.

The hatchery program will be operated consistent with the Oregon Columbia River Chum Salmon Recovery Strategy, described in the Chum Recovery Strategy (ODFW 2010).

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.*

N/A

3.3. Relationship to harvest objectives.

This program does not currently have a relationship to harvest objectives.

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.
N/A

3.4. Relationship to habitat protection and recovery strategies.
Assumption regarding habitat conditions related to this program are that habitat is good, production is not limited in other habitats for different life stages, and artificially produced populations can coexist without jeopardizing the fitness of natural populations. Considering these assumptions, this program rears juveniles from egg to fry in a hatchery setting to increase early survival. Those juveniles are then released to utilized available habitat, ultimately maximizing recovery.

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.]
Listed fish have potential to both negatively impact and be negatively impacted by the program through competition for resources and attraction of predators. Listed fish in the area may positively impact and be positively impacted by the program through increased nutrient cycling and the subsequent increase in production potential of surrounding habitat.

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.
Big Creek Hatchery – 80.53 cfs are authorized from Big Creek, Mill Creek, and an upper and lower natural spring. Operation and discharge are authorized under a NPDES permit.

Gnat Creek Hatchery – 46.92 cfs are authorized from Gnat Creek. Operation and discharge are authorized under a NPDES permit.

Klaskanine Hatchery – 50 cfs are authorized from North Fork Klaskanine and the North Fork of North Fork Klaskanine. Operation and discharge are authorized under a NPDES permit.

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.
Hatcheries adhere to water right and NPDES permit.

Section 5. FACILITIES

5.1. Broodstock collection facilities (or methods).
Broodstock are collected from an adult trap located at Big Creek Hatchery. Adults enter a fish ladder leading a temporary holding pond.

5.2. Fish transportation equipment (description of pen, tank truck, or container used).
Juvenile and adult transportation is performed by liberation trucks or portable liberation tanks. Liberation trucks are typically 1,000–2,500-gallon capacity units, either mounted on a large flatbed or tanker style truck. The trucks are equipped with oxygen diffusing systems, water re-circulation pumps, and dissolved oxygen meters. Portable liberation tanks have a capacity of 300 gallons and are equipped with oxygen diffusion systems. The transfer of juvenile fish on station is performed using a distribution box, irrigation pipe and a gas-powered water pump. Eggs and milt are transported via passenger vehicles in small, covered containers.

5.3. Broodstock holding and spawning facilities.
Broodstock are held at Big Creek Hatchery in one large upper pond and one lower pond that can be divided into 7 sections. Spawning is conducted within a metal building.

5.4. Incubation facilities.
Eggs are incubated at Big Creek Hatchery inside a large hatch-house building via deep troughs, shallow troughs, or vertical stack incubators. Each trough has a capacity of 100,000 eggs while each vertical stack incubator tray have a capacity of 10,000 eggs per tray. Flow through the trough incubators is 3-10 gpm.

5.5. Rearing facilities.
Fry are reared at Big Creek Hatchery in Canadian style tanks in the hatch-house. Each trough can rear approximately 44,000 fry. Juveniles are also reared in concrete raceways with a maximum capacity of 6,000 lbs of fish each.

5.6. Acclimation/release facilities.
Juveniles are direct released from Big Creek hatchery and other designated locations. Remote site incubators are utilized for acclimated releases at several locations.

5.7. Describe operational difficulties or disasters that led to significant fish mortality.
Significant fish mortality could occur due to human error, disease outbreaks, intake failure, high stream flows, drought, high temperatures, low temperatures, wildfire, or various other natural disasters.

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.

Hatchery-origin Chum propagated under this program are ESA-listed. Back-up generators, automatic alarm and notification systems, UV light treatment, and 24/7 on-call staff are all utilized to avoid and minimize impacts from operational failures at the hatchery. Hatchery and fish health staff continuously work to minimize disease transmission.

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.

Broodstock for the Big Creek Chum (stock-13) program originated from the integrated Grays River Hatchery program in Washington.

6.2. Supporting information.

6.2.1. History.

The Big Creek Chum program first began in 2010 with eyed eggs shipped from the integrated Gray River Hatchery program in Washington.

6.2.2. Annual size.

Up to 676 pairs are necessary during peak production years. Although staff will not be able to designate origin at the time of spawning, otolith and genetic samples are used to determine origin after spawning. The most recent 5-year average is 65% natural origin.

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

Analysis of otolith and genetic samples has shown that about 65% of the broodstock have been natural origin in the last 5 years. The program will take up to 676 pairs during peak production and continue to evaluate origin after spawning.

6.2.4. Genetic or ecological differences.

Big Creek Chum are not expected to exhibit differences from naturally produced Chum.

6.2.5. Reasons for choosing.
Integration of natural origin Chum into the hatchery population will serve to mitigate genetic risk from the reintroduction program and may improve performance.

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.
The program will be managed as an integrated population, receiving gene flow from the wild population on a regular basis. This management approach will decrease the rate of genetic divergence between the wild and hatchery populations, effectively mitigating for genetic risk.

Section 7. BROODSTOCK COLLECTION

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

7.2. Collection or sampling design.
The traps described above typically target Chum throughout the run.

7.3. Identity.
Origin cannot be identified at the time of spawning. Otolith and genetic samples are utilized to determine origin after spawning.

7.4. Proposed number to be collected:

7.4.1. Program goal (assuming 1:1 sex ratio for adults)
Up to 676 pairs are necessary during peak production years.

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

Brood Year	Adults		Pond Loss
	Females	Males	
2015	111	110	14
2016	15	26	5
2017	38	22	3
2018	56	45	1
2019	28	27	3
2020	159	161	17
2021	168	169	84

2022	230	228	4
2023	216	177	3
2024	180	188	12

Data ource: HMS

7.5. Disposition of hatchery-origin fish collected in surplus of broodstock needs.
Surplus adults will be passed upstream of the hatchery or released in proximal tributaries.

7.6. Fish transportation and holding methods.
Adults may be transported to outplant locations for reintroduction.

7.7. Describe fish health maintenance and sanitation procedures applied.
The fish health monitoring plan is based on the Integrated Hatchery Operations Team for the Columbia Basin Anadromous Salmonid Hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. Bonneville Power Administration) and the ODFW Fish Health Management Policy (OAR 635-007-0960 to 635-007-0995). Other resources are used to guide the program and management of diseases such as American Fisheries Society Fish Health Section Blue Book and the World Organisation for Animal Health Manual of Diagnostic tests for Aquatic Animals.

7.8. Disposition of carcasses.
Carcasses are to be used for stream enrichment or disposed of in accordance with ODFW policies and procedures, which include freezing, rendering, or burying.

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.
The risks of disease in broodstock will be minimized by protocols described above in section 7.7. Broodstock will be collected from the entire run period to maintain genetic diversity within the hatchery-produced population.

Section 8. MATING

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

8.1. Selection method.
Adults are collected randomly from throughout the temporal distribution of the run to avoid any timing or size bias.

8.2. Males.
Males are generally only used once during spawning unless there is a shortage of males.

8.3. Fertilization.

This program intends to utilize 1:1 male-to-female ratios in a 2X 2 matrix system. Alternative matrices will be used when necessary.

8.4. Cryopreserved gametes.

Cryopreservation is not utilized for this program.

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.

Factorial mating schemes and random broodstock selection will be used to reduce the risk of loss of within-population genetic diversity.

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.

Table 9.1.1. Eggs taken and survival rates.

Brood Year	Egg Take	Percent Survival to Eye-Up
2014	150,543	89.9
2015	285,940	93.7
2016	36,636	93.1
2017	94,732	92.2
2018	139,075	93.8
2019	72,528	94.6
2020	408,755	87.9
2021	443,527	94.6
2022	632,514	90.2
2023	546,133	96.5
2024	150,543	89.9

Data Source: HMS

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

No surplus eggs are expected to be taken for this program. If necessary, eggs are culled randomly across the early egg take groups to retain diversity among those adults spawned.

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9.1.3. Loading densities applied during incubation.
Water flows at 3-10 gmp through incubators. Each vertical incubating tray is loaded with up to 10,000 eggs.

9.1.4. Incubation conditions.
The water temperature, flow, and dissolved oxygen (DO) are monitored with a range of 42º – 52ºF at 3-10 gpm.

9.1.5. Ponding.
Fry are manually relocated from incubators ponded at approximately1523 temperature units (TU).

9.1.6. Fish health maintenance and monitoring.
The fish health monitoring plan is based on the Integrated Hatchery Operations Team for the Columbia Basin Anadromous Salmonid Hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. Bonneville Power Administration) and the ODFW Fish Health Management Policy (OAR 635-007-0960 to 635-007-0995). Other resources are used to guide the program and management of diseases such as American Fisheries Society Fish Health Section Blue Book and the World Organisation for Animal Health Manual of Diagnostic tests for Aquatic Animals.

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.
Eggs are incubated on well water or treated river water to prevent exposure to disease. Water supplies and the power supply are alarmed to notify hatchery personnel if a failure occurs and hooked up to a back-up generator, in case of a power failure. Hatchery staff are available 24 hr/day for immediate response to any emergency situation.

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..

Table 9.2.1 Rearing survival rates.

Brood Year	Number of Fry Ponded
2014	89,460
2015	203,300
2016	33,662
2017	85,871

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2018	128,964
2019	68,012
2020	355,623
2021	406,664
2022	433,134
2023	337,593

Data Source: HMS

9.2.2. Density and loading criteria (goals and actual levels).
The goal is to maintain less than 1.0 lb of fish per cubic foot of water during rearing.

9.2.3. Fish rearing conditions
Water temperatures range from 40º – 67ºF. Dissolved oxygen will be maintained at 6 ppm or greater.

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.
Only weight samples are collected for inclusion in monthly pond reports.

Table 9.2.4. Average end-of-month size.

Month	Size (fpp)
1	1,055.8
2	462.3
3	231.6

9.2.5. Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.
See Table 9.2.4 above for fish growth. No energy reserve data is available.

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*).
Fish are fed according to the feed manufacturer's guidance and ODFW's growth program tool.

9.2.7. Fish health monitoring, disease treatment, and sanitation procedures.
The fish health monitoring plan is based on the Integrated Hatchery Operations Team for the Columbia Basin Anadromous Salmonid Hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. Bonneville Power Administration) and the ODFW Fish Health

Management Policy (OAR 635-007-0960 to 635-007-0995). Other resources are used to guide the program and management of diseases such as American Fisheries Society Fish Health Section Blue Book and the World Organisation for Animal Health Manual of Diagnostic tests for Aquatic Animals.

9.2.8. Smolt development indices (e.g. gill ATPase activity), if applicable.
Weight samples of the fish are taken monthly to ensure proper growth rate.

9.2.9. Indicate the use of "natural" rearing methods as applied in the program.
"Natural" rearing methods are not utilized by this 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.
Rearing ponds are cleaned on weekly basis or as necessary through visual observation of solid wastes on pond bottom.

Section 10. RELEASE

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

10.1. Proposed fish release levels.

Table 10.1 Proposed annual fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fry	1,690,000[1]	165 – 225 fpp	April - May	Big Creek and Clatskanie River and tributaries
[1]The program may exceed the authorized goal by 5% annually (1,774,500) and 2% over any 5-year period (1,723,800) to account for variation during rearing.				

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

Stream, river, or watercourse: Big Creek
Release point: Big Creek and tributaries
Major watershed: Big Creek
Basin or Region: Lower Columbia

Stream, river, or watercourse: Clatskanie River
Release point: Clatskanie River and tributaries
Major watershed: Clatskanie River
Basin or Region: Lower Columbia

This program shall be implemented according to the Incidental Take Statement, Terms and Conditions, and Hatchery Operation Framework of the NMFS Mitchell Act Biological Opinion. Any deviation from the biological opinion must be approved by NMFS.

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

Table 10.3. Program releases.

Brood Year	Fry	Average Size
2011	110,090	218
2012	108,502	172
2013	100,863	185
2014	190,188	185
2015	192,147	144
2016	32,725	275
2017	84,958	431
2018	171,649	385
2019	120,189	678
2020	351,358	454
2021	403,152	461
2022	422,955	467
2023	357,031	322
Average	**203,524**	**337**

Data Source: HMS

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

Table 10.4. Annual release dates.

Brood Year	Release Date Range
2011	4/9
2012	4/15 – 4/17
2013	4/16
2014	4/24 – 5/15
2015	4/25
2016	4/17
2017	3/29 – 4/16
2018	3/13 – 4/9
2019	3/25 – 4/9
2020	3/3
2021	3/22 – 4/18
2022	3/29 – 4/10
2023	3/26

Data Source: HMS

10.5. Fish transportation procedures, if applicable.
All juveniles are transported in liberation equipment described above.

10.6. Acclimation procedures (methods applied and length of time).
Juveniles are direct released from Big Creek hatchery and other designated locations. Remote site incubators are utilized for acclimated releases at several locations.

10.7. Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.
This program utilizes otolith and/or genetic marking for 100% of the release. Alternative marking may be used if necessary.

10.8. Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.
Under current policy, surplus juveniles are destroyed or marked and released into a closed water system such as a lake, reservoir or pond where they contribute to angling opportunities. In general, OAR 635-007-0545 directs disposition of surplus hatchery juveniles.

10.9. Fish health certification procedures applied pre-release.
The fish health monitoring plan is based on the Integrated Hatchery Operations Team for the Columbia Basin Anadromous Salmonid Hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. Bonneville Power Administration) and the ODFW Fish Health Management Policy (OAR 635-007-0960 to 635-007-0995). Other resources are used to guide the program and management of diseases such as American Fisheries Society Fish Health Section Blue Book and the World Organisation for Animal Health Manual of Diagnostic tests for Aquatic Animals.

10.10. Emergency release procedures in response to flooding or water system failure.
Emergency releases may occur at any size or point in time during rearing in response water system failure, disease, drought, wildfire, flood, rising air/water temperatures, or any other adverse environmental conditions that may pose a threat to hatchery staff and/or hatchery fish.
Emergency releases will occur after the hatchery crew has exhausted all possibilities for retaining the fish and consulted with the ODFW District Biologist. Emergency releases will be limited to the Willamette basin, or into a closed water body per OAR 635-007-0545.

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.
Juveniles are generally released at times and sizes that minimize potential interactions during emigration.

This program shall be implemented according to the Incidental Take Statement, Terms and Conditions, and Hatchery Operation Framework of the NMFS Mitchell Act Biological Opinion. Any deviation from the biological opinion must be approved by NMFS.

Section 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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.

Table 11.1.1. Methods for evaluating program indicators.

Performance Indicator M&E	Methods
Record the number of natural origin broodstock incorporated annually	Keep hatchery records of broodstock numbers and egg take
Record adult return, live outplants, and carcass outplants	Keep hatchery records of adult dispositions.
Adhere to IHOT standards	N/A
Adhere to fish health standards and policies	N/A

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

Current funding is sufficient to implement the activities identified in 11.1.1. Any additional monitoring or evaluations would require additional funding/staffing.

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.

Please see Section 12.

Section 12. RESEARCH

12.1. Objective or purpose.

The purpose of this program is to facilitate reintroduction of Chum Salmon into the Oregon portion of the Lower Columbia River ESU as per the Chum Salmon Reintroduction Plan (Homel 2014) and direction of the Chum Recovery Workgroup. Briefly, the project includes: (1) creating a conservation broodstock (potentially including constructing and operating spawning channels), (2) collecting baseline data prior to reintroduction in order to assess effects of reintroduction, (3) collecting and analyzing habitat data to make recommendations for restoration projects, (4) reintroducing chum salmon into habitats they formerly occupied, (5) supplementing existing populations, where applicable, (6) monitoring the success of reintroduction and recolonization, and (7) conducting research on critical uncertainties about reintroduction strategies and factors that limit survival/ reproduction in freshwater and estuary habitats.

As such, this project monitors multiple life stages of wild and hatchery-origin Chum Salmon before, during, and after reintroduction. Data collection is currently focused on juvenile outmigration, adult returns, and estuary occupancy, but may include behavioral studies or egg survival research in the future.

- For outmigration and adult return data, estimates may be made using traps positioned low in the watersheds to achieve an integrative measure of salmon production throughout the watershed. Currently, the project operates up to five out-migration traps and one adult trap, but trapping effort may vary depending on funding and research/ monitoring needs.

- Estuary occupancy data collection may involve use of beach seines or trawls, and is done as part of specific research questions throughout the Oregon portion of the Columbia River estuary.

- Reintroduction and supplementation activities have occurred in the Big Creek and Clatskanie River populations, including outplanting wild and hatchery adults and outplanting eyed-eggs using remote site incubators. These efforts will continue in locations outlined in the Chum Reintroduction Plan (Homel 2014) and as determined by the Chum Recovery Workgroup.

In completing this work, the Chum Salmon Reintroduction Coordinator collaborates with state, federal, and non-governmental organizations to develop and implement a reintroduction strategy, and to conduct the necessary research to inform recovery efforts.

12.2. Cooperating and funding agencies.

Research, monitoring, and evaluation are funded by the Pacific Coastal Salmon Recovery Fund through NOAA Fisheries. Additional research and reintroduction activities have been funded through ODFW Restoration and Enhancement, Bonneville Power Administration (BPA; through a collaboration with Washington Department of Fish and Wildlife, WDFW), and the U.S. Forest Service. Collaborators on research and monitoring work include NOAA, U.S. Forest Service, WDFW, and BPA. Other collaborators and funding sources may be pursued in the future depending on research questions and availability of funding.

12.3. Principle investigator or project supervisor and staff.

Name (and title): Erik Suring, LCM Project Leader
Agency or Tribe: Oregon Department of Fish and Wildlife
Address: 28655 Hwy 34, Corvallis, OR 97333
Telephone: 541-286-5328

Fax: 541-757-4102
Email: Erik.Suring@odfw.oregon.gov

Name (and title): Kelcee Smith, Chum Reintroduction Coordinator
Agency or Tribe: Oregon Department of Fish and Wildlife
Address: 17330 SE Evelyn Street, Clackamas, OR 97015
Telephone: 503-680-4622
Email: Kelcee.L.Smith@odfw.oregon.gov

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

All as described in Section 2.

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

Juvenile sampling:

Rotary screw traps, inclined plane traps, and box and panel traps will be used to capture juvenile salmonids migrating downstream. Traps generally begin fishing as stream flows allow and are fished continuously until catch diminishes to low levels or low stream flows preclude further trap operation. The traps will be checked and cleared of fish and debris once per day; visits will be more frequent during storm events and periods of high debris transport.

Fish will be anesthetized with MS-222 and enumerated by species and age or size group (nearest millimeter fork length, FL). Coho Salmon *(O. kisutch)* will be identified as fry (age 0) or smolts (age 1+). All captured Chum Salmon (*O. keta*) and Chinook Salmon (*O. tshawytscha*) will be fry (age 0).

Capture efficiency of out-migrant traps will be evaluated daily for each species and age/size class by marking fish from each category with a small clip from the caudal lobe then releasing clipped fish upstream of the trap.

Adult sampling:

Adults will be captured using box and weir adult traps, or other approved trapping designs (e.g. floating weir) depending on the size of the target system. The traps are fished continuously, as conditions allow. The trap will be checked and cleared of fish and debris daily; visits will be more frequent during storm events or periods of high debris transport.

Captured adult Chum Salmon may be implanted with t-bar anchor tags (e.g., Floy tags) or Peterson disc tags, and will have scales removed for aging and a fin clip removed for genetic analysis. Additional data will be collected on length and condition. During tagging and handling, the fish is held in a padded cradle to minimize stress. After

sampling, the fish is released upstream of the trap in slow water and is observed until it swims away. Other tagging options include radio telemetry tags, acoustic telemetry tags, visual implant elastomers, and passive integrated transponder tags, as research needs require. These tags would be implanted using established best practices in surgery and animal care.

Estuary sampling:
Chum Salmon may be captured in the estuary using beach seines, trawls, or other types of nets and traps, as appropriate. The following samples may be collected from captured fish: scales, fin clip, tissue plug, and stomach contents (via gastric lavage). Other sampling may occur, depending on research needs. For invasive sampling or tagging, fish will be anesthetized with MS-222, as described above.

Reintroduction activities:
Specific reintroduction activities include transporting adult Chum Salmon to reintroduction sites using a liberation truck, outplanting unfed or fed fry in acclimation ponds, and outplanting eyed-eggs in remote site incubators. Each of these activities is done experimentally and survival and stray rates are assessed by recovering carcasses or removing samples (e.g., tissue for genetic analysis) from live fish. These tissue samples (also including otoliths from carcasses) may be processed to determine the origin of the fish in hand in relation to known marks applied to outplanted fish.

12.6. Dates or time period in which research activity occurs.
Juvenile research (e.g., trapping) will occur between February and June. Adult research (e.g., trapping or movement studies) will occur from October through January. Egg research may occur between December and February, and estuary research may occur between March and July.

12.7. Care and maintenance of live fish or eggs, holding duration, transport methods.
Eyed-eggs may be transported to Remote Site Incubators (RSIs). To do so, burlap sacks are soaked in stream water and then placed into a box. The eggs are gently poured into the box and more wet burlap is placed on top to cover them. Eggs are immediately transported to RSI sites. At the RSI site, eggs are gently poured into egg trays, which are then stacked into the RSI barrels. Each RSI set up consists of multiple water intake lines (all screened) that run into settling barrels. Filters in these barrels reduce the amount of fine sediment that is transported into the egg barrels. Water flows out of the top of the settling barrel and drops into a pipe where it then flows into the bottom of the egg barrel. The water is oxygenated as it flows through an “x” shaped pipe on the bottom of the barrel. Above this pipe, there is a tray with pea gravel (sterilized using argentine), and then above this is a layer of PVC substrate. This provides cover to hatched fry. Egg trays sit on top of the PVC substrate and are held in place by a metal bracket. The

outflow to the barrel is always open and connects to a pipe that drops down to the creek. Fry may volitionally leave the barrel when they are ready.

Live juvenile fish will be held in aerated containers and anesthetized with MS-222 for the minimum amount of time required to enumerate, measure, and mark the fish. This may occur during juvenile trapping or beach seining. If fry should be held in acclimation ponds at a release site, a separate protocol will be developed and submitted as an addendum to this HGMP.

Adult fish may be handled during operation of adult traps, active capture in the estuary, or when handled at Big Creek Hatchery prior to outplanting. At traps, adults will be placed in a cradle for enumeration and measurements before being released into an upstream recovery pool for volitional escape. Should movement studies be conducted requiring more involved surgical techniques, adult fish would be anesthetized with MS-222 and handled according to established best practices.

In the estuary, adults may be captured using tangle nets or gill nets. These nets would be checked frequently to avoid causing excessive stress to fish. The purpose of these studies would be to understand adult encounter rates in fisheries in different habitats. All collected fish would be measured for length, scales would be removed for aging, the fish would be scanned for presence of a CWT, and a fin clip would be removed to determine the population of origin.

Lastly, for outplanting fish using a liberation truck, water in the truck is oxygenated at 2 psi and prepared with an additive (Vida Life; 25 ml/ 200 gallons water) to prevent loss of the fish slime coat. The tank is filled to about 350 gallons of water and up to 20 adult Chum Salmon may be transported at one time. At the release site, individuals are removed from the tank using a large dip net and carried to the creek where they are released in slow water. Any Chum Salmon that return to Big Creek Hatchery, post-release, may be opercle punched, any tag numbers may be recorded, and the individual may be released again. If stream conditions do not permit outplanting the fish again, it may be incorporated into the broodstock.

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

The majority of take will be capture and handle which have minimal impact on the fish. From past experience operating adult traps and screw traps on the Oregon coast, mortalities are typically below 1% for adults, below 1% for smolts, and below 3% for fry.

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".

See Table 2.2.3.2 – 2.2.3.4 for the projected take levels.

12.10. Alternative methods to achieve project objectives.
The best available techniques shall be used in this monitoring program, to minimize take levels while achieving the project objectives.

12.11. List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
See Table 2.2.3.2 – 2.2.3.4 for the projected take levels.

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.
To minimize take levels, traps will be observed daily with visits more frequent during storm events, periods of high debris transport, or period of high fish abundance. In cases of high flows or excessive debris loads adult traps and screw traps will not be fished to reduce fish mortality.

Section 13. ATTACHMENTS AND CITATIONS

AFS-FHS (American Fisheries Society-Fish Health Section). 2014. FHS blue book: suggested procedures for the detection and identification of certain finfish and shellfish pathogens, 2020 edition. Accessible at: https://units.fisheries.org/fhs/fish-health-section-blue-book-2020/

Homel, K. 2014. Chum Salmon Reintroduction Plan (draft). Oregon Department of Fish and Wildlife, Clackamas, OR, 201 pages.

IHOT (Integrated Hatchery Operations Team). 1996. Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin. Volume II-Oregon. Annual Report 1995. Portland, OR. Project Number 92-043, Contract Number DE-BJ79-91BP60629.

NMFS. 2017. Endangered Species Act Section 7(a)(2) Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. NOAA's National Marine Fisheries Service's implementation of the Mitchell Act Final Environmental Impact Statement preferred alternative and administration of Mitchell Act hatchery funding. January 15, 2017. NMFS Consultation No.: WCR-2014-697. 535p.

ODFW. 2010a. Final Lower Columbia River Conservation and Recovery Plan for Oregon Populations of Salmon and Steelhead. August 6, 2010. 437p.

Oregon Administrative Rules (OAR 635-007- -0542 through -0548). 2003. Fish Health Management Policy. Oregon Department of Fish and Wildlife, Salem, OR.

Oregon Administrative Rules (OAR 635-007-0960 through 1000). 2003. Fish Health Management Policy. Oregon Department of Fish and Wildlife, Salem, OR.

Oregon Administrative Rules (OAR 635-007-050 2 through -0509). 2002. Native Fish Conservation Policy. Oregon Department of Fish and Wildlife, Salem, OR.

World Organisation for Animal Health (OIE). (2024). Manual of Diagnostic Tests for Aquatic Animals, eleventh editions 2024. Available at: https://www.woah.

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."

Certified by_____ Date:_____

Attachment 1. 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

[1] Coho 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.