HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Salmon River Fall Chinook Program**
Species or Hatchery Stock:	**Fall Chinook Salmon *Oncorhynchus tshawytscha* (stock-36)**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**Salmon River Basin, North Coast Watershed District**
Date Submitted:	**April 10, 2006**
First Update Submitted:	**June 22, 2016**
Date Last Updated:	**June 22, 2016**

SECTION 1

GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Salmon River Hatchery, Fall Chinook Salmon Program.

1.2) Species and population (or stock) under propagation and ESA status.

Fall Chinook Salmon *Oncorhynchus tshawytscha* (Salmon River Stock 36).
This stock is not listed under the Endangered Species Act (ESA).

1.3) Responsible organization and individuals.

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

The Salmon River fall Chinook Salmon program is used as an indicator stock in ocean fisheries under the Pacific Salmon Treaty. The Pacific Salmon Commission (PSM) is involved in the program by providing funding for coded-wire tagging (CWT) of the 200,000 smolts for monitoring and evaluation of returning adults to Salmon River.

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

Salmon River Hatchery is funded through the State of Oregon general fund. The 2005-2007 biennial budget included three FTEs at 24 person months and 10 months of seasonal time; $556,082 for the biennium of which $140,182 or 25.2 percent was directed towards the fall Chinook Salmon program.

1.5) Location(s) of hatchery and associated facilities.

This facility was constructed in 1979. The Salmon River Hatchery is located at river mile (RM) 5.1 near Otis, Oregon. The hatchery site is at an elevation of 30 feet above the sea level, at latitude 45º 01' 36" N and longitude 123º 56' 61" W. The site has an area of 23.67 acres. The ODFW's water body code for Salmon River is 1800160000. The regional mark processing code for Salmon River Hatchery is 5F22225 H25 21.

Adult collection, spawning, egg incubation and rearing:
All adult fall Chinook Salmon brood are collected and spawned at Salmon River Hatchery. All eggs are incubated and reared at the Salmon River Hatchery up to smolt stage, which (200,000 smolts) are directly released from the hatchery into the Salmon River without additional acclimation.

1.6) Type of program.

The smolt releases into the Salmon River are an isolated harvest program.

1.7) Purpose (Goal) of program.

One goal of the Salmon River fall Chinook Salmon program is to provide augmentation of recreational and commercial fishery for fall Chinook Salmon both in the ocean and in the Salmon River. The program fish are used as an indicator in monitoring migrating fall Chinook Salmon to develop ocean harvest management strategies.

1.8) Justification for the program.

Salmon River hatchery- and natural-origin Chinook Salmon contribute to ocean fisheries off the coasts of Alaska and British Columbia, which is similar to other Central and North Oregon coast fall Chinook Salmon stocks. Because of the basin's small size and location of the hatchery, the Salmon River hatchery stock was chosen as an indicator group to represent all north-migrating Oregon coastal fall Chinook Salmon in harvest management

under the U.S.-Canada Pacific Salmon Treaty. This stock is monitored to evaluate the exploitation rates of wild fall Chinook Salmon stocks along the northern Oregon coast. Estimates of numbers of Salmon River hatchery fall Chinook caught in ocean sport and commercial fisheries and in the Salmon River sport fishery have been made since 1986. Approximately one-third of the Chinook Salmon returning to Salmon River are harvested in the in-river sport fishery. Hatchery-origin Chinook contribute approximately 60% of the harvest. Smolt-to-adult survival for the hatchery fall Chinook brood years 1983 through 1994 averaged 1.58% (Table 1-2).

Returning hatchery adult Chinook are captured at Salmon River Hatchery and used for broodstock. The hatchery fall Chinook program's goal is to have the hatchery fish mimic the characteristics of the wild fall Chinook population. This includes using 50% wild fish each year for broodstock along with hatchery fish. The broodstock goal has been met in two of the last five years.

The Coastal Multispecies Conservation and Management Plan calls for hatchery Chinook Salmon that mimic the wild population to be limited to 30% of the spawners in natural areas. The percentage of hatchery Chinook Salmon in natural areas has averaged 60% since 1992. The hatchery weir at Salmon River Hatchery is not effective at diverting all hatchery fish into the hatchery. Options to reduce the level of hatchery fish bypassing the hatchery are being reviewed. ODFW has been exploring ideas to modify the hatchery weir, but has yet to come up with a design that addresses all concerns related to operating a weir without aggravating flooding problems at the hatchery or nearby homes.
Even if the level of hatchery fish spawning in natural areas in Salmon River cannot be reduced, ODFW believes this will not jeopardize the overall health of wild fall Chinook Salmon in the mid-coast. The Salmon River Basin represents less than four percent of the drainage area of Oregon's mid-coast and concentrating potential risks to wild Chinook Salmon into such a small area limits overall risk. The Oregon Native Fish Status Report (ODFW 2005) interim assessment for coastal fall Chinook Salmon is not at risk and ranks the Salmon River fall Chinook Salmon stock as passing five of the six assessment criteria with reproductive independence being the only failure.

To minimize interactions with naturally produced juvenile fish in the Salmon River, hatchery-produced fish are released at full-term smolt stage which out-migrate to the ocean quickly. All smolts (100%) are adipose finclipped (AD) and CWT to distinguish between hatchery-origin and natural-origin fish as well as for program performance evaluation.

1.9) List of program "Performance Standards" and 1.10) List of program "Performance Indicators", designated by "benefits" and "risk".

*The following are **key** performance standards and indicators identified to evaluate the success of this fish propagation program. Note: not all measurable standards are listed.*

Additional within-hatchery standards will be evaluated using data gathered during adult collection, mating, incubation and rearing, and release of the fall Chinook Salmon. Data will confirm fish propagation procedures identified in Sections 7 through 10.

Sport Fishery Contribution

Standard 1.1: Provide an average annual total sport catch of 1,000 fall Chinook Salmon in the Salmon River Basin.
Indicator: Data from returned harvest tags indicate a catch of close to 1,000 including both wild and hatchery fish.

Impacts to Wild Fish

Standard 2.1: Adult migration and spawning timing of natural population does not change as a result of this fish propagation program.
Indicator: Wild fall Chinook return and spawning timing is consistent with historical timing prior to establishment of the 036 broodstock.

Standard 2.2: Broodstock collection does not remove a significant portion of the wild fall Chinook Salmon population in the Salmon River.
Indicator: Confirm that no more than 20% of the wild fall Chinook Salmon returning to Salmon River are used for broodstock.

Standard 2.3: Limit hatchery fish to 50 percent or less of the fish spawning in natural habitats of the Salmon River.
Indicator: Estimate the total number of adult fall Chinook Salmon and the number of marked hatchery adult fall Chinook spawning in Salmon River.

Standard 2.4: Impacts to ESA listed natural Coho Salmon trapped at Salmon River are minimized.
Indicator: Confirm that trap is checked on a regular basis and listed Coho Salmon are promptly removed and released upstream.

Coastal Chinook Exploitation Rate

Standard 3.1: All hatchery smolt releases for this program will be CWT and finclipped to allow analysis of ocean fishery exploitation rates. This will continue as long as Salmon River stock is used as an indicator stock by the Pacific Salmon Commission.
Indicator: Confirm that all smolts were CWT and marked with an adipose finclip prior to release. Pre-release mark quality checks, based on a sample of 200 smolts, indicate at least 99% of fish released have retained identifiable marks.

Program and Facility Operation

Standard 4.1: Timing of adult broodstock collection and spawning mimics the average wild fall Chinook Salmon migration and spawning.

Indicator: The proportion of broodstock collected each month is identical to the proportion of the natural population, on average, that enters Salmon River Hatchery's trap during that month and spawning times of hatchery and wild fish are comparable. Details are provided in Section 7.

Standard 4.2: Adult selection, mating, and spawning is consistent with approved methods and procedures.
Indicator 1: Females and males are selected (and paired) randomly as they ripen for spawning.
Indicator 2: Fish are spawned at a 1:1 male-to-female ratio and are matrix spawned.

Standard 4.3: Develop operational plans that maximize survival rates at varying life stages within the hatchery (refer to Section 9.2) to ensure cost-effectiveness / optimize the public's resources in implementation of the program.
Indicator: Annually enumerate survival rates from egg-fry, fry-fingerling, and fingerling to smolt to determine optimal rearing conditions and practices and if needed, modify operational plans accordingly.

Standard 4.4: Release 200,000 (plus or minus 2%) stock-36 hatchery fall Chinook Salmon smolts annually from Salmon River Hatchery.
Indicator: Hatchery production will be inventoried during CWT operations to enumerate fingerling numbers. Juvenile mortality after marking will be subtracted from this inventory to indicate final smolt release numbers.

Standard 4.5: Follow approved fish health and disinfection monitoring guidelines to minimize disease impacts to natural populations.
Indicator: Compliance with approved fish health standards and criteria.

1.11) Expected size of program.

The Salmon River fall Chinook program is expected to produce and release 200,000 fall Chinook Salmon smolts annually into the Salmon River.

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

A total of 75 pairs of fall Chinook Salmon are needed for broodstock. Fifty percent of these fish will be returning hatchery-origin fish and the other half will be unmarked (wild) fall Chinook Salmon.

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

Table 1-1. *Proposed Annual Fish Release Levels.*

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Salmon River Hatchery	200,000 smolts

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

Estimates of adult fall Chinook Salmon production from the Salmon River hatchery fall Chinook program, for the last 12 years are presented in Table 1-2. Estimates of adults produced reflect program performance in relation to the harvest (ocean and freshwater) program goal. The estimated number of total adult hatchery fall Chinook Salmon produced was derived from recoveries of CWT fish.

The Salmon River fall Chinook Salmon is a unique program as this stock has been used as an indicator to determine the exploitation rate of fall Chinook Salmon by the Pacific Salmon Commission (PSC) since 1986 (Nuzum and Williams 1991). Information obtained from the Salmon River fall Chinook program is used as the indicator of ocean exploitation rate for all north migrating Oregon coastal fall Chinook Salmon populations. To accurately calculate the ocean exploitation rate, requires documenting all catch (ocean and freshwater) as well as escapement for the group of fish. Therefore, PSC provides funding for CWT for all 200,000 smolts each year, as well as for statistical creel and a mark-recapture program in the Salmon River Basin. The information in Table 1-2 was estimated by expansion of CWT recoveries to reflect total production as follows: {(Estimated CWT recoveries / number of CWT smolts released) * total fish released}. This calculation was made for each group of CWT smolts released, and then summed across all CWT groups released for each brood year. This estimate represents landed catch only. Smolt to adult survival is calculated as the sum of the prior 5 columns divided by the "Smolt Release" column. The "Goal" row, at the bottom of the table, represents the point where program harvest benefits match program costs, based on the economic model in ODFW (1999). The hatchery return "goals" are not goals per se, but represent the number of fish expected to escape the fishery, based on the survival rate and harvest rate.

Table 1-2. **Estimated smolt to adult survival rate and total adult Salmon River hatchery fall Chinook Salmon produced per brood year. Data derived from expansion of CWT recoveries.**

		Estimated Total Adult Hatchery Fall Chinook Produced					
Brood Year	Smolt Release	Ocean Comm.	Ocean Sport	Freshwater Sport	Hatchery Return	Spawning Areas	Smolt to Adult
1983	200,824	1,480	68	853	1,082	1,469	2.47%
1984	205,858	1,665	60	1,090	937	1,912	2.75%
1985	182,151	410	18	167	47	408	0.58%
1986	141,845	950	37	499	61	631	1.54%
1987	200,781	979	60	557	114	1,146	1.42%
1988	202,126	474	16	239	69	311	0.55%
1989	211,483	1,135	54	477	97	940	1.28%
1990	195,786	1,481	140	1,358	164	2,647	2.96%
1991	193,186	161	43	183	21	199	0.31%
1992	205,179	598	21	857	90	1,417	1.45%
1993	206,574	1,579	157	1,629	158	2,323	2.83%
1994	205,215	729	47	468	68	465	0.87%
Goal [a]							
Low	200,000	407	21	342	1,370	b	1.07%
High	200,000	1,140	60	160	640		1.00%

a = Program goals for CHF stock 36, "Low" is at the lowest ocean harvest rate (20%); "High" is at the highest ocean harvest rate (60%) used in the hatchery audit economic analysis (ODFW 1999).
b = 50% or less of Salmon River naturally spawning fall Chinook abundance.

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

The Salmon River hatchery fall Chinook Salmon program in its current form began with smolt releases in 1977.

1.14) Expected duration of program.

This program will continue indefinitely as outlined in the Coastal Multispecies Conservation and Management Plan.

1.15) Watersheds targeted by program.

The watershed targeted by this program is the Salmon River Basin.

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

1.16.1) Brief Overview of Key Issues.

In Salmon River, the key issues involving the hatchery fall Chinook Salmon program relate to the protection of wild fall Chinook Salmon, providing harvest for the in-river recreational fishery and providing the indicator stock under the Pacific Salmon Treaty. Significant numbers of hatchery fall Chinook Salmon adults spawn in natural areas in Salmon River each year. The possible impact this has had on the wild fall Chinook

Salmon population is not known. Measures to remove more of the hatchery adults at the hatchery or to produce fewer hatchery adults have been considered. These measures, if successful, would likely lead to fewer hatchery fall Chinook Salmon adults being harvested or compromise the ability to assess the exploitation rate of the indicator stock.

Another issue with this program, and one seen with most hatchery programs, is the desire for more harvest. Some anglers would like to see more hatchery smolts released to produce more adults that could be caught, but this may increase interactions with naturally-produced native fish.

1.16.2) Potential Alternatives to the Current Program.

Alternative 1: *Discontinue the current hatchery fall Chinook Salmon program.*
This would pose the least risk of any of the alternatives to wild fall Chinook and listed Coho Salmon in the Salmon River Basin. The sport fishery for fall Chinook Salmon on the Salmon River would continue with only wild fish being harvested. This could mean a lower amount of harvest in the in-river fishery. The ability to use Salmon River hatchery Chinook Salmon to estimate the exploitation rate of the wild population to meet the needs of ocean harvest management under the Pacific Salmon Treaty would be lost.

Alternative 2: *Develop a better site for collecting returning hatchery adults.*
A collection facility that was efficient at attracting and collecting returning hatchery adults could lessen the impacts of the hatchery program on wild fall Chinook Salmon. Due to the location of the current hatchery weir, designing improvements has been difficult. Designs considered thus far would either cause flooding upstream or inhibit passage of wild fish. Relocating the weir is an expensive option that has not been critically analyzed thus far. This idea, and others, could be reviewed to determine if a workable design is feasible. If a new weir that was more efficient at capturing returning adults was installed, removal of these adults would reduce fisheries above the weir.

Alternative 3: *Reduce the number of hatchery fall Chinook Salmon smolts released.*
Releasing fewer smolts would help reduce interactions between wild and hatchery juvenile Chinook Salmon and help reduce the number of returning hatchery fall Chinook adults spawning in natural areas. The reduction in returning adults would result in fewer hatchery fall Chinook Salmon being caught in the in-river fishery. A reduction in smolt releases would have to be reviewed to determine whether it would affect the usefulness of the hatchery program as an Indicator Stock for the Pacific Salmon Treaty.

Alternative 4: *Release more hatchery fall Chinook Salmon smolts.*
Releasing more smolts could help increase the harvest in Salmon River. Releasing more smolts could also result in the same number of fall Chinook Salmon being caught – just more of them hatchery fish. Any increase in smolts, and resulting adults, would increase the risk to wild fish in Salmon River and violate the Salmon River Basin Fish Management Plan and the interim criteria of the Native Fish Conservation Policy.

1.16.3) Potential Reforms and Investments.

Reform/Investment 1: Build a new weir and adult collection facility that would remove more of the returning hatchery adults before they can spawn in natural areas. This would only be considered if the design was expected to provide adequate passage to all native fish in the Salmon River Basin and be efficient at attracting returning adults. A cost of approximately $5,000,000 would be a rough estimate.

SECTION 2

PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS

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

The HGMP for this program was submitted to NMFS on 4/10/2006 for ESA permit or take authorization. This is an updated version of the previously submitted HGMP.

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

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

The Oregon Coast Coho Salmon Evolutionary Significant Unit (ESU) was listed as threatened under the federal ESA on August 10, 1998 (Federal Register Notice 1998). It was subsequently de-listed in 2005 and was relisted effective May 12, 2008 (Federal Register 73FR7816, Oregon Coastal Coho ESU, February 11, 2008). This program may affect the ESA-listed Coho Salmon population in the Salmon River Basin. Coho populations that could be incidentally affected by this program are located to the north and south of Salmon River. They include the Nestucca and Devils Lake Basin populations.

Siletz Complex

The Siletz Complex consists of Coho Salmon inhabiting mid-coast streams located between Cascade Head on the north and Cape Foulweather on the south (Nickelson 2000). These include Salmon River, Devils Lake tributaries, and Siletz River. There is an estimated 170 miles of spawning habitat available to the Coho Salmon of this complex.

Coho Salmon Life History

Adult Coho Salmon migrate into fresh water in the fall to spawn. Spawning of wild Coho Salmon usually occurs from mid-November through February. Adult spawning Coho Salmon are typically 3 years old and are often accompanied by 2-year-old jacks (precocious males) from the next brood. Spawning occurs primarily in small tributaries located throughout coastal basins. The parents normally exhibit strong homing to their natal stream. The female digs a nest (redd) in the gravel and lays her eggs, which are immediately fertilized by accompanying adult males or jacks. The eggs are covered by digging and displacing gravel from the upstream edge of the nest. Each female lays about 2,500 eggs. The adults die soon after spawning. Sex ratios of spawning adults tend to average around 50:50 at most locations (Table 2-1). However, Moring and Lantz (1975) observed 77 percent males in three small Alsea River tributaries over a period of 14 years. They concluded that males tend to move around a lot and visit multiple streams. The eggs hatch in about 35 to 50 days, depending upon water temperature (warm temperature speeds hatching). The alevins remain in the gravel two or three weeks until the yolk is absorbed and emerge as fry to actively feed in the spring. Most

juvenile Coho Salmon spend one summer and one winter in fresh water. The following spring, approximately one year after emergence, they undergo physiological changes that allow them to survive in seawater. They then migrate to the ocean as silvery smolts about 10 to 12 centimeters (cm) in length.

Table 2-1. Observations of Coho Salmon Sex Ratio at Adult Traps.

Population Complex	Percent Males	Percent Females	Location	Run Years	Data Source
Nehalem	52%	48%	North Fork trap	1998-1999	Life Cycle Monitoring
Siletz	50%	50%	Mill Creek trap	1997-1999	Life Cycle Monitoring
Yaquina	51%	49%	Mill Creek trap	1997-1999	Life Cycle Monitoring
Alsea	77%	23%	Drift Creek tributaries	1959-1972	Moring & Lantz (1975)
	50%	50%	Cascade Creek trap	1997-1999	Life Cycle Monitoring
Umpqua	55%	45%	Smith River trap	1999	Life Cycle Monitoring
Coos	63%	37%	S. Coos River, Winchester Creek, and Fall Creek	1999	Oregon Plan Monitoring

The smolts undergo rapid growth in the ocean, reaching about 40 to 50 cm by fall. Little is known of the ocean migrations of Coho Salmon from Oregon coastal streams; however, based on what is known, it appears migrations are mostly limited to coastal waters. Initial ocean migration appears to be to the north of their natal stream (Fisher and Pearcy 1985; Hartt and Dell 1986). After the first summer in the ocean, a small portion of the males attain sexual maturity and return to spawn as jacks. Ocean migration patterns during the fall and winter are unknown. Those fish remaining at sea grow little during winter but feed voraciously during the next spring and summer, growing to about 60 to 80 cm in length. During this second summer in the ocean, a substantial percentage of these maturing adults are caught in ocean troll and sport fisheries, usually to the south of their natal stream (Lewis 2000). The survivors return to their home streams or neighboring streams where they spawn and die to complete the life cycle.

Habitat Use and Freshwater Distribution

Spawning and rearing of juvenile Coho Salmon generally take place in small, low-gradient (generally less than 3 percent) tributary streams, although rearing may also take place in lakes where available. Coho Salmon require clean gravel for spawning and cool water temperatures (53º to 58°F preferred, 68°F maximum) for rearing (Reiser and Bjornn 1979). Fry emerge from February to early June (Moring and Lantz 1975) and occupy backwater pools and the stream margins (Mundie 1969; Lister and Genoe 1970; Nickelson et al. 1992a). During the summer, Coho prefer pools in small streams. During winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex cover (Nickelson et al. 1992a, 1992b). Habitat complexity, primarily in the form of large and small wood is an important element of productive Coho Salmon streams (Nickelson et al. 1992b; Rodgers et al. 1993). Little is known about residence time or habitat use of

estuaries during seaward migration. It is usually assumed that Coho Salmon spend only a short time in the estuary before entering the ocean. However, recent research is finding that rearing in the upper ends of tidal reaches can be extensive.

The distribution of Coho Salmon within a basin is primarily determined by two factors: marine survival and the distribution of freshwater habitat of different levels of quality. When marine survival has been very poor as in recent years, Coho will be found in only the highest quality habitats. Coast-wide, these habitats comprise about 22 percent of the habitat (Nickelson 1998). When marine survival increases, as could occur with a changing climate regime, Coho will redistribute into freshwater habitats of lower quality. Thus, Coho Salmon population dynamics function with a classic "source-sink" relationship among stream reaches.

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

A draft on Oregon Native Fish Stock Status Report including the status of coastal Coho Salmon has been developed by the Oregon Department of Fish and Wildlife, which is now under public review. The following information of the status of Siletz Complex's Coho Salmon population was taken from Nickelson 2001, which is consistent with the Coho population status described in the draft of Oregon Native Fish Stock Status Report. The Siletz Complex consists of Coho Salmon inhabiting mid-coast streams located between Cascade Head on the north and Cape Foulweather on the south. These include Salmon River, Devils Lake tributaries, and Siletz River. There is an estimated 170 miles of spawning habitat available to the Coho Salmon of this complex. The critical population level for the Siletz Complex is 700 adult spawners. The habitat of this complex has the potential to support a viable population because high quality habitat is estimated to be present in 51 miles of stream, more than the 15-mile threshold (Nickelson 2000).

The abundance of Coho Salmon spawners of the Siletz Complex has ranged from about 400 to about 33,000 and has averaged about 7,300 since 1990 (Figure 2-1 and Table 2-2). In eight of those years, spawner abundance fell below the critical threshold of 700 fish. Recruits per wild spawner have been highly variable, with six of the last 22 broods falling to below one (Table 2-2 and Figure 2-2). However, the 1997 brood was very productive: a parent stock of about 700 producing an estimated 3,300 adults and 3,000 spawners in the 2000-2001 run.

Table 2-2. Population Parameters for the Siletz Complex Coho Salmon.

Return Year	Wild Spawners	Pre-harvest Wild Population	Recruits per Spawner
1990	247	915	
1991	415	1,153	
1992	2,397	6,478	
1993	220	367	1.48
1994	712	757	1.83
1995	419	471	0.20
1996	477	507	2.31
1997	314	345	0.48
1998	402	437	1.04
1999	1,223	1,315	2.76
2000	3,566	3,715	11.83
2001	1,820	1,896	4.72
2002	2,672	2,813	2.30
2003	8,080	8,783	2.46
2004	9,821	10,675	5.87
2005	14,646	15,256	5.71
2006	5,718	6,215	0.77
2007	2,256	2,564	0.26
2008	21,286	21,720	1.48
2009	24,823	26,691	4.67
2010	7,665	8,068	3.58
2011	36,730	39,074	1.84
2012	4,792	5,844	0.24
2013	8,825	10,262	1.34
2014	23,176	23,410	0.64
Annual mean	7,308	7,989	2.63

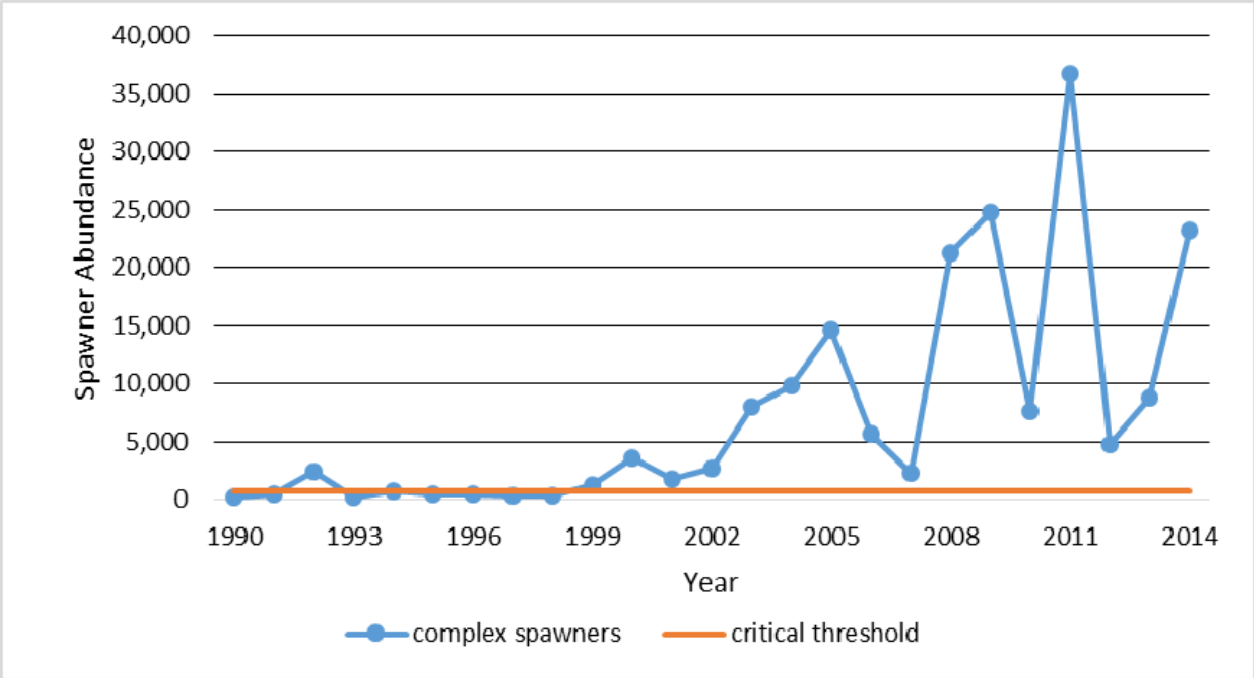

Figure 2-1. Trend in adult Coho Salmon abundance relative to the critical population level for the Siletz Complex. Error bars are 95% confidence limits.

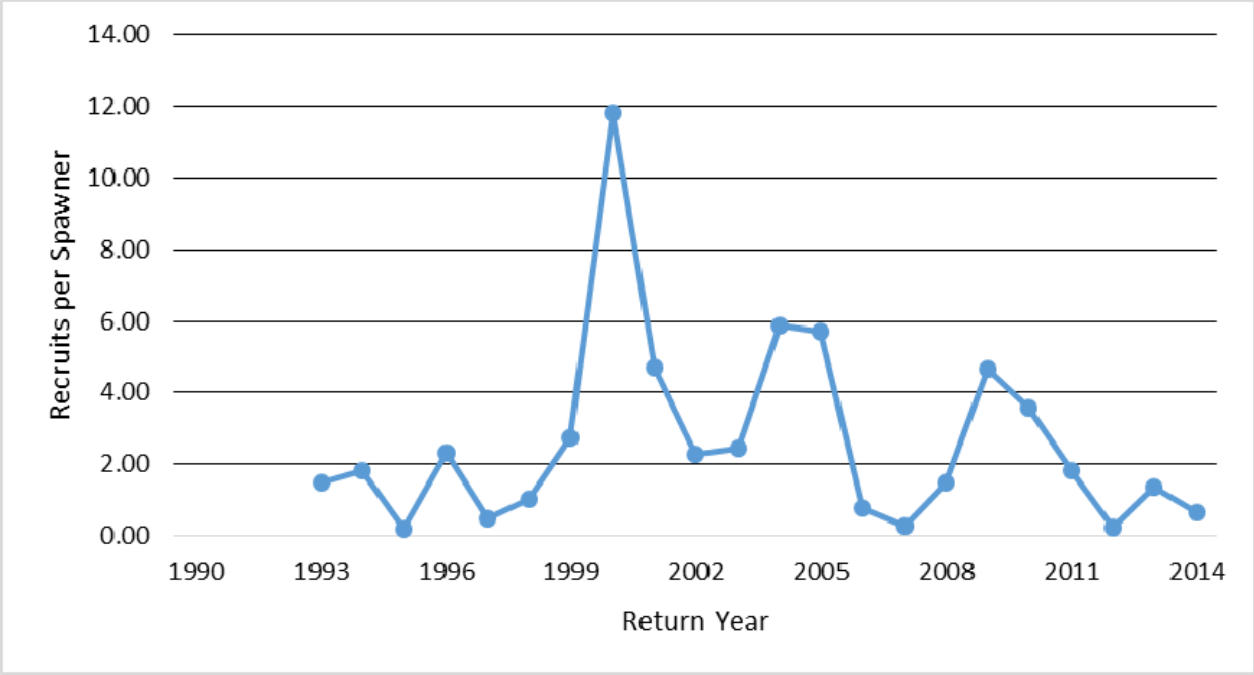

Figure 2-2. Trend in recruits per spawner for Siletz Complex wild Coho Salmon.

Hatchery fish have been very common in the spawning population since 1990, with 1,343 of 1,569 (85.6%) of scale samples collected in 1990-99 having hatchery scale patterns. The number of hatchery Coho smolts that could potentially interact with this complex in freshwater was gradually reduced from 1.5 million to zero between the 1991 and 2007 brood years.

A Life-Cycle Monitoring Site (Solazzi et al. 2000) is located at Mill Creek, a Siletz River tributary. Adult abundance in Mill Creek since 1997 has ranged from 55 to 147 (Table 2-3) and has averaged 50 percent males. Smolt production has ranged from about 4,300 to about 9,500. Estimated smolt abundance for the Siletz Complex ranged from 39,000 to over six million for the 1997-2014 broods (Table 2-4).

Table 2-3. Summary of Life-Cycle Monitoring for Mill Creek (Siletz River).

Brood Year	Estimated Egg Deposition	Smolts Produced	Returning Adults			Freshwater survival	Marine survival
			Males	Females	Total		
1994			65	48	113		
1995		8,110	30	25	55		0.7%
1996		9,547	64	83	147		1.5%
1997	95,945	8,409				8.8%	
1998	52,716	4,311				8.2%	
1999	204,416						

Table 2-4. Estimated Abundance of Juvenile Life Stages Based on spawner abundance in Siletz complex. Estimates are in Millions.

Year	Eggs	Fry	Parr	Smolts
1990	0.309	0.201	0.124	0.042
1991	0.519	0.337	0.209	0.071
1992	2.996	1.948	1.207	0.411
1993	0.275	0.179	0.111	0.038
1994	0.890	0.579	0.359	0.122
1995	0.524	0.340	0.211	0.072
1996	0.596	0.388	0.240	0.082
1997	0.393	0.255	0.158	0.054
1998	0.503	0.327	0.203	0.069
1999	1.529	0.994	0.616	0.209
2000	4.458	2.897	1.796	0.611
2001	2.275	1.479	0.917	0.312
2002	3.340	2.171	1.346	0.458
2003	10.100	6.565	4.070	1.384
2004	12.276	7.980	4.947	1.682
2005	18.308	11.900	7.378	2.508
2006	7.148	4.646	2.880	0.979
2007	2.820	1.833	1.136	0.386
2008	26.608	17.295	10.723	3.646
2009	31.029	20.169	12.505	4.252
2010	9.581	6.228	3.861	1.313
2011	45.913	29.843	18.503	6.291
2012	5.990	3.894	2.414	0.821
2013	11.031	7.170	4.446	1.512
2014	28.970	18.831	11.675	3.969

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Broodstock Collection

The ESA-listed natural Coho Salmon are likely to be incidentally captured in the trap at the Salmon River Hatchery during fall Chinook Salmon broodstock collection. The trap is operated from late September through December. Any Coho Salmon found in the trap without a finclip or a CWT will be passed above the hatchery with minimum stress. Wild Coho Salmon may be affected from delaying upstream migration and invoking stress as a result of capture, handling, and upstream release.

Smolt Releases

Hatchery fall Chinook smolts are likely to interact with wild Coho juveniles while migrating to the ocean. The location of the Salmon River Hatchery, just above tidewater, provides for brief interactions in freshwater habitat. Interactions in estuarine habitat are not completely understood and cannot be comprehensively defined at this time.

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

In the past there was a Coho Salmon hatchery program in the Salmon River and hatchery-produced Coho were not marked. The 1999 was the first year that all returning hatchery Coho Salmon were marked. Prior to 1999, it was not possible to distinguish wild adult Coho from hatchery-origin adult Coho in the hatchery trap. In 2000, 71 unmarked Coho were captured in the hatchery trap at the Salmon River and passed upstream. *Note: 1) no visual scar or scale loss has been attributed to trapping; and 2) no mortality of Coho Salmon has been observed at the trap or at the release site.*

- 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 Table 2-5 below summarizes projected capture, handling and release of wild Coho Salmon associated with fall Chinook Salmon broodstock collection at Salmon River.

- 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.

Handling and sorting of adults in the hatchery trap at the Salmon River would occur more frequently if higher than expected numbers of wild Coho Salmon were captured in the trap. Due to the relatively passive nature of the incidental take associated with broodstock collection, changes would not be made in the handling and sorting methods.

Table 2-5. Estimated Listed Salmonid Take Levels by Hatchery Activity.

Listed Species Affected:	**Coho Salmon**	**ESU/Population:**	**Oregon Coast/ Salmon Rv.**	**Activity:**	**Broodstock collection**
Location of Hatchery Activity:	**Salmon River Hatchery**	**Dates of Activity:**	**September through December**	**Hatchery Program Operator:**	**Oregon Dept. of Fish and Wildlife**

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass a)	0	0	0	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	0-500	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	0	0	0	0
Other Take (specify) h)	0	0	0	0

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.

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.

- **Salmon River Basin Fish Management Plan** - (approved by the Oregon Fish and Wildlife Commission—November 14, 1997). The basin management plan identifies the potential of a fall Chinook Salmon hatchery program.
- **Native Fish Conservation Policy** - The Oregon Fish and Wildlife Commission approved the Native Fish Conservation Policy (NFCP) in 2002. This policy relies on conservation plans being developed for each species management unit. Until a conservation plan for coastal fall Chinook is developed, management of fall Chinook in the Salmon River Basin will be directed by the Salmon River Basin Fish Management Plan or the interim criteria outlined in the NFCP, whichever is more protective of native fish.
- **Hatchery Fish Management Policy** – This policy provides guidance for the responsible use of hatchery fish. The Policy outlines the best management practices for hatchery programs. This Hatchery and Genetic Management Plan will serve as the guiding document for the Salmon River fall Chinook program under the Hatchery Fish Management Policy.
- **Coastal Multispecies Conservation and Management Plan** – (approved by the Oregon Fish and Wildlife commission – June, 2014). The plan identifies the fall Chinook Salmon program on the Salmon River.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

- **Oregon Plan for Salmon and Watersheds** (Executive Order 99-01). The Oregon Plan for Salmon and Watersheds is a prescriptive set of measures for recovering threatened and endangered salmon and steelhead, and meeting federal water quality standards established by Executive Order of the Governor. The Oregon Plan includes measures linked to the hatchery production of fall Chinook Salmon in the Salmon River Basin, including nutrient enrichment, acclimation, and other separations of hatchery and wild production, terminal fisheries that reduce harvest impacts on wild coho, and monitoring of hatchery and wild runs.
- **NPDES 300-J General Permit.** The Salmon River hatchery is operated under the NPDES general permit to maintain the environmental standards of hatchery effluents. Water quality parameters (e.g. flow, total suspended solids, settleable solids, pH, total phosphorus, ammonia nitrogen, temperature etc.) of hatchery effluents are monitored and reported to DEQ as per permit requirements.

- **Water Right Permit.** The facility is in compliance with the water right, water withdrawal, and annual reporting of water uses to Oregon Department of Water Resource.

3.3) Relationship to harvest objectives.

One of the objectives for the hatchery fall Chinook Salmon program in the Salmon River is to provide fall Chinook for the ocean and in-river fisheries. There are no numerical goals identified for the ocean fishery, but the Salmon River Basin Fish Management Plan identifies a goal for harvest in the in-river fishery of 1,000 fall Chinook Salmon. This harvest can include both hatchery and wild fall Chinook. The commercial and recreational harvest data of Salmon River fall Chinook program are present in Table 1-2. This hatchery program is also used to evaluate the exploitation rate of Oregon's north-central coast fall Chinook Salmon populations in the ocean commercial and sport fisheries. The Salmon River stock 36 fall Chinook Salmon have served as the indicator stock for this evaluation since 1986. The indicator stock project has provided data that helps to monitor the wild fall Chinook population in the Salmon River.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The current program of releasing 200,000 smolts annually (Salmon River stock 36) from the Salmon River Hatchery benefits the commercial and sport Chinook fisheries in the ocean and the in-river Chinook fishery. Estimates of harvest of adults for past brood years of this program are presented in Table 1-2.

3.4) Relationship to habitat protection and recovery strategies.

Refer to Appendix 1 for ODFW habitat protection and enhancement policies identified in the Salmon River Basin Fish Management Plan (adopted November 14, 1997). Generally, habitat protection and recovery strategies are prioritized in areas with (potential) good to high quality habitat for Coho Salmon. Hatchery releases from this program are localized away from these areas to minimize potential adverse impacts on wild fish populations.

Habitat protection and recovery strategies for Coho Salmon in the Salmon River Basin focus on riparian areas, and winter and summer rearing habitat. Progress has been made to improve fish passage at road crossings. Most fish passage barriers blocking significant habitat reaches have been remedied.

ODFW personnel work with both private and public landowners in the Salmon River Basin to protect and restore riparian areas suitable for listed natural Coho Salmon. Numerous projects using large wood have been implemented to enhance natural processes in streams, and create summer and winter rearing habitats for Coho Salmon fry and juveniles.

3.5) Ecological interactions.

Ecological interactions caused by the introduction of hatchery fall Chinook Salmon into the natural environment are likely to occur throughout the time period that hatchery fish are present. These interactions are likely to impact wild Coho Salmon and other fish species in freshwater, estuarine, and ocean environments for food, space, and predation.

Juvenile Interactions

Hatchery fall Chinook smolts are released in the fall at the same time that wild Chinook smolts are migrating to the ocean. Hatchery smolts are released at a larger size than the wild smolts. This action will expedite their out-migration to the ocean and minimize the interaction period with naturally-produced fish. Most of the potential interactions (competition, disease amplification, and predator attraction) are likely to have negative impacts on native fishes, including wild Coho.

Hatchery releases at the Salmon River are made in the evening during a high tide to help speed the emigration of the smolts.

Adult Interactions

Hatchery fall Chinook adults have comprised an average of 60 percent of the fish on the natural spawning grounds in the Salmon River in the recent past. Efforts are underway to develop a plan to modify the hatchery weir to direct more hatchery fish into the hatchery, and to develop other management approaches to reduce the number of hatchery Chinook spawning in natural production areas.

In general:

(1) Species that could negatively impact program:

Competition for food between hatchery fall Chinook Salmon smolts and other hatchery and naturally produced salmon smolts in the Salmon River and near shore ocean environment may negatively impact this program. Avian and marine mammal predation may also negatively impact this program.

(2) Species that could be negatively impacted by program:

The competitive interactions with hatchery fall Chinook Salmon smolts may negatively impact the listed natural Coho Salmon and other natural salmonid juveniles in the Salmon River and near shore ocean environment. Straying of hatchery fall Chinook adults to natural spawning habitats may have adverse ecological impacts to listed Coho Salmon. Increased angling pressure on adult hatchery fall Chinook may increase incidental mortality on naturally produced Coho, Salmon in the Salmon River basin.

(3) Species that could be positively impact program:

Any hatchery or wild fish (Coho, Chinook, steelhead) that dies naturally or is spawned and recycled for nutrient enrichment in the basin may positively impact the program.

(4) Species that could be positively impacted by program:

Spawned carcasses of fall Chinook are placed throughout the Salmon River

watershed for nutrient enrichment. The freshwater and marine species that depend directly or indirectly on salmonids for their food and nutrient supply could be positively impacted by the program. These include larger salmonids, other fish species, aquatic mammals, birds, etc. Thus, the hatchery production has the potential for playing a significant role in the predator-prey relationships and community ecology during periods of low natural productivity.

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.

- All water used for fish culture purposes is pumped directly from the Salmon River.
- ODFW has the right under Permit 45000 to not more than 16.5 cubic feet per second or its equivalent in case of rotation, measured at the point of diversion from the source for the purposes of fish rearing.
- Inflow and effluent water is tested under normal and cleaning operations for flow, settleable solids, total suspended solids, temperature, pH, total phosphorus and ammonia nitrogen according to the NPDES 0300-J General Permit.
- Reuse water—from the production pond outflow—is supplied underground from a 25 horsepower (HP) vertical turbine pump at 2,058 gallons per minute (gpm), which in turn flows down the fish ladder.
- Water flows are measured with a Francis formula method.
- Water temperatures are recorded by a thermograph.
- There are no known natural limitations to fall Chinook production at the Salmon River Hatchery attributable to the water source.

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

- Intake fish screens have been upgraded to the NOAA fish screening criteria to minimize impacts to resident Coho Salmon.
- The Salmon River Hatchery is managed and operated to comply with water quality criteria and monitoring protocols defined in the state's NPDES 0300-J General Permit. Water quality data is collected, analyzed, and reported quarterly on discharge monitoring reports; data and information is submitted to local DEQ officials at the end of each quarter, to maintain effluent water quality standards prescribed in the NPDES permit.

SECTION 5

FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock for Salmon River fall Chinook program are collected at the Salmon River Hatchery. Adults are collected after they ascend a fish ladder and jump over a finger weir. After collection, adults are crowded into a sorting area. Adults are either passed upstream or held for broodstock.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Adult fall Chinook Salmon are not transported by mechanized equipment. In order to transfer fall Chinook upriver of the hatchery, adults are placed into a 12-inch diameter, 300-foot long PVC pipeline. Water is supplied to the gently sloped pipeline at 100 gpm, to help fish move through the pipe.

5.3) Broodstock holding and spawning facilities.

- Fall Chinook Salmon are sorted and held in 10-foot by 25-foot barred pens within a 177-foot by 30-foot holding pond.
- Under normal operation, the holding pond is operated at a 2.5-foot depth.
- The covered spawning deck is located along side of the adult holding pond.

5.4) Incubation facilities.

The egg incubation room is adjacent to the spawning deck. Salmon River supplies water to the headbox and vertical stack incubators via a 5-HP vertical turbine pump. There are presently 40 stacks of incubators with 8 trays per stack. Emergency back-up water pumps are stored in this room during incubation. Discharge water is routed to Salmon River.

5.5) Rearing facilities.

At the hatchery, fFall Chinook Salmon are reared in two 21-foot by 2-foot Canadian troughs, two 80-foot by 10-foot raceways, two 80-foot by 20-foot modified Burrows raceways, and four 80-foot by 20-foot raceways. In addition, three 200-foot by 50-foot asphalt ponds are used for pre-smolt and long-term rearing. Pond depths are adjusted with dam boards and flush gates. Water is supplied underground from the Salmon River through 40 HP and 25 HP vertical turbine pumps. Water flows are measured using the Francis formula and method. Average flows through the rearing units are as follows:

Canadian trough =	15 gpm
Raceway (80 feet by 10 feet) =	250 gpm
Raceway (80 feet by 20 feet) =	500 gpm
Asphalt pond (200 feet by 50 feet) =	2,000 gpm

5.6) Acclimation/release facilities.

- Approximately 200,000 smolts are volitionally released for a two-day period, when 90% of the fish out-migrate. The remaining fish are then forced out into the Salmon River. No additional acclimation facility is used in Salmon River.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Salmon River Hatchery has not had operational difficulties that led to significant mortalities of fall Chinook Salmon.

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.

- The fish facility is staffed full-time, 24 hours a day, 7 days a week, 365 days a year.
- Alarm systems allow instantaneous notice of water pump failure.
- Pond water depth alarms have recently been installed. The intake head difference alarm is near completion.
- Two backup emergency generators are onsite in case of electrical failure.
- Fish loss (escapement to the river) resulting from flooding is partially controlled with screens and seines.
- Disease transmission is kept in check through stringent disinfection protocols and monitored pond loading densities.
- Mortality pickers and screen brushes are kept separated between species and ponds.
- Portable pumps and hoses are available to restore water to incubation and early rearing troughs.

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.

The current fall Chinook Salmon broodstock originated from wild fall Chinook captured in the Salmon River. The broodstock was created in 1976 with smolt releases in 1977.

6.2) Supporting information.

6.2.1) History.

The fall Chinook Salmon broodstock (stock-36) at Salmon River Hatchery originated from the wild fall Chinook captured in Salmon River. The first year fall Chinook eggs were taken was 1976. Since at least the mid-1980s, the goal has been to utilize wild fall Chinook for 50% of the adults needed for broodstock. Records to verify the percentages of wild fish used in the broodstock are only available from 1997 to the present. The 50% goal was achieved in two of the five years of available data. Since 1986, all hatchery fall Chinook Salmon adults returning to Salmon River have been adipose finclipped and can be distinguished from wild fish.

6.2.2) Annual size.

A total of 75 pairs of fall Chinook Salmon are needed for broodstock each year. The production goal for the Salmon River hatchery fall Chinook Salmon program is to utilize wild fall Chinook adults for 50% of the broodstock along with returning hatchery adults.

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

Salmon River wild fall Chinook were originally used to develop this broodstock in 1976. The goal for the hatchery program is to use 50% wild fall Chinook from Salmon River in the broodstock each year. The future goal of this program is to continue using wild fall Chinook for 50% of the broodstock as long as the number used does not represent more than 20% of the wild population. This goal may be changed if new information suggests that changes to the broodstock goal would reduce risks to wild fall Chinook Salmon.

6.2.4) Genetic or ecological differences.

Adult spawn timing

The Salmon River hatchery-origin fall Chinook do not appear to have significantly different spawn timing than the wild fall Chinook in the Salmon River. There does not appear to have been a change in the wild fall Chinook spawn timing since the hatchery has been in place.

Age class representation
The Salmon River hatchery fall Chinook Salmon program produces a higher percentage of two-year old jack salmon than occurs with the wild population. From 1992 through 1999, jacks averaged 10.1% of the total hatchery adults returning to Salmon River compared to 4.4% of the total of wild fall Chinook. The age structure difference could result from genetic differences or the effects of rearing Chinook Salmon in the hatchery environment.

Size of smolts
The size of fall Chinook Salmon smolts released at the Salmon River Hatchery is much larger than naturally-produced smolts. The hatchery has been releasing smolts at 13 to 14 fish per pound.

6.2.5) Reasons for choosing.

Salmon River stock-36 fall Chinook were chosen because these fish were native to the basin and were well adapted to the habitat in Salmon River.

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

The only broodstock selection practice that may have an adverse ecological effect on wild Coho Salmon is the actual collection of broodstock. This practice and measures to minimize impacts to wild Coho Salmon are described in Section 7.

All broodstock selection practices followed for the Salmon River hatchery fall Chinook program were chosen to minimize the likelihood for adverse genetic and ecological affects to wild fall Chinook while maintaining a healthy hatchery stock. The number and timing of wild and hatchery broodstock collected and spawned is intended to maintain the genetic diversity of the hatchery stock. Efforts will be made to develop an improved weir at the hatchery to better remove returning hatchery fish, and reduce the numbers of hatchery fall Chinook Salmon spawning in natural areas.

SECTION 7

BROODSTOCK COLLECTION

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

The Salmon River Hatchery production plan includes the provision for collecting broodstock for the hatchery production from fish processed through the hatchery. Approximately 75 brood pair of fall Chinook Salmon are needed to meet the production goal of 200,000 smolts annually.

7.2) Collection or sampling design.

Fall Chinook Salmon are processed at the Salmon River Hatchery facility from mid-September through December. The Salmon River Hatchery facility includes an electrical weir that has not been activated for a number of years due to its impact on the adults and public opposition to its use. The wooden weir portion of the structure still directs fish into the hatchery at lower flows, but not as effectively as it was originally designed to do. Broodstock are collected throughout the run as they swim in.

7.3) Identity.

- Two populations of fall Chinook return to the Salmon River. The natural component of the adult run is unmarked and untagged.
- Hatchery origin adults are 100% adipose finclipped/coded-wire tagged (ADCWT).

7.4) Proposed number to be collected:

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

A total of 75 adult pair of fall Chinook brood must be collected to achieve the current production goal of 200,000 smolts. Half of the broodstock will be wild fall Chinook that enter the hatchery.

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

See table 7-1 below.

Table 7-1. Salmon River Fall Chinook Salmon Broodstock Collection Levels.

Brood Year	Adults			Total Eggs
	Females	Males	Jacks	
1990	58	93		287,328
1991	79	104		311,918
1992	80	81		317,372
1993	81	96		287,260
1994	101	108		334,403
1995	70	90		281,123
1996	89	103		296,343
1997	52	58		267,437
1998	77	80		307,968
1999	82	75		287,864
2000	95	76		299,932
2001	93	98		313,055
2002	79	88		315,418
2003	64	63		321,204
2004	54	58		229,182
Data source: ODFW HMS database.				

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Natural- and hatchery-origin fall Chinook Salmon adults surplus of broodstock needs are released above the hatchery weir. Some hatchery origin fish are provided to local food share programs or removed from the system. Fish passed above the weir are tagged when released and then recovered on the spawning grounds to help estimate the spawning population in Salmon River for the Pacific Salmon Commission exploitation rate monitoring program.

7.6) Fish transportation and holding methods.

Adults are not mechanically transported into the hatchery. Ripe and unripe hatchery brood are sorted into holding pens as they swim in. Anesthetics and antibiotics are not used on fish held for brood at the Salmon River Hatchery.

7.7) Describe fish health maintenance and sanitation procedures applied.

The spawning area and equipment are routinely disinfected with an iodine solution to prevent disease outbreaks and transmission of diseases. Green eggs are water-hardened in an iodine solution to prevent disease or viral contamination. Ovarian fluid and sperm samples are collected and cultured for bacterial kidney disease or viruses. Refer to Appendix 2 regarding state approved fish health protocols.

7.8) Disposition of carcasses.

Spawned carcasses are used for stream enrichment throughout the Salmon River watershed. The timing of the carcass placement is designed to provide maximum potential benefit to the ecosystem. Placement occurs throughout the fall and early winter.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- Fish health inspections and sanitation procedures will be followed as described under ODFW's Fish Health Management Policy and IHOT guidelines to minimize disease risks resulting from collection and holding of adult fall Chinook Salmon.
- The ESA-listed adult Coho Salmon of natural origin that are found in the trap at time of sorting are immediately removed from the holding area and released upstream with minimum stress.
- No genetic risks to listed Coho Salmon is anticipated from the collection of fall Chinook Salmon broodstock.

SECTION 8

MATING

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

8.1) Selection method.

Ripe females are randomly selected for spawning. Currently, to achieve production goals, eggs are taken from adults that are selected for broodstock weekly, as they ripen. Eggs are randomly culled if an excess occurs.

8.2) Males.

Ripe males are randomly selected from broodstock collected during the entire run period. Backup male broodstock is not needed. Jacks are generally not incorporated into the broodstock because Salmon River Hatchery is not able to retain the smaller fish in their holding ponds.

8.3) Fertilization.

Broodstock is selected based on available ripe fish. Matings and spawning are done on a 1:1 sex ratio. Eggs are soaked in 1:200 pvp iodine for one half hour prior to closing incubation trays. Formalin treatments are given three times per week for sanitation purposes.

8.4) Cryopreserved gametes.

Cryopreserved sperms or gametes are not used in the Salmon River fall Chinook Salmon program.

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

The ESA listed Coho Salmon are not affected by the mating practices used in the Salmon River fall Chinook Salmon hatchery program.

SECTION 9

INCUBATION AND REARING

9.1) Incubation.

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

Goals for this program are an egg take of 300,000 and egg to smolt survival of 77 percent. Data for the most recent 12 years of eggs taken and survival rates to ponding are as shown in Table 9-1.

Table 9-1. Eggs Taken in the past and Survival Rates (egg to smolts) of Salmon River fall Chinook Salmon.

Return Year	Eggs Taken	Percent Survival
1988-89	342,619	90.7
1989-90	337,651	89.4
1990-91	287,328	92.9
1991-92	311,918	88.4
1992-93	317,372	88.3
1993-94	287,260	84.2
1994-95	334,403	85.2
1995-96	281,123	85.3
1996-97	296,343	89.7
1997-98	267,437	91.9
1998-99	307,968	69.4
1999-00	287,864	80.2
2000-01	299,932	93.1
2001-02	313,055	90.5
2002-03	315,418	91.4
2003-04	321,204	91.0
2004-05	229,182	91.1

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

Extra eggs are typically collected (40 percent or less above production cap) to compensate for egg to smolt mortality resulting from poor egg quality, silt loading, and soft-shell. Surplus eggs and fish are buried.

9.1.3) Loading densities applied during incubation.

- Average egg mass (measured as eggs per ounce) is approximately 50 to 55 eggs per ounce.
- Eggs are typically loaded at 6,000 eggs per tray.
- Typical water flow through the incubator trays is 4 to 5 gallons per minute.

9.1.4) Incubation conditions.

- Temperature and flow are monitored in the incubator water supply. Typical temperature ranges are from 40° to 50°F.
- When possible, silt is flushed from the incubator trays.

9.1.5) Ponding.

Fry are physically relocated from the incubator trays to the starting ponds in February and March, when fry are 100 percent buttoned-up (approximately 800 to 850 fish per pound). This generally occurs at 1,650 to 1,750 temperature units.

9.1.6) Fish health maintenance and monitoring.

Eggs are treated with a formalin drip at 1:600 for 15 minutes to control fungus, starting 2 days after an egg take. Treatment occurs every other day and is stopped at eyed inventory. Refer to Appendix 2 regarding state approved fish health protocols.

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

We anticipate no genetic or ecological risks to wild Coho from the incubation techniques used for this fall Chinook program.

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.

Number of fry ponded and fry to smolt survival (percent) since the 1988-89 run years is provided in Table 9-2.

Table 9-2. Fry to Smolt Survival Rate of Salmon River fall Chinook (1988-2004).

Run Year	Fry Ponded	Percent Survival (Fry to Smolt)
1988-89	218,785	91.6
1989-90	218,130	95.2
1990-91	216,496	88.8
1991-92	215,880	87.8
1992-93	214,843	95.6
1993-94	212,216	97.3
1994-95	215,868	96.0
1995-96	214,633	87.0
1996-97	222,099	91.8
1997-98	215,654	95.3
1998-99	216,245	92.0
1999-00	232,090	85.8
2000-01	272,539	84.9
2001-2002	280,404	98.9
2002-2003	265,291	98.2
2003-2004	265,322	99.0

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

Fingerling and smolt loading and rearing density goals are shown below in Table 9-3.

Table 9-3. Fingerling and Smolt Loading and Rearing Density Goals.

Fiah	Loading Goal	Rearing Density Goal
Fingerling	5 lbs fish/gal/min	1 lb/ft^3 water
Smolt	8 lbs fish/gal/min	2 lbs./ft^3 water

9.2.3) Fish rearing conditions.

Rearing water temperatures average 43º to 60º F, and range from 32º to 70º F. Other water quality indicators such as dissolved oxygen, carbon dioxide, and atmospheric pressure have not been reliably measured; therefore, no reliable historical data exists on this information.

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.

- Data on fish weight are collected and routinely reported in ODFW Hatchery Management Information System - Monthly Ponded Reports.
- Forklength (mm) and smolt condition factor measurements are collected shortly before liberation.

Table 9-4. Monthly weight of Salmon River fall Chinook Salmon stock-36. Weights are expressed in number of fish per pound.

Month	Fish/pound
Ponded size	850.33
March	506.06
April	184.80
May	111.79
June	42.32
July	19.24
August	13.62

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

The Salmon River fall Chinook Salmon are fed for maximum growth to match the target release size of 14 fish/lb. The target size is reached between mid August to mid September. Table 9-4 shows the monthly growth rate of Salmon River fall Chinook Salmon stock-36.

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

Wet and dry diets are used to grow Salmon River fall Chinook Salmon juveniles. The fall Chinook are fed for maximum growth. Feeding rates and frequencies vary with fish size and age. Feed application in terms of percent body weight (BW) per day starts at around 3.5 percent per day and drops to 2.5 percent per day by the end of the rearing period. Food conversions are generally at the food manufacturer's efficiency projections. Depending on the food brand, early food conversions average approximately 0.7, 0.9 midway, and reaches 1.1 at the end.

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

Fish health is monitored by Agency (ODFW) pathologists (See Appendix 2). ODFW fish pathologists monitor juvenile fish health, on average, once per month. Through fish health monitoring, a detailed history of pathogen occurrence has been documented at the Salmon River Hatchery. Procedurally, the ODFW pathologists and hatchery managers control pathogen outbreaks through refined fish culture techniques and methods, such as seasonal pond flushing, medicated feeds, and disease treatments with drugs and chemicals. In addition, during times of high pathogen susceptibility, an ODFW pathologist may monitor fish health bi-monthly. Likewise, hatchery staff watch for disease outbreak indicators and communicate regularly with pathologists. These procedures help minimize disease outbreaks and their effects on the hatchery fall Chinook Salmon broodstock.

Sanitation procedures are stringent. All nets, tools, and containers are disinfected between each use and between fish groups. Individual pond tools are on hand for each species and pond. Footbaths are used when necessary, and sanitizing agents such as iodine and bleach are regularly used to help minimize disease transfer. Considering solar ultraviolet light has a disinfecting quality, it is capitalized upon whenever possible.

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

Smoltification stage is determined by indices like condition factor, fork length, physical appearance, and behavior of smolts. No ATPase studies are conducted.

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

The following hatchery conditions may lend to a more “naturalized” hatchery rearing experience.

- Raceways and asphalt ponds are flushed on a regular basis to represent changing water, light, and flow conditions.
- Predators such as fish-eating birds prey on the fish throughout all phases of their juvenile rearing, adding to their instinct of predator wariness. Fall Chinook rearing densities in the asphalt ponds are low.
- The deep, dark, and long asphalt ponds collect much more natural silt, mud, and food than a traditional raceway.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

We anticipate no genetic risks to wild Coho Salmon from the in-hatchery rearing techniques used in this fall Chinook program. To minimize adverse ecological impacts, rearing ponds are cleaned each week or as necessary. Dead eggs or fry are picked up and not allowed to enter the water of the states. Hatchery effluent quality is monitored and data are reported to DEQ, to comply with the water quality standards for hatchery effluents per NPDES permit requirements. Fish health status is inspected each month and fish are treated as necessary.

SECTION 10

RELEASE

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

10.1) Proposed fish levels.

Table 10-1. Proposed Fish Release Levels of Salmon River fall Chinook Salmon (stock-36).

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Smolt	200,000	14.0	Mid-August to mid-September	Salmon River

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

Smolt Releases:
Stream, river, or watercourse: Salmon River
Release point: Outflow of the Salmon River Hatchery at RM 5.1
Major watershed: Salmon River
Basin or Region: Salmon

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

See Table 10-2 below.

Table 10-2. Numbers and Sizes of Salmon River fall Chinook Salmon Released by Age Class (1988-2015).

Release Year	Eggs/ Unfed Fry	Avg Size	Fry	Avg Size	Fingerling	Avg Size	Yearling	Avg Size	Release Date
1988							200,781	14.0	
1989	56,000	800					202,126	13.4	
1990	84,215	800					211,483	15.8	
1991	51,131	800					195,786	14.6	
1992	33,800	800					193,186	14.0	
1993	65,990	800					205,179	15.1	
1994							206,574	13.0	
1995							205,215	15.0	
1996							186,780	13.9	
1997							203,986	14.4	
1998							205,489	13.0	
1999							198,979	13.4	
2000							119,089	11.3	
2001							207,468	14.0	
2002							208,878	13.7	
2003							196,335	14.0	
2004							207,461	13.25	
2005							157,738	13.97	
2006							211,306	13.94	8/20
2007							209,586	13.69	9/3
2008							210,237	13.93	9/4
2009							158,978	12.40	8/29
2010							180,112	14.30	9/6
2011							191,336	13.50	8/31
2012							206,602	12.60	9/7
2013							230,777	13.60	8/26
2014							214,694	13.70	8/31
2015							156,150	13.60	
Average	**58,227**	**800**					**195,797**	**13.75**	
Data source: ODFW Hatchery Management System Database.									

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

See Table 10.-2 above for actual smolts release dates (2006-2015). Releases of fall Chinook Salmon smolts from the Salmon River Hatchery are based on the following criteria:

- Scheduled release times coincide with yearly production schedule from mid-August to mid-September.
- Smolt readiness in terms of appearance, crowding outlets, etc.
- Release times coincide with natural smolt out-migrants.
- Fall Chinook Salmon at the Salmon River Hatchery are released volitionally for a two day period when ~90% of the fish out-migrate. The remaining fish are then forced out into Salmon River.
- Assuming predation will be lessened, smolts are released during large tides and dark moon phases.

10.5) Fish transportation procedures, if applicable.

Salmon River hatchery fall Chinook Salmon smolts are not transported for release or transfer.

10.6) Acclimation procedures.

Salmon River hatchery fall Chinook smolts are not acclimated at any other release location.

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

All hatchery fall Chinook Salmon smolts released from Salmon River Hatchery are 100 percent AD fin-clipped and CWT.

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

Fish are inventoried at the time of marking. Any fish in excess of the amount needed for release are destroyed at that time.

10.9) Fish health certification procedures applied pre-release.

Per ODFW Fish Health Management Policy, fish health status is examined prior to any transfer or release, and only certified fish are released. The policy dictates that all fish must pass a pre-liberation certification by an ODFW pathologist prior to release. (Refer to Appendix 2.)

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

Backup systems are in place at the Salmon River Hatchery to minimize the chances of emergency releases. In the event of circumstances that cause the water supply to be lost to the hatchery rearing ponds, any fish stocks that are normally released in the Salmon River can be prematurely released. Those stocks that are not normally released in the Salmon River will be kept in their ponds.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Hatchery fall Chinook Salmon smolts released into the Salmon River are released at the hatchery site (RM 5.1). The hatchery smolts have access to a very limited amount of freshwater habitat, which limits the ecological effects they can have on listed natural Coho Salmon in freshwater. There are likely to be interactions between hatchery fall Chinook and juvenile Coho in the Salmon River estuary. These interactions are not completely understood and their impact is unknown at this time. However, program fish

are released at full-term smolt stage which out-migrate to the ocean quickly and minimize interaction with wild fish in the freshwater environment.

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.

Sections 1.9 and 1.10 define the plans for monitoring the performance of this program. The indicators listed identify methods to be used to monitor 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.

The majority of measures identified in Section 1.9 and 1.10 are being performed with existing staff and facilities. Funding could be sought to modify the hatchery weir and fish ladder at the Salmon River Hatchery.

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

Spawning ground surveys and operation of hatchery trap are the only monitoring and evaluation activities that may impact listed natural Coho Salmon. The impacts of spawning surveys are likely to be inconsequential. If evidence suggests spawning surveys are having adverse effects to natural Coho Salmon, survey techniques will be reviewed and modifications made to lessen the effects.

Measures to minimize effects of operating the hatchery trap are identified in Section 2.2.3.

SECTION 12

RESEARCH

No true research is being conducted at the Salmon River Hatchery.

SECTION 13

ATTACHMENTS AND CITATIONS

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SECTION 14

CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

I hereby certify that the foregoing information 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 and Title of Applicant: Chris Knutsen, North Coast Watershed District Manager, ODFW

Signature: _____ Date: _____

Certified by: Scott Patterson, Fish Propagation Program Manager, ODFW

Signature: _____ Date:_____

Appendix 1

Salmon River Basin Fish Management Operating Policies and Objectives

635-500-4330

Habitat Management - Policies and objectives for habitat management in the Salmon River Basin.

(1) Policies:

a. The Department shall actively pursue and promote habitat protection and improvement necessary to achieve the objectives for management of the basin's aquatic resources;
b. The Department shall coordinate with and advise landowners and management agencies of the Salmon River Basin;
c. Habitat protection shall be emphasized over habitat restoration and enhancement;
d. Potential losses of fish production from habitat alteration shall be prevented or reduced to the extent possible.

(2) Objectives:

a. Maintain or increase in-stream flows during summer low flow periods in the Salmon River Basin;
b. Reduce summer water temperatures where artificial warming occurs that is detrimental to fish;
c. Increase in-stream channel complexity in the Salmon River Basin;
d. Reduce artificially accelerated erosion rates and inputs of sediments into waterways in the Salmon River Basin;
e. Prevent chemical contaminants from degrading fish habitat in the Salmon River Basin;
f. Restore natural fish passage conditions in the Salmon River Basin;
g. Increase habitat area available to fish in the Salmon River Basin;
h. Coordinate with other agencies and landowners to implement habitat protection and restoration activities.

Stat. Auth.: ORS 496.138, ORS 496.146 & ORS 506.119

Stats. Implemented: ORS 506.109 & ORS 506.129

Hist.: DFW 5-1998, f. & cert. ef. 1-12-98

Appendix 2

Table A2.1 Five year disease history[a] (1997 to present) by fish stock at Salmon River Hatchery. ChF= Fall Chinook Salmon, STS=Summer Steelhead, Co= Coho Salmon Stock codes are 36 =Salmon River, 33= Siletz River, 146=Yaquina River.

Hatchery Programs (stock code and species)

Disease or Organism	33 Co	36 ChF	146 ChF	33 STS
IHN Virus	No	No	No	No
EIBS Virus	Yes	Yes	No	No
Coho Anemia Disease	Yes	No	No	No
Aeromonas salmonicida	Yes	Yes	Yes	Yes
Aeromonas/Pseudomonas	Yes	Yes	Yes	Yes
Flavobacterium psychrophilum	Yes	Yes	Yes	Yes
Fl. columnare	No	Yes	No	No
Fl. branchiophilum	No	Yes	Yes	Yes
Renibacterium salmoninarum	Yes	Yes	Yes	No
Yersinia ruckeri	No	Yes	No	No
Ichthyobodo	Yes	Yes	Yes	Yes
Gyrodactylus	No	No	No	Yes
Ichthyophthirius multifilis	Yes	Yes	Yes	Yes
Gill Ameba	Yes	Yes	Yes	Yes
Trichodinids	Yes	No	No	Yes
Loma sp.	Yes	No	No	No
Nanophyetus salmincola	Yes	Yes	Yes	Yes
Blood Flukes	No	No	No	Yes
Coagulated Yolk Disease	Yes	Yes	Yes	Yes
External Fungi.	Yes	Yes	Yes	Yes
Internal Fungi	No	No	No	Yes

[a] Yes indicates detection of the pathogen but in many cases no disease or fish loss was associated with presence of the pathogen. No indicates the pathogen has not been detected in that stock.

Table A2.2. The fish health monitoring plan is identical to that developed by 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).

- All fish health monitoring will be conducted by a qualified fish health specialist.
- Annually examine brood stock for the presence of viral reportable pathogens. Number of individuals examined, usually 60 fish, will be great enough to assure a 95% chance of detection of a pathogen present in the population at the 5% level. American Fisheries Society "Fish Health Blue Book" procedures will be followed. With wild adult steelhead stocks generally all fish are sampled for viruses at spawning.
- Annually screen each salmon brood stock for the presence of *R. salmoninarum* (R.s). Methodology and effort will be at the discretion of the fish health specialist.
- Conduct examinations of juvenile fish at least monthly and more often as necessary. A representative sample of healthy and moribund fish from each lot of fish will be examined. The number of fish examined will be at the discretion of the fish health specialist.
- Investigate abnormal levels of fish loss when they occur.
- Determine fish health status prior to release or transfer to another facility. The exam may occur during the regular monthly monitoring visit, i.e. within 1 month of release.
- Appropriate actions including drug or chemical treatments will be recommended as necessary. If a bacterial pathogen requires treatment with antibiotics a drug sensitivity profile will be generated when possible.
- Findings and results of fish health monitoring will be recorded on a standard fish health reporting form and maintained in a fish health database.
- Fish culture practices will be reviewed as necessary with facility personnel. Where and when pertinent, nutrition, water flow and chemistry, loading and density indices, handling, disinfecting procedures, and treatments will be discussed.

Disease Treatment

Treatments for disease at Salmon River Hatchery include: green eggs are routinely water hardened in diluted buffered iodophor; flush treatments of 1:600 formalin for 15 minutes given three to five times per week for fungi prevention on eggs and juvenile fish are treated with formalin. Juvenile fish may also receive hydrogen peroxide treatments at 100 ppm for one hour for gill ameba. Depending on species of fish, parasite treating and water temperature, formalin is used at 1:15,000 to 1:6,000 for one hour for three to five consecutive days. Juvenile fish are treated for bacterial infections with oxytetracycline or Romet medicated feed according to label or under an Investigational New Animal Drug Permit (INAD). Each spring it is necessary to

treat juvenile steelhead and Coho with oxytetracycline medicated food or veterinarian prescribed fish pills containing antibiotic for cold-water disease and opportunistic aeromonad/pseudomonad bacteria. During the summer, steelhead and fall Chinook juveniles may require an oxytetracycline or Romet medicated food treatment for furunculosis. Aquamycin (erythromycin) is administered in feed for one scheduled treatment of 28 days to control bacterial kidney disease in the coho salmon stock. If bacterial gill disease occurs potassium permanganate is used at 1.0 and 1.25 ppm for 1 hour as a bath on two to three consecutive days. The adult Coho broodstock held prior to spawning in some years may require injections of oxytetracycline for furunculosis.