HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Coos River Winter Steelhead Program**
Species or Hatchery Stock:	**Winter Steelhead (Stock 37)**
Agency/Operator:	**Oregon Department of Fish & Wildlife**
Watershed and Region:	**Coos River Watershed-West Region**
Date Submitted: **First Update Submitted:** **Second Update Submitted:**	**October 19, 2005** **June 6, 2016** **October 5, 2017**
Date Last Updated:	**October 4, 2017**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Coos River Winter Steelhead Program

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

Coos River (stock 37) winter steelhead are propagated under this program. The broodstock includes Oregon Coast Steelhead ESU *Oncorhynchus mykiss*, which are not ESA-listed population although registered by the NMFS as Candidate species (Federal Register Notice March 1998). These fish are also a sensitive species under Oregon's Sensitive Species Rule (OAR 635-100-0040).

1.3) Responsible organization and individuals.

Lead Contact:	Scott Patterson, Fish Propagation Program Manager
Agency:	Oregon Department of Fish and Wildlife
Address:	4034 Fairview Industrial Drive, Salem, OR 97302
Telephone:	(503) 947-6218
Fax:	(503) 947-6202
Email:	Scott.d.patterson@state.or.us

On-site Lead Contact:

Lead Contact	Mike Gray, District Fish Biologist
Agency or Tribe:	Oregon Dept Fish & Wildlife
Address:	63538 Boat Basin Drive, Charleston, OR 97420
Telephone:	(541) 888-5515
Fax:	(541) 888-6860
Email:	michael.e.gray@state.or.us

Hatchery Contact:	David Welch, Bandon Hatchery Manager
Agency or Tribe:	Oregon Dept Fish & Wildlife
Address:	Rt. 2 Box 418, Bandon, OR 97411
Telephone:	(541) 347-4278
Fax:	(541) 347-3079
Email:	david.e.welch@state.or.us

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

The South Coast Anglers STEP Association volunteers, as well as numerous unassociated students, anglers, and volunteers, assist with broodstock collection, rearing, and spawning. Volunteers also assist in other aspects of the operation of the STEP facilities. Volunteer efforts are under the supervision of an ODFW STEP biologist or other ODFW fish district and hatchery personnel.

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

Funding source-State dollars from the sale of fishing licenses and tags, and 50% from state general fund (tax dollars).

Bandon Hatchery Staffing level:
One hatchery manager-2, one hatchery technician-, and one hatchery technician-1.
Bandon Hatchery operating costs: $387,352 per biennium. Total facility annual operating costs for four years included in a hatchery audit are: 1996-$162,725; 1997-$177,120; 1998-$178,860; 1999-$193,674

Cole Rivers Hatchery Staffing level:
One hatchery manager, nine Tech-1, one Tech-2, one Tech-3, two Trades Maintenance, and one Office Coordinator.

Coos Steelhead Program operational costs:

- Bandon Hatchery: 1996-$814; 1997-$886; 1998-$894
- Alsea Hatchery: 1996-$37,771; 1997-$47,638; 1998-$39,045 (Note: rearing moved from Alsea H. to Cole Rivers Hatchery in 2000. Figures for operational costs at Cole Rivers H. are not yet available.)

In addition to these ODFW facility costs, there has been a substantial value to the volunteer labor, materials, and other aspects of the operation of Millicoma Interpretive Center and other acclimation facilities that contribute to the production of Coos River hatchery steelhead.

1.5) Location(s) of hatchery and associated facilities. (See Appendix C for map of the sites)

Bandon Hatchery is located in the Coquille watershed, one mile east of the city of Bandon, legal description latitude 43º 06' 58"N and longitude 124º 23' 57" W. The hatchery is situated at the confluence of Ferry Creek and its tributary, Geiger Creek. Ferry Creek enters the Coquille estuary at RM 1.5. Watershed code is 1700301000. The regional mark processing code for Bandon Hatchery is 5F22237 H37 21.

Cole M. Rivers Hatchery is located in the Rogue watershed approximately 30 miles NE of Medford at this location: Latitude 42º 41' 18" N and Longitude 122º 37' 45" W. This hatchery is located at the base of Lost Creek Dam at river mile 157. The regional mark processing code for Cole M. Rivers Hatchery is 5F22208 H8 21.

Spawning and egg incubation facilities

Spawning occurs at Millicoma Interpretive Center on the West Fork Millicoma River. Incubation of green eggs takes place at Bandon Hatchery. A small number of eyed eggs are distributed to elementary schools for educational display in classroom incubators.

Egg incubation and rearing facilities

Eyed eggs from Bandon hatchery are transported to Cole Rivers Hatchery for rearing to

acclimation-ready smolts. Multiple classroom incubators in local elementary schools each incubate up to a few hundred eggs to hatching and "button-up". The school children then take a "field trip" to a nearby stream and release these buttoned-up fry.

Release sites

A total of 125,000 smolts are released from acclimation sites at Big Creek, Hodges, and West Fork Millicoma sites. Smolts are released from acclimation sites after three weeks of acclimation. Small numbers of unfed fry are released into streams near elementary schools, from classroom incubators.

1.6) Type of program.

Isolated Harvest Program (smolt program)

1.7) Purpose (Goal) of program.

This program is being used for harvest augmentation. The goal of the smolt program is to provide fish for harvest that are genetically and ecologically similar to wild populations, to minimize any potential impacts to wild populations. Eyed eggs are placed in classroom incubators for educational purposes.

1.8) Justification for the program.

This program provides fish for harvest in the West and East Forks of the Millicoma and the South Fork Coos River.

1.9) List of program "Performance Standards" and 1.10) Performance Indicators, addressing benefits (1.10.1) and addressing risks (1.10.2)

BENEFITS Performance Standards	BENEFITS Performance Indicators	BENEFITS Monitoring & Evaluation
Provide an opportunity for anglers to harvest hatchery steelhead in-basin.	• Program fish contribute to the ocean and freshwater harvest. • Anglers pursue program fish. • Program fish are externally marked to help evaluate survival, distribution, straying, and contribution to the fishery.	• All releases are properly documented. • Analyze returned harvest tags to determine harvest level of hatchery steelhead. • Periodically conduct creel or other surveys to estimate angler effort and harvest rates of program fish.
Carcasses or other nutrient products will	• Specified monitoring streams are designated	• Distribution of carcasses and other

be placed in wild steelhead spawning streams for nutrient enrichment. This is identified as an Oregon Plan salmon restoration measure.	for target nutrient loading, while other streams are not loaded and act as experimental controls.	products for nutrient enrichment is in compliance with DEQ guidelines.
Healthy winter steelhead are released.	• Release groups will meet ODFW fish health standards.	• Conduct appropriate health checks throughout incubation, rearing, and prior to release. • Document size and age of program fish prior to release. • Verify compliance with approved fish health standards and criteria. (See Appendix A.)
The steelhead program will meet the criteria provided by the Native Fish Conservation Policy.	• A Conservation Plan will be developed for the appropriate Species Management Unit (SMU). • Based on the Conservation Plan and the Fish Hatchery Management Policy, a Hatchery Management Plan will be developed.	• Procedures for assessing stock status and risks will be developed in conjunction with the Conservation and Hatchery Management Plan. • Public input will be sought during the development of the plans.
RISKS **Performance Standards**	**RISKS** **Performance Indicators**	**RISKS** **Monitoring & Evaluation**
All hatchery steelhead smolt release lots will be 100% adipose fin-marked. This will identify hatchery-produced steelhead in fisheries and on the spawning grounds.	• Confirm that hatchery smolts are marked with appropriate fin marks prior to release. Conduct quality control measures during and after fin marking, prior to release.	• Appropriate monitoring techniques will be used to evaluate finmark efficiency. • Hatchery steelhead will be identified/quantified in angler creel and spawning surveys.
Capture steelhead adults for broodstock	• Steelhead broodstock collection activities will	• Record wild broodstock collected and incidental

in a manner that does not threaten the persistence/rebuilding of wild coho and steelhead in the basin.	avoid the take of wild coho to the extent possible. • Steelhead broodstock collection activities that become susceptible to take of wild coho will be modified to reduce take, even within approved take limits.	catch of wild coho in the basin. • Avoid the take of listed coho and wild steelhead in excess of fish collected for the hatchery programs under HGMP.
Hatchery operations comply with the Fish Hatchery Management Policy and other state and federal guidelines and permits.	• Hatchery operations conform to applicable fish health, sanitation, and operational guidelines. • Hatchery operations conform to STEP poundage and/or DEQ/NPDES guidelines for water quality. • Facility intakes are appropriately screened or above anadromous salmon distribution.	• Fish health is regularly monitored to avoid the introduction of new pathogens or significant levels of existing pathogens. • Fish health is certified prior to release. • Appropriate reports are filed to document fish mortality and growth. • Sanitation and maintenance activities are conducted regularly. • Appropriate protocols will be followed for monitoring water quality standards.

1.11) Expected size of program.

The expected program size in the near-term is 125,000 Coos River winter steelhead smolts release at several acclimation sites in the Coos Basin.

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

Annual broodstock collection objectives for this program are approximately 120 fish (60 pairs) of which a minimum target of 30% are comprised of wild fish.

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

Table 1-1. Proposed annual release levels of Coos River winter steelhead, by life stage.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry (STEP for education)	Multiple locations near schools. From classroom incubators.	2,000
Fry		
Fingerling		
Yearling	Big, Hodges, and W.Fk. Millicoma acclimation sites	125,000

Also, see Appendix B for Hatchery Production Flow Chart.

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 winter steelhead production from the Coos Basin hatchery winter steelhead program, for last 11 brood years available, are presented in Table 1-2. The estimated number of adult hatchery winter steelhead produced was derived from a variety of data sources.

The "Freshwater Sport" column is based on punch card estimates of catch in the Coos Basin. For the 1991-92 and 1995-96 broods, age composition and hatchery or wild origin was based on averages from 1983-84 through 1990-91 fishery scale data. Beginning with the 1996-97 run-year, the entire Coos Basin has been managed as a hatchery fish only fishery, with age composition based on an average of the 1983-84 to 1990-91 fishery scale data. Punch card data is not yet available for the 1997-98 to 1999-00 run-years. The "Hatchery Return" column depicts the actual count of adult winter steelhead returns at hatcheries and fish traps in areas where hatchery winter steelhead smolts were released. Adult age composition for these fish is based on an average of the 1983-84 to 1991-92 fishery scale data. Estimates are not available for the number of hatchery winter steelhead that strayed to natural spawning areas in the Coos Basin. A minimum smolt to adult survival is calculated as the sum of the prior 3 columns divided by the "Smolt Release" columns.

Table 1-2. Estimated total adult Coos hatchery winter steelhead produced per brood year (and related adult return year). Information generated from hatchery returns and punch card data. Italicized data represents incomplete returns for the brood year (i.e. missing 3 salt return data). N/A=data not available.

Brood Year	Smolt Release	2-Salt Return Year	Estimated Adult Hatchery STW Produced (2-salt + 3-salt)			
			Freshwater Sport*	Hatchery Return**	Spawning Areas	Smolt to Adult***
1991	133,485	1993-94	1,420	327	N/A	1.31%
1992	134,486	1994-95	1,686	317	N/A	1.49%
1993	120,557	1995-96	1,293	293	N/A	1.32%
1994	126,406	1996-97	1,782	445	N/A	1.76%
1995	126,202	1997-98	945	309	N/A	0.99%
1996	140,287	1998-99	1,453	553	N/A	1.43%
1997	137,492	1999-00	1,215	140	N/A	0.99%
1998	117,659	2000-01	1,363	117	N/A	1.26%
1999	140,268	2001-02	2,526	337	N/A	2.04%
2000	138,739	2002-03	701	452	N/A	0.83%
2001	113,707	2003-04	*215*	*317*	N/A	*0.47%*

* = Coos Basin catch, based on punch card returns. The 1993-94 through 1995-96 run years hatchery/wild and age comp based on average of 1983-84 through 1990-91 scale data.. The 1996-97 to 2004-05 run years are hatchery fish only fisheries, with age comp based on average of 1983-84 through 1990-91 scale data.
** = Used average age composition from fishery scales to assign age to Estimated Hatchery returns.
***= Smolt to Adult Survival percentage is based on Noble Creek returns because of a known number of releases and returns due to no harvest rate, which can be used as a control group to represent to rest of the basin.

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

The current program (localized broodstock) was started in 1991. Prior to that time, the program included production of out-of basin stocks (Stocks 43-Alsea, and 44-Coquille).

1.14) Expected duration of program.

The smolt program is ongoing and has no planned termination. The program at its current/proposed size was confirmed through the development of the 2014 Coastal, Multi-Species Conservation and Management Plan (aka "CMP").

1.15) Watersheds targeted by program.

This program is targeted at the Coos River watershed.

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

Issues, problems, controversies in connection with the program. (e.g., size of facilities,

program efficiency, straying, broodstock problems, etc.) A sentence or two for each issue, in simple paragraph form.

Issue #1: Program Efficiency
Survival of hatchery fish, adult returns, and program cost may generate questions with regard to program's efficiency. Although it has not been evaluated recently with a statistical creel survey, the program is cost effective in that the steelhead smolts acclimated at Coos River Basin sites survive well and contribute well to the sport fishery. The hatchery steelhead smolt program generates a very popular fishery that provides a substantial number of angler days and harvest.

Issue #2: Straying
Straying of hatchery-produced fish is always a concern. Based on the fishery for winter steelhead in the basin, returning adults exhibit a strong homing tendency to acclimation sites. Observations of marked hatchery steelhead in acclimation streams also indicate a high degree of homing. Periodic evaluation of hatchery steelhead straying should be conducted, and appropriate program changes made if problems are identified.

Issue #3: Broodstock Collection
Capture of wild coho during steelhead broodstock collections at the two main river traps may occur, but is not a serious issue as coho migrate upriver prior to steelhead. If necessary, coho can be passed above the trap, or steelhead trapping can be suspended when late coho move upriver through the trapping locations. Coho and steelhead typically move at different times up the West Fork Millicoma and the South Coos River, with minor overlap in their timing.

Issue #4: Unfeasible water conditions at acclimation time
In the event of extreme drought conditions or other water supply related conditions, full three-week acclimations may not be feasible with some of the existing acclimation facilities. Such examples include low stream flows and/or dissolved oxygen necessitating a direct-stream release, or high water flooding the containment ponds and causing early release.

1.16.2) Potential Alternatives to the Current Program

Alternatives are "draft" only and not necessarily endorsed by the management entity.

DRAFT ALTERNATIVE 1—Program expansion.

DESCRIPTION AND IMPLICATIONS:
Expand the current winter steelhead hatchery program by increasing the numbers of smolts and unfed fry released. Expansion of the hatchery winter steelhead program in the Coos Basin could have unanticipated impacts on coho. Coho spawn earlier, so hatchery winter steelhead could have an impact on coho redds.

PROS AND CONS:
Pros— Expanded hatchery releases would increase angling opportunities, benefiting anglers and the economy for the local community and for Oregon.
Cons— An expanded program would require additional broodstock collection that could

potentially have impacts to coho.

DRAFT ALTERNATIVE 2—Current program size, with improvements.

DESCRIPTION AND IMPLICATIONS:
The current hatchery winter steelhead program in the basin could be kept at status quo. Changes could be made to the hatchery winter steelhead program to improve survival of releases and contribution to fisheries. As an example, adding more acclimation ponds to distribute the fishery, particularly in the South Coos could increase survival and expand the fishery. Additional acclimation sites would be evaluated prior to installation, to avoid additional straying and competition with naturally-produced fish.

PROS AND CONS:
Pros— This would continue the economic benefits that are currently being realized as a product of the program, but could improve returns to anglers' creel.
Cons— Status quo in release numbers - combined with minor program changes in release strategies might be expected to have increased costs associated with improvements.

DRAFT ALTERNATIVE 3—Program reduction.

DESCRIPTION AND IMPLICATIONS:
Reduce the number of winter steelhead juveniles that are produced in the hatchery program to some unidentified lower level.

PROS AND CONS:
Pros— This could result in reduced potential impacts on coho, however minimal they may be.
Cons— This would result in reduced economic benefits and angler success, as well as reduced angler/volunteer support for conservation efforts such as habitat improvement or water conservation.

DRAFT ALTERNATIVE 4—Eliminate hatchery winter steelhead program.

DESCRIPTION AND IMPLICATIONS:
Eliminate the hatchery program for winter steelhead in the basin.

PROS AND CONS:
Pros— This would completely eliminate any potential impacts on coho.
Cons— This would completely eliminate the benefits of the program to anglers and the local economy. Angler support for conservation efforts could be significantly reduced. No steelhead harvest would occur under current steelhead regulations that require the release of unmarked steelhead.

1.16.3) Potential Reforms and Investments

These are draft only, for further discussion, not final decisions. Discuss operating changes that require additional funds or facility modifications.

Reform / Investment 1: Construct additional winter steelhead acclimation ponds to

diversify and expand the fishery. These facilities could be constructed at other locations where the land is publicly owned or where long term agreements for the use of the facilities exist. This action would spread the distribution of steelhead and expand the winter steelhead fishery throughout the basin. A rough estimate of the cost of such expanded acclimation sites would be $20,000 each. Also, investments could be made to improve the water supply to existing facilities to improve contingencies for extreme water conditions (costs unknown).

Reform / Investment 2: Construct additional traps or adult holding ponds to diversify the collection of winter steelhead in the basin. This would add to the number of broodstock that could be collected and utilized in the program. The advantage of additional steelhead broodstock from other Coos Basin streams would be added genetic variability of the hatchery stock.

A rough estimate of the cost of constructing additional trapping and adult holding facilities is $26,000 for each site.

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 winter Steelhead program was submitted to NMFS on 10/19/2005 for ESA authorization. This is an updated version of the HGMP originally submitted in 2005, and updated in June 2016.

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

Coos Complex
The Coos Complex consists of Coho Salmon inhabiting the Coos Basin. There are an estimated 220 miles of spawning habitat available to the Coho Salmon of this complex (Nickelson 2001).

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 3). 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 2 or 3 weeks until the yolk is absorbed and emerge as fry to actively feed in the spring. Most juvenile coho salmon spend 1 summer and 1 winter in fresh water. The following spring, approximately 1 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 proportion of the males attain sexual maturity and return to spawn as jacks. 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, whereas during winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex cover (Nickelson et al. 1992a, 1992b). 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 total 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.

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

This is a winter Steelhead propagation program, no ESA-listed Coho Salmon will be directly affected or taken by this program.

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

Oregon Coast Coho Salmon ESU are the listed in this basin that could be indirectly affected by the winter steelhead hatchery program during broodstock collection when listed Coho may be trapped or caught which will be released immediately with minimum handling stress. The released steelhead fry may indirectly affect the naturally produced Coho fry through predation and competitive interactions for space and food. The returned adults of program fish may also interfere with listed Coho Salmon in the spawning grounds.

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

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

The Coos Complex consists of Coho salmon inhabiting the Coos Basin. There are an estimated 220 miles of spawning habitat available to the Coho Salmon of this complex. The critical population level for the Coos Complex is 900 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 56 miles of stream, more than the 15-mile threshold (Nickelson 2001).

The abundance of Coho Salmon spawners of the Coos Complex ranged from about 1,100 to about 16,500 and averaged about 8,100 between 1990 and 2000 (Figure 1). The abundance from 2001 through 2012 ranged from 1,329 to 33,595 and averaged 19,565 fish (Figure 2.). Abundance since 1990 has never fallen below the critical threshold of 900 fish, and in only two years fell below 2,000 fish. The updated abundance estimates for the Coos Coho Salmon population are:

2013—6,884
2014—38,880 (highest return from 1990-2015)
2015—3,030 (sixth lowest since 1990) (ODFW 2016)

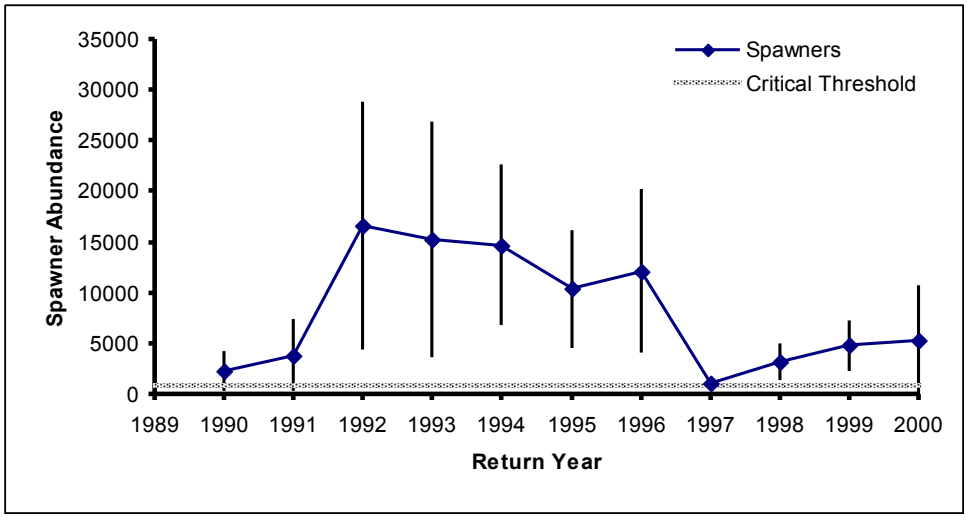


Figure 1. Trend in adult Coho Salmon abundance relative to the critical population level for the Coos Complex. (Base years 1990-2000, from 2001 HGMP). Error bars are 95% confidence limits.

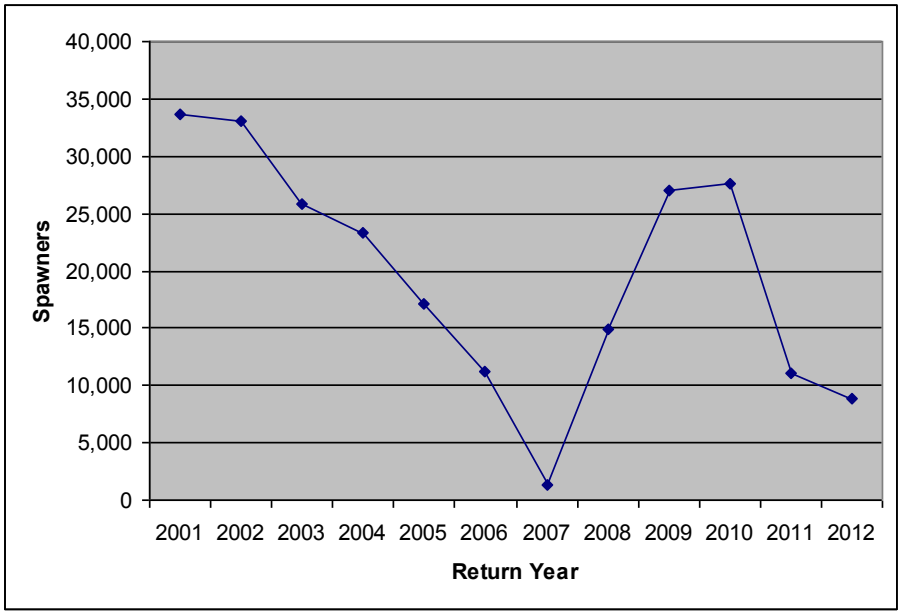


Figure 2. Trend in adult Coho Salmon abundance (spawners) for the Coos Complex, 2001-2012.

- Provide the most recent 12 year progeny-to-parent rations, survival data by life stage, or other measures of productivity for the listed population. Indicate source of data.

Recruits per wild spawner exhibited a downward trend from 1993 to 1999, with 1995 to 1999 falling to below one (Figure 3). This was the result of a series of five consecutive extremely strong broods not replacing themselves. During the mid-1990s, marine survival of Coho Salmon of this complex was much higher than most of the complexes to the north. At the end of the 1990s, survival came down to the level that the other complexes had been experiencing. The downward trend in recruits per spawner reversed in 2000, when the 1997 brood produced about 5,800 adults and 5,400 spawners from about 1,100 parent spawners. See Figure 2 above for spawner abundance from 2001 – 2012.

Recruits per wild spawner for the period 2001 through 2012 is shown in Figure 4. Again, low recruit per spawner levels were generally the result of large spawning escapements not fully matched three years later.

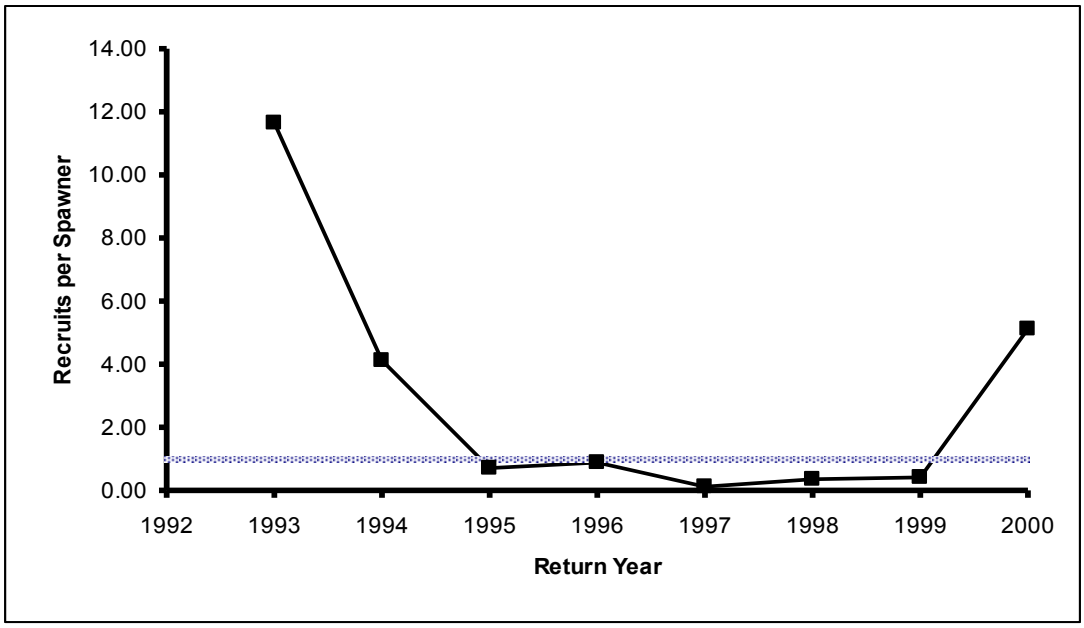


Figure 3. Trend in recruits per spawner for Coos Complex wild Coho Salmon, 1992-2000.

- Provide the most recent 12 year annual spawning abundance estimates, or other abundance information. Indicate the source of these data.

See Figure 2 above for annual spawner abundance information from 2001-2012.

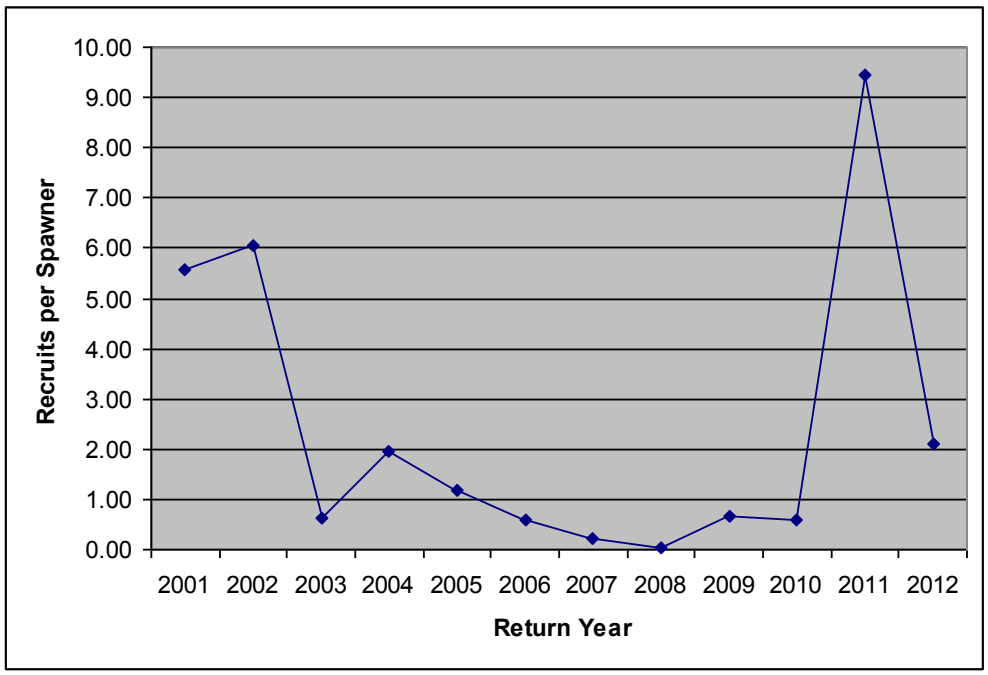


Figure 4. Trend in recruits per spawner for Coos Basin wild Coho Salmon, 2001-2012.

- Provide the most recent 12 year estimates of annual proportions of direct hatchery origin and listed natural-origin fish on natural spawning grounds, if available.

The proportion of hatchery-origin steelhead spawners (pHOS) in the Oregon Coast DPS was 10% in 2015 (ODFW 2015). This was lower than the 2003-2014 average of 14%, and nearly the lowest observed in thirteen years of monitoring the Oregon Coast ESU. The pHOS for steelhead is evaluated at the Monitoring Area scale, and not at the basin or population scale. For the Mid-Coast Monitoring Area, the pHOS in 2015 was 12%, where the 2003-14 average is 17%. ODFW has recognized "hotspots" of hatchery-origin spawners observed in streams near acclimation/release sites. The new Coastal Multi-Species Conservation and Management Plan considers these hotspots and allows for higher pHOS adjacent to release sites. ODFW is developing new criteria for evaluating pHOS that might stratify areas based on adjacency to release sites.

Intraspecific pHOS has potential genetic and environmental impacts to naturally-produced fish. Interspecific pHOS, in this case hatchery steelhead found on natural Coho Salmon spawning grounds have only environmental impacts. For streams with high steelhead pHOS, hatchery steelhead adults may superimpose their redds on existing Coho redds, displacing those eggs from the gravel. Progeny of hatchery steelhead may compete with Coho juveniles for rearing space and food. Finally, hatchery-progeny steelhead parr may be predators on Coho Salmon fry.

The environmental impacts, from redd superimposition to competition, is not monitored or evaluated. These impacts are likely greater near hatchery steelhead acclimation/release sites where pHOS may be higher, depending on dispersal of juvenile steelhead post-emergence.

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.

Adult steelhead broodstock are collected by three primary methods: netting, trapping, and angler donation, at a variety of sites within the Coos Basin. Traps are located at South Coos River (RM10.0), West Fork Millicoma River (RM 2.2), Millicoma Interpretive Center (RM 12.0), and Tioga Creek (RM 7.0). Netting occurs at the Millicoma Interpretive Center using seines and entanglement nets. Angler donations are taken throughout the open angling area for steelhead, and with a core group of trained and permitted anglers. ODFW biologists provide the volunteer anglers with orientation on handling and transport of wild steelhead. These anglers (by way of permit or authorization letter) are allowed to keep and deliver non-finclipped steelhead to holding tanks at key locations in the Coos Basin, despite regulations prohibiting harvest of wild steelhead. ODFW employees and key volunteers transport the adult steelhead to hatchery facilities where they are held until ripe, and spawned.

Steelhead broodstock collection occurs from late November through March and occasionally

into April, to represent fish from throughout the run period.

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

Only a few, if any, Coho Salmon mortalities would be associated with steelhead broodstock collection activities.

- 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).

Take of wild Coho associated with the Coos winter Steelhead broodstock collection is anticipated to be minimal.

- 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.

Options include:

1. Discontinue trapping/netting of winter steelhead as take limits (of Coho Salmon) are reached.
2. Close trap facilities to prevent capture of additional wild Coho Salmon.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan or other regionally accepted policies. Explain any proposed deviations from the plan or policies.

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 coho salmon and steelhead in the Coos 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. Also included in the Oregon Plan is a measure to establish and monitor Steelhead Population Health Goals. ODFW is currently in the process of developing these goals for coastal steelhead populations.

The Coos River hatchery steelhead program will operate consistently with **Pacific Fishery Management Council (PFMC) Harvest Program Section 7 consultation** and with Regional harvest management programs. Specifically, the steelhead hatchery smolts will be

mass marked with an adipose finclip prior to release to allow for selective harvest as adults. Allowable harvest impacts to wild Coho Salmon will be determined based on the harvest matrix in Amendment 13 to the Pacific Coast Salmon Plan (PFMC 1997), updates to that plan, and Fishery Management Evaluation Plans (FMEPs) as developed.

ODFW Native Fish Conservation Policy (NFCP) is the guiding policy for state management of wild and hatchery fish for protection of genetic resources. Through various avenues including the development of localized broodstocks, acclimation and release strategies for smolts, and other management activities, the Native Fish Conservation Policy will continue to direct protection of native steelhead and coho. The NFCP directs the development of conservation plans, which ODFW completed for the Oregon Coast by the development of the 2014 Coastal, Multi-Species Conservation and Management Plan (aka "CMP"). ODFW fish managers continue to refine the hatchery programs for all species in order to minimize impacts of hatchery fish releases on wild fish production and watershed ecology.

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

1. Oregon Plan for Salmon and Watersheds ("Oregon Plan")
2. PFMC Harvest Program Section 7 consultation
3. Coos River Basin Fish Management Plan
4. Hatchery Management Review
5. Integrated Hatchery Operations Team guidelines
6. DEQ National Pollutant Discharge Elimination System (NPDES) permit for hatchery effluents and Memorandum of Agreement regarding fish carcass distribution in Oregon streams
7. US Army Corps of Engineers general authorization for fish habitat improvement in Western Oregon.
8. ESA Section 7 consultation, biological opinion with Roseburg and Coos BLM districts, Interagency population and monitoring program approved NMFS April 10, 1997
9. ODFW's Native Fish Conservation Policy (NFCP) and 2014 Coastal, Multi-Species Conservation and Management Plan (aka "CMP").

3.3) Relationship to harvest objectives.

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.

An in-river sport fishery targets the fin marked steelhead. This fishery takes place in larger tributaries of the watershed. Most small tributaries are closed to adult steelhead angling, as sanctuaries for spawning fish.

Data on harvest rates for program fish exists in one form: which is punch card data. (see Section 1.12 and Table 2).

3.4) Relationship to habitat protection and recovery strategies.

Major factors affecting natural production include ocean conditions, predation, water flows, water quality, climatic conditions, rearing habitat, and others. The Oregon Plan lays out habitat protection measures to be followed by all the state agencies including fish habitat and restoration measures by ODFW, Forest Practices rule revisions by Oregon Dept. of Forestry, water quality protection by Dept. of Environment Quality, diversion monitoring by Water Resources Dept., and Senate Bill 1010 implementation by Dept. of Agriculture. These are all designed to protect and improve salmonid habitat, both short and long term, and will ultimately improve natural production of salmonids. The Coos Watershed Association also implements habitat improvement projects throughout the Coos Basin that include riparian fencing and planting, placement of large woody debris, and culvert replacement to improve or restore fish passage. Projects completed by numerous partners through avenues such as the Oregon Plan improve habitat for natural production, and are linked to the unfed fry releases primarily through the rectifying of passage barriers. Habitat improvement efforts will contribute heavily toward the rebuilding of coho stocks toward an eventual de-listing, and toward improvement of steelhead runs.

3.5) Ecological interactions.

a) *Species that could negatively impact program.*
Predacious fish that could impact outmigrating salmonid smolts include one native fish (Coastal Cutthroat Trout) and one introduced non-native fish (Striped Bass). Striped Bass have nearly disappeared from the Coos Basin in the last ten years. Effects of predation by Cutthroat Trout on steelhead fry and smolts are unknown. ODFW assessment is that predation effects are not a major limiting factor on salmonid populations. Predation by aquatic mammals like otters, seals, sea lions etc. could negatively impact the program. Also, birds like blue herons, Caspian terns, cormorants, and gulls may impact the program.

b) *Species that could be negatively impacted by program.*
Our understanding of the consequences of interactions between hatchery steelhead and wild coho salmon is incomplete. The Coos hatchery program for winter steelhead is designed to mimic wild populations in spawning, run timing, and genetic considerations to minimize any potential negative effects with wild steelhead. Hatchery smolt releases are located at specific sites within Coos Basin to concentrate returns in high-success fishery areas and minimize straying into upriver spawning areas. Wild juvenile coho and steelhead have been observed to partition available rearing habitat, but much overlap exists in their distributions in the Coos Basin. The ongoing smolt production programs for salmon and steelhead do not release fish into major wild salmon and steelhead production areas.

Hatchery steelhead smolts are acclimated for a period of three weeks and released volitionally over 2-3 days' time. Release is predicated upon a high degree of the acclimating fish displaying characteristics of a migration-ready smolt, including silvery appearance, loss of visible parr marks, slender body shape, and changes in behavior. This migration-readiness is intended to reduce the in-basin residency of released fish, and thus reduce competition with riverine and estuarine resident wild juveniles. Fish are typically displaying these characteristics as they begin the acclimation process. As a standard practice, pre-

release pathology tests are conducted to detect the presence of disease (see Fish Health Monitoring, Appendix A).

c) Species that could positively impact program.
Any hatchery or wild fish that dies or is recycled for nutrient enrichment of the basin may positively impact the program.

d) Species that could be positively impacted by the program.
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.

Bandon Hatchery
The water sources for incubating eggs are Ferry and Geiger creeks. The Ferry Creek system feeds into the Coquille River estuary at river mile 1, near the Port of Bandon. This source is all surface water. Average summer flows are approximately 1.25 cfs in each stream. Winter flows vary greatly with storm activity, but average about 5 cfs from each stream.

Bandon Hatchery has water rights for a total of 3.0 cfs. These water rights are senior to all other active water rights in Ferry and Geiger creeks.

Intakes are fully screened with perforated aluminum plates with 1/8" x ¾"slots, installed approximately eight years ago. Anadromous salmonids are currently unable to reach the area above the hatchery weir where the intakes are located; however, resident cutthroat are present.

The hatchery is operated under the NPDES general permit 300J to maintain the environmental standards of the discharges.

Annual water temperatures range from about 38ºF in the winter to a maximum of 61ºF in the summer. The 14-year average is 51ºF. The water quality meets or exceeds the recommended IHOT standards for temperature, ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc. For adult holding and egg incubating purposes, the overall quality of water is good. Fish production at Bandon Hatchery is limited by available water.

Cole Rivers Hatchery

Up until recently (2000 brood year), stock #37 Coos winter steelhead smolt production was conducted at Alsea Hatchery. Due to concerns for adult steelhead straying into the Alsea River upon return, the program was shifted to Cole Rivers Hatchery. Drought conditions in 2001 jeopardized the potential that the warm water supply at Cole Rivers was available to rear brood year 2001 smolts to target size by the spring of 2002. Discussion did occur within ODFW regarding alternative options for reaching production and conservation goals with this program that particular year. The warm water supply issue may affect only Coos and Tenmile winter steelhead programs, and would not affect coho programs. To date the loss of the warm water supply has not prevented Cole River Hatchery staff from getting the steelhead smolts to target size.

Eyed eggs are shipped from Bandon to Cole Rivers Hatchery where they are hatched and reared to full term smolts. Cole Rivers Hatchery's main water supply is the Rogue River. Ambient water is gravity fed to the hatchery from an impoundment formed by a diversion dam. The intake structure is screened with #4 mesh having 0.178 inch square holes. This supply system will provide up to 300 cubic feet of water per second. Annual ambient water temperatures range from 41.2ºF to 56.7ºF. The hatchery's warm water supply is piped from the surface of Lost Creek Reservoir. Warmer water is gravity fed to the hatchery from a floating intake on the Powerhouse Intake Tower. The supply system will provide up to 60 cubic feet of water per second. Annual warm water temperatures range from 42.8ºF to 72.8ºF. When the warm water temperature rises above 55ºF it is mixed with ambient water to achieve an upper limit goal of 55ºF. At Cole Rivers hatchery, the water quality parameters meet or exceed the recommended IHOT standards for temperature, ammonia, carbon dioxide, chlorine, pH, copper, DO, hydrogen sulfide, dissolved nitrogen, iron, and zinc.

Incubation water is pumped from the ambient water supply line and passed through ultra violet light for sterilization. Incubation water is all single pass. Cole Rivers Hatchery has the ability to filter some incubation water with pressure sand filters. The Coos steelhead are generally incubated on sand filtered UV sterilized ambient water. The hatchery is equipped with facilities to heat or chill water to speed up and slow down egg or fry development. They use this strategy to "catch up" development of all egg takes to achieve a common ponding date. The overall quality of the water is very good. Fish production at Cole M. Rivers has not been limited by available water or water temperature. The hatchery is operated under the NPDES general permit #300J and maintains the environmental standards for effluents. The water right is for 224 cfs and the permit number is (S 44910).

Both Bandon and Cole Rivers hatcheries are in compliance with the water right permits, water uses, and reporting.

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.

Bandon Hatchery water intake is screened to minimize the risk of entrapment of juvenile listed fish or any other native fish species, but the intake structure doesn't comply with the

NOAA screening criteria. The NOAA criteria would be met once the funding becomes available. Anadromous salmonids are blocked at the hatchery weir, and cannot reach the water intakes above the facility. Water diversion for fish culture purposes is non-consumptive, and is returned to Ferry Creek at the fish weir. The water flow, settleable solids, total suspended solids, temperature, pH, ammonia and phosphorus of hatchery effluents are monitored and reported to DEQ as per the NPDES permit to insure compliance with pollution abatement.

There are no listed natural fish above Cole Rivers Hatchery intake structures, and barriers prevent anadromous fish from reaching intake structures. The water diversion for fish culture purposes is non-consumptive and is returned to the Rogue River below the hatchery. All wastewater is pumped to a 150' x 100' x 6' asphalt lined pollution abatement settling basin. Like Bandon hatchery, the effluents of Cole Rivers hatchery are monitored and reported quarterly to DEQ as per NPDES 300J permit.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Steelhead are collected by three different techniques: trapping, netting, and angling. Netting operations occur at various locations throughout the basin where pools exist and where access is good. Most of the netting for steelhead in recent years has been near the Millicoma Interpretive Center. Angling operations occur throughout the basin where it is legal to angle for steelhead. Traps that collect wild steelhead are located at four different locations, described below.

a) South Coos River Trap

The major trap in the main river is located at the head of tidewater on the South Fork Coos River at river-mile 10.0 (known as Dellwood). This trap has been operated since 1987 and has been an important tool in collecting wild salmonids to incorporate into hatchery programs. This trap was originally constructed in 1900 and operated up until 1958. This trap is composed of a leading weir that guides upstream migrating fish into a concrete and wood trap. The leading weir is 3 feet wide, 3 feet tall, and 157 feet in length. The box trap that is made of concrete is 6 feet wide, 4 feet tall and 16 feet long. The concrete box opens into a wood trap pen that is 5 feet tall, 10 feet wide, and 20 feet long. A PVC incline weir is on top of the guiding weir. This trap is primarily used for fall Chinook collection, and typically must be removed before winter, due to high river flows.

b) West Fork Millicoma Trap

Another main river trap is located at river mile 2.2 on the West Fork Millicoma River. This trap has been operated since 1987 and has also been an important tool in collecting wild salmonid adults to incorporate into hatchery programs. This trap is composed of a leading weir that guides upstream migrating fish into a concrete box trap. The leading weir is 3 feet wide, 3 feet tall, and 130 feet in length. The box trap is 8 feet wide, 4 feet tall and 16 feet long. A second concrete box is adjacent to the trap box. This box provides water control for attraction for the fish and is similar in size to the box trap. A PVC incline weir is on top of

the guiding weir.

c) Millicoma Interpretive Center

Steelhead are also trapped at the Millicoma Interpretive Center, which is located at river-mile 12.0 on the West Fork Millicoma. Fish ascend a fishway that for the first 60 feet is a small stream with jump pools made of log weirs or gabions. The last 20 feet of the fishway is a concrete structure that is 3 feet wide and 4 feet tall. Once through the fishway the steelhead move over a finger weir where they are trapped in a concrete box that is 20 feet wide, 20 feet long, and 4 feet high.

d) Tioga Creek

Steelhead can also be trapped at Tioga Creek fishway, although this trap has not been used for several years. This fishway was constructed around a waterfall to improve fish passage. The trap is in a rock cut with concrete weirs and walls. The trap is 8 feet wide, 6 feet long, and 4 feet tall. Fish enter the trap through a fyke and are prevented from leaving the fishway by a blocking weir.

Trapping hatchery returns

Hatchery steelhead are trapped returning to the Millicoma Interpretive Center. The Millicoma Interpretive Center is located at river-mile 12.0 on the West Fork Millicoma River. Approximately 35,000 winter steelhead smolts are acclimated and released from the station. The acclimated smolts are the source of the returning hatchery steelhead. A small number of steelhead juveniles are held on station during the time that adults are expected to return, as attraction fish to increase adult homing to the facility. The attraction steelhead appear to be effective at increasing homing.

Netting Wild Steelhead for Broodstock Collection

Steelhead are netted usually in close proximity to the Millicoma Interpretive Center. Two methods are used to capture steelhead in netting operations: (1) A 250-foot beach seine, or (2) entanglement nets. The seine is made of two-inch mesh and is eight feet deep. The entanglement nets are three inch mesh and are also eight feet deep. The entanglement nets are actively moved through the resting pool near the facility. The entanglement nets are pulled-in immediately upon sensing that a fish has been captured. This minimizes the time a fish is entangled, and fish typically recover well, to survive to spawning.

Angler Donation of Wild Broodstock

Wild steelhead are also collected for broodstock via angler donation (see Section 2.2.3). Angler donations are taken throughout the open angling area for steelhead, and with a core group of trained and permitted anglers. Despite regulations prohibiting harvest of wild steelhead, these anglers (by way of permit) are allowed to keep and deliver non-finclipped steelhead to holding tanks at key locations in the Coos Basin. The anglers hold wild steelhead temporarily in "socks" (mesh bags that can be tied-off to a rootwad or other anchor along a stream). Many of these anglers also have specially-converted ice chests fitted with aerators to act as live boxes for short-term transport of adult fish to larger holding tanks. ODFW employees and key volunteers transport the adult steelhead from the holding tanks to hatchery facilities where they are held until ripe, and spawned.

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

Broodstock collected via trapping, netting, or angler donation are transported in plastic water storage tanks that have been modified to fit in the back of pickup trucks. These tanks are four feet in diameter and about four feet tall. They hold about 250 gallons of water. A 12-volt aerator circulates the water to keep the fish alive. In 2003 a new aluminum tank was constructed and put into operation. This tank is four feet by four feet and four feet tall. This new tank is permanently placed onto a trailer.

5.3) Broodstock holding and spawning facilities.

Steelhead broodstock are held for spawning at the Millicoma Interpretive Center. The pond at the facility is 80 feet long, 20 feet wide, and 4 feet deep. All sorting and handling of the fish is done by hand and no power equipment is used for sorting or spawning at any of this facility.

5.4) Incubation facilities.

Bandon Hatchery has a total of 27 vertical, double stack incubators. These are supplied by two aluminum headboxes. Five gallons of water per minute are normally run through each stack.

Eggs are incubated at Bandon Hatchery from fertilization to eye-up. Water supply headboxes are equipped with alarms that sound when water depth drops. During the period of steelhead egg incubation, the facility is at an estimated 95% tray capacity (multiple species/stocks). Bandon Hatchery ships eyed eggs to the Millicoma Interpretive Center for incubation to unfed fry (see Section 1.5), and eyed eggs to Cole Rivers Hatchery for smolt production.

At Cole Rivers, incubation takes place in 66 stacks of vertical incubators. Each stack has 15 usable trays for a total of 990 trays. The water is generally ambient, sand filtered and UV sterilized. The water supply is the ambient water line. Eggs are loaded at approximately 5,000 per tray upon receipt from Bandon Hatchery. Water supply lines, pumps, and the aeration tower (used as a reservoir for gravity feed) are equipped with pressure and temperature alarms. The wet well used to feed the aeration tower is also equipped with an alarm.

5.5) Rearing facilities.

Cole Rivers Hatchery

At Cole Rivers Hatchery there are 26 circular ponds in two groups of 13 each. Each circular is 25 feet in diameter and 4 feet deep. Each group of circulars is supplied with ambient or warm water from separate valves connected to each group. Cole Rivers is equipped with 87 concrete ponds 100 feet long, 20 feet wide and 5.5 feet deep. All ponds are supplied with ambient water and 21 ponds have warm water facility. The Coos River winter steelhead require use of ambient water in 1 circular pond and 2 raceway ponds during rearing. Warm water from the reservoir is also used for the Coos steelhead to ensure they get to target size. Flows are adjustable in all containers and all containers are single pass.

5.6) Acclimation/release facilities.

Steelhead are acclimated at multiple sites in the Coos River Basin. During the acclimation period the steelhead are fed 1% of their body weight per day, which is a maintenance diet and not a growth diet. The acclimation period is three weeks in length, after which the screens are pulled and the steelhead are allowed to leave volitionally.

Acclimation sites in the basin include Big Creek, Hodges, West Fork Millicoma. These acclimations are all accomplished in containment ponds. The former Rodine acclimation and E. Fork Millicoma direct release will be discontinued beginning with the spring 2018 release. In the event of extreme drought conditions or other water supply related conditions, full three-week acclimations may not be feasible. Such examples include low water flows and low dissolved oxygen necessitating a direct-stream release, or high water flooding the containment ponds, causing early release. As previously stated in Section 3.5, smolts are typically showing characteristics of migration-readiness as they begin the acclimation period, so residualization or poor homing is not expected, even if the full acclimation period is not accomplished.

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

Fish are rarely lost due to mortality. Broodstock have only been able to escape the holding ponds at the Millicoma Interpretive Center during extreme flood events. This has only occurred on one occasion (1996). Water failures at Millicoma have never occurred and have never caused mortalities.

At Cole Rivers Hatchery, disease outbreaks pose the greatest operational difficulty. Coos stock winter steelhead have experienced some levels of disease as shown in Appendix A. Disease outbreaks at Cole Rivers Hatchery have led to significant losses of Coos stock winter steelhead.

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.

Coos River winter steelhead is not an ESA-listed species, although a candidate.

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 following is an excerpt from the Coos Basin Fish Management Plan (ODFW, 1990): *Between 1924 and 1958, the Coos River steelhead stock was propagated at the hatchery on the South Coos River and released as fingerling (2 to 4 inches) into the South Coos River.*

Numbers released ranged between 10,000 and nearly 2.2 million. Beginning in 1970, Alsea River stock steelhead were reared to full-term smolt (age 1+) at the Alsea River Hatchery for release in the Coos River. Since 1976, releases have totaled more than 100,000 fish annually at a size of about 6 fish/lb. Since 1976, smolt allocation for Coos River basin has been divided among the South Coos River and the East and West Forks of the Millicoma River and, since 1980, Palouse and Larson creeks. In addition, STEP has released Alsea stock steelhead fry from hatchboxes since 1981 and has also released native and backcrossed (hatchery x wild parents) presmolts above barriers.

Since 1991, steelhead broodstock has come from collections made strictly in the Coos Basin, with a target of 30% wild fish to be incorporated into each year's brood. Hatchbox programs for steelhead are no longer carried out.

6.2) Supporting information.

6.2.1) History.

The current steelhead hatchery broodstock began development in 1982. Problems with adult holding ponds and rearing facilities delayed the conversion of the hatchery steelhead program over to a native stock for several years. These facilities were constructed and operated by volunteers who did not, at that time, have the financial resources to construct adequate facilities. Facilities continued to improve as funds available for steelhead programs increased.

6.2.2) Annual size.

The broodstock sex ratio target each generation is one male to one female (1:1). The annual target is to collect 60 female and 60 male steelhead from hatchery and wild adult returns.

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

Program objectives describe a minimum goal of 40 wild fish to be incorporated into the broodstock annually, or about 30% of the steelhead each generation that are spawned in the hatchery are of wild origin. This is conducted to maintain genetic similarity with the wild population.

6.2.4) Genetic or ecological differences.

There are no known genotypic differences between hatchery stocks and wild stocks. Due to the objectives of the program, certain behavioral/physical differences may exist between hatchery and wild smolts. Since the inception of the broodstock development program for steelhead in the basin, every effort possible has been made to mimic the naturally produced steelhead in the basin, at least genetically. This has been accomplished through aggressive incorporation of wild steelhead each generation. Staff and volunteers conducting spawning operations are instructed to make the collections and the matings as random as possible. Protocols stipulate that steelhead are not to be selected for a given physical or behavioral trait. Wild and hatchery steelhead are spawned throughout the entire run to maintain genetic

variability. Hatchery steelhead are released at the time when peak outmigration is occurring in the natural steelhead population. No major differences have been observed between wild and hatchery populations in the basin, other than geographic separation between return areas for wild vs. hatchery adults. This is a desired result of this program's acclimation and release strategies.

6.2.5) Reasons for choosing.

This broodstock was chosen to represent the local wild population and appropriate subdivisions with the Coos Basin. Development of the broodstock in the 10-15 years leading up to 2002 was designed to improve compliance with ODFW's former Wild Fish Management Policy, and reduced the potential for genetic impacts to wild fish. The Native Fish Conservation Policy, adopted in 2002, will continue to provide guidelines for wild fish protection.

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.

Broodstock selection practices for steelhead are not anticipated to have genetic or ecological effects on listed coho salmon.
The Oregon coastal winter steelhead which is under propagation is not an ESA-listed fish. However, several measures have been put in place to minimize risk to the wild steelhead population. Broodstock is collected from throughout the spawning run, a minimum target of 30% wild fish are incorporated into the broodstock annually to infuse wild genetics into the hatchery stock, spawning at the hatchery is one male to one female, and jacks are included to mimic the natural occurrence. In addition, broodstock collection numbers are estimated to be well below the old Wild Fish Management Policy level of 25% of the wild escapement, however an abundance estimate is not available for steelhead as it is for expanded coho spawning survey data (see section 2.2.2 and Table 2).

SECTION 7. BROODSTOCK COLLECTION.

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

Steelhead are collected in the Coos River Basin as adults.

7.2) Collection or sampling design.

All collections are conducted as randomly as possible. This is a fundamental premise of all collections. All staff and volunteers involved in the spawning process are trained to make collections of broodstock randomly. Collections are not to be made based on size, condition factor, maturity, sex, age or other characteristics. Occasionally, bright steelhead caught in tidewater during angler collections are released unharmed because it would be too difficult to hold them until they are ready to spawn.

Traps that are highly-efficient are operated on a rotation basis. The collections are stratified over the entire migration of a population. Protocol dictates that the trap is operated for a set number of days on and a set number of days off. Again, non-random selection is avoided during this collection.

When fish are netted, attempts are made to conduct these operations throughout the run timing as well. Netting success for a given outing is often dictated by river conditions and fish migration behavior. Overlap occurs in the run timings of Chinook and coho, and coho and steelhead.

7.3) Identity.

The WFMP status review (ODFW 1995) lists one population (Coos Bay), with two sub-populations in the Coos Basin: Coos River and Millicoma River. Some natural gene flow is expected to occur between these sub-populations. All hatchery steelhead are adipose fin-clipped for recognition purposes. This mark provides for easy recognition between wild and hatchery fish in broodstock collection and in the sport fishery.

7.4) Proposed number to be collected:

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

The primary mating strategy is that fish are spawned one male to one female (1:1). The minimum target for wild steelhead incorporation is 30% each generation. This goal for wild steelhead was directed by the former Wild Fish Management Policy. This wild incorporation rate to maintain genetic compatibility between the hatchery and wild populations continues as a general practice today. The ability to achieve this goal is variable due to population abundance and weather conditions. A total of 60 pairs (120 fish) are needed to achieve the steelhead production goal. Within this goal, a minimum target of 40 wild steelhead (20 males and 20 females) is sought.

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

Table 7-1. Winter steelhead spawned as hatchery broodstock in the Coos Basin, 1988-2004.

Steelhead spawned				
Year	Male	Female	Jack	Total
1988	35	33	0	70
1989	49	53	0	115
1990	37	32	0	69
1991	87	87	0	184
1992	143	159	0	330
1993	87	74	0	151
1994	81	75	0	156
1995	93	84	0	177
1996	78	71	0	149
1997	165	133	13	311
1998	64	63	0	135
1999	118	103	2	223
2000	94	76	3	173
2001	82	60	0	142
2002	78	70	0	148
2003	117	109	3	229
2004	100	77	4	181

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

Steelhead adults and jacks of hatchery origin that return to hatcheries and are surplus to broodstock needs are released in Empire Lakes to be caught as "trophy trout" or placed into streams for enrichment. Due to reliance on netting and trapping efforts to collect much of the broodstock, major surpluses of adults do not typically occur. Netting and trapping efforts are adjusted to collect as close as possible to broodstock needs. The small surpluses that do occur are usually a few male hatchery steelhead. Hatchery steelhead are not released above traps or released into streams to spawn with wild fish.

7.6) Fish transportation and holding methods.

See section 5.2 for the description of the transport tanks that are used in the district. See section 5.3 for the description of the holding containers.

7.7) Describe fish health maintenance and sanitation procedures applied.

All ponds and equipment are cleaned and allowed to air dry prior to each spawning season. Broodstock collection equipment is disinfected using iodophore. Pathologists routinely screen most of the brood females to detect the presence of viral pathogens. Eggs taken from any infected females are buried to prevent the spread of diseases. The pathologists also conduct a pre-liberation disease certification check-up prior to reared steelhead being

released into the Coos River basin. Mortality of adult steelhead is a rare occurrence. See Appendix A for pathology monitoring standards.

7.8) Disposition of carcasses.

All carcasses that are produced by the hatchery spawning process are placed into streams for nutrient enrichment. The only carcasses that are not placed into streams are the rare mortalities among the steelhead while they are being held for broodstock. Pond mortalities are buried to prevent the spread of a pathogen in the event they died of an infection. Carcass distribution for nutrient enrichment is carried out under a MOA with the Oregon Department of Environmental Quality. Nutrient enrichment is a salmonid population restoration measure under the Oregon Plan.

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.

The broodstock collection for Steelhead overlaps the run timing for Coho. While some wild Coho may be captured during netting and trapping efforts, they are typically released unharmed. The use of full-term steelhead smolts and location of acclimation sites in main rivers reduces potential competition or other types of density dependent effects on wild juveniles.

Hatchery steelhead are routinely checked by pathologists and are treated when virulent pathogens are present. Standard testing and procedures are conducted to reduce or avoid the horizontal and the vertical transmission of pathogens.

The fact that hatchery reared steelhead are geographically separated from the bulk of their wild counterparts may be the most significant treatment at reducing risk of disease amplification through a hatchery program.

SECTION 8. MATING

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

8.1) Selection method.

Steelhead are taken randomly and spawned over the entire run. The importance of utilizing all segments of the run is recognized to prevent an unnatural shift in run timing. Matings to produce unfed fry are from WxW crosses; while matings to produce smolts are WxW, HxH, or WxH. If in the event there are excess gametes, the wild gametes are utilized to their maximum capability, and gametes from hatchery parents are discarded first. Broodstock collections and inventory control are conducted so as to minimize excess gamete supply.

Size, coloration, body condition, or other physical features are not to be used as criteria for mating. Matings are conducted as randomly as possible in order to maintain genetic diversity. Once gametes are placed into plastic bags they are labeled as to wild or hatchery origin. Fish are sorted weekly from early December to early April, and only ripe females are used. This ensures egg representation from the entire span of the spawning period.

8.2) Males.

See Section 7.4.1 for the proposed number of males and Section 8.1 for selection method for mating. The target spawning percentage for the utilization of jacks is 5 percent. This percentage may vary depending on brood year survivals in both the hatchery and wild populations. Males are used one time only. Male to female sex ratio is1:1. Surplus males are released into Empire Lakes (in City of Coos Bay) to be caught as "trophy trout" or are killed and placed into streams as nutrients enrichment.

8.3) Fertilization.

The spawning protocols are that one female is mated with one male. This mating strategy is an attempt to maximize genetic variability within the hatchery population. Gametes from an individual fish are taken into baggies and are kept completely separate from those of other fish. Actual mating occurs in individual plastic bag to ensure fertilization of a single female by a single male. Differential sperm motility is not a concern when using these fertilization techniques. Gametes are never pooled.

The plastic bags that are used to hold gametes and to effect fertilization are used only once and then discarded. This technique provides a good aseptic environment that gametes can be handled and subsequently fertilized without the threat of horizontal pathogen transmission. When the eggs are placed into a common incubator the water is treated with an iodophore that further reduces the potential for the horizontal pathogen transmission. During the actual egg taking operation the equipment that is used is also treated with an iodophore to prevent the spread of diseases.

8.4) Cryopreserved gametes.

Cryropreserved gametes are not utilized in this 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.

At least 120 family groups are used in the spawning of the Coos River steelhead. This number of family groups reduces the risk of random or non-random biases in the mating of hatchery steelhead.

There is no known risk to wild coho from the mating strategy of Coos winter steelhead hatchery program.

SECTION 9. INCUBATION AND REARING -

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

9.1) Incubation:

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

Table 9-1. Number of eggs taken and survival rates to eye-up for Coos River Winter Steelhead at Bandon Hatchery (1988-2003).

Year	Eggs Taken	Eyed % Survival
1988	41,216	89.6
1989	--	--
1990	--	--
1991	293,308	78.2
1992	484,138	92.9
1993	256,915	99.7
1994	250,080	86.3
1995	322,594	90.8
1996	254,155	86.4
1997	508,810	87.8
1998	221,913	84.9
1999	372,873	90.1
2000	247,180	83.5
2001	235,291	82.7
2002	252,949	77.1
2003	350,067	87.4

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

No gametes from wild parents are ever considered to be surplus of the hatchery spawning program. Wild gametes always have priority over those from returning hatchery fish. Fertilized eggs from wild parents are used in rearing programs or placed into hatchboxes to be released as unfed fry. Eggs directed toward both the smolt and unfed fry programs are selected to be representative of the run timing for the entire season.

A predetermined number of adults and jacks are identified prior to the start of the collection season as the collection goal. Fewer hatchery adults "swim-in" to hatchery facilities than the goal for broodstock collection. Thus, broodstock collection is also accomplished via netting, trapping, and angler donation. These efforts can be adjusted in order to avoid major surpluses of hatchery fish. The few steelhead adults and jacks that are not needed are released into Empire Lakes or killed and placed into streams for nutrient enrichment.

9.1.3) Loading densities applied during incubation.

At Bandon Hatchery eggs are loaded into vertical stack incubators at a density of approximately 13,100 eggs per tray, or what will usually amount to the gametes of just under four females. The standard water flow rate is 5 gpm/tray. The 12 year average for egg size is 142.9 eggs per ounce, with a range of 120 to 156.

Eyed eggs, upon arrival at Cole Rivers Hatchery, are loaded into vertical stack incubators at a density of approximately 5,000 eggs/tray. The standard flow rate is 5 gpm/tray for egg and fry incubation. The 2 year average for egg size is 152.4 eggs per ounce.

Eyed eggs from Bandon Hatchery are incubated in vexar baskets placed in wooden troughs at Millicoma Interpretive Center. This incubation is strictly for the unfed fry releases in the basin.

9.1.4) Incubation conditions.

At Bandon Hatchery water temperatures are checked twice daily and recorded, then averaged. Temperature units are tracked daily to monitor egg development. Dissolved oxygen levels are not monitored, as suffocation has not been a problem with steelhead eggs in flow-through system. Tray screens are brushed and bottoms are "rodded out" as needed depending on the number and severity of storms. Water supply is visually checked daily, and trays are checked following storms for silt and debris accumulation.

Eyed eggs destined for smolt production are transferred to Cole Rivers Hatchery in Styrofoam containers. Ice in the top tray insures a cool, moist shipping environment.

At Cole Rivers Hatchery incubation temperatures are monitored and recorded at 1:00 PM daily. Temperature units are tracked daily to monitor egg development. Oxygen is randomly monitored, minimum dissolved oxygen level is 7 ppm, and suffocation has not been a problem with steelhead eggs. Tray screens are brushed daily during hatching. All incubation water is UV sterilized and may be sand filtered. Heated or chilled water is used to "catch up" or "slow down" egg takes to achieve desired ponding dates. Vexar is placed in the bottom of trays to provide a substrate for fry.

9.1.5) Ponding.

At Cole Rivers Hatchery, fry are force ponded when 99% have buttoned up, normally between 1,100 and 1,200 temperature units. Fry length at ponding is 2.770 cm and weight is 2,200 fish per pound. Ponding dates range from April 10th to May 3rd.

9.1.6) Fish health maintenance and monitoring.

At Bandon Hatchery eggs are treated with formalin every other day at 1:600 for 15 minutes to prevent fungus growth. During the eyeing stage, eggs are not handled. Eyed eggs are addled at 400 or more temperature units, then run through a Van Gaalen brand egg-picking machine to separate the dead (white) eggs. Additional hand picking may be necessary for

blank and/or weak eyed eggs.

At Cole Rivers Hatchery, eggs are received eyed, disinfected with PVP iodine at 1:100 for 15 minutes and hand picked for mortality and fungus. Eyed eggs are treated with formalin at 1:600 for 15 minutes three times a week to prevent fungal growth. Hatch house water is disinfected with UV sterilizer units and much of the water is sand filtered. See Appendix A for pathology monitoring standards.

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.

It is unlikely that incubation of steelhead eggs will have any adverse genetic effects on listed Coho.

Incubating eggs are disinfected regularly to prevent transmission of pathogens to the receiving stream. At Bandon Hatchery, eggs are incubated at low-density levels that have proven to be safe. Headboxes are equipped with water level monitor alarms to reduce risk of interrupted flows. Bandon Hatchery's water supply has a history of being an extremely reliable gravity feed system. All supply lines and valves including main pipeline from intake, hatchery building supply line, and headbox feed/valve were replaced in 1998/99. The Ferry Creek Reservoir was dredged in 1998, significantly reducing silt levels in incubators, thus increasing safety factors for all eggs.

At Cole Rivers, eggs and fry are incubated in UV sterilized water to minimize losses due to disease. Eggs and fry are incubated at low densities that have proven to be safe. Siltation has not been a problem. Water supply alarm systems are also in place at Cole Rivers Hatchery.

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. Coos winter steelhead eggs received and survival to transport for Cole Rivers Hatchery (eyed incubation and rearing program was at Alsea Hatchery prior to year 2000).

Brood Year	Eggs Taken	Eyed % Survival	Eyed Eggs Received	Fry % Loss	Juvenile % Loss	Smolts Shipped to Acclimation	Excess Fingerling Liberated to Impoundments	Smolt Release Goal
2000	247,180	83.5	163,441	1.95	8.14	139,139	0	125,000
2001	235,291	82.7	145,416	3.2	19.2	108,691	0	125,000
2002	252,949	77.1	149,091	7.4	33.5	82,605	0	125,000
2003	350,067	87.4	223,856	1.86	9.57	195,387	0	125,000
2004	259,354	87	NA	NA	NA	NA	0	125,000

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

Cole Rivers Hatchery densities are stated for temperatures below 58° F. Fish density/loading with respect to water flow is 6.22 lbs. fish/gal/min; and with respect to rearing space is less than 1 pound/cubic foot.

9.2.3) Fish rearing conditions

Cole Rivers temperature is monitored daily. Dissolved oxygen is monitored during times of concern. Rearing containers are cleaned weekly or as needed. Mortality is collected daily. Densities are monitored monthly.

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.

Table 9-3. Data of feed type, feeding rate, fish growth (weight gain), and feed conversion.

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	AVG
F/LB	1750	400	120	70	32	15	10	9	8.5	7.5	6.4	5.9	436.31
FEED	Skretting fed through #3 dry ~90 f/lb							Growout diet is BiomoistGrower					NA
%BW/DAY	2.6	2.7	2.6	2.8	2.7	3.1	2.5	2.7	2.3	1.6	1.9	2.2	2.48
CONV.	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.40
LBS/GPM	1.03	1.3	1.57	1.97	2.38	2.86	3.6	4.32	5.15	5.98	6.71	7.67	3.71

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

See Table above in Section 9.2.4. Energy reserve data are not 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*).

Food type used is: Skretting Nutra Mash Plus Starter between 2,500 f/lb and 2,000 f/lb.
#0 Nutra Starter between 2,000 f/lb and 570 f/lb.
#1 Nutra Starter between 570 f/lb and 300 f/lb.
#2 Nutra Starter between 300 f/lb and 150 f/lb.
#3 Nutra Starter between 150 f/lb and 45 f/lb
2.5 BioMoist Grower between 45 f/lb and 38 f/lb
3.0 BioMoist Grower between 38 f/lb and 17 f/lb
4.0 BioMoist Grower between 17 f/lb and 6 f/lb

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

Fish health and behavior are monitored daily. All mortalities are collected and analyzed daily. Fish health examinations are conducted every month by ODFW's fish pathologists. Parasitic, bacterial, and fungal infections are treated as prescribed by pathologists. Viral

samples are monitored by ODFW fish health section. Disinfection techniques are followed primarily to prevent lateral transfer of viral infection. See Appendix A for pathology monitoring standards.

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

Smolt development indices used are age, size, external appearance and behavior of juvenile fish. No ATPase studies are conducted.

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

Natural rearing methods are not practiced, except that smolts are acclimated in release sites for a period of three weeks. Feeding rates are reduced during acclimation to force them to search for natural food.

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.

Fish are reared to 1-year smolt size before transfer for acclimation. All rearing ponds used are double screened to prevent escape due to screen failure. Sampling for size, condition factor, and mark retention are conducted at the hatchery prior to transport back to the Coos Basin, and subsequent release. See Sections 7.9 and 9.1.7 for detailed risk aversion measures. Also see Appendix A for disease monitoring standards.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels. (See Section 1.11.2, Table 1)

Table 10-1. Proposed fish release levels.

Age Class	Programmed Release Number	Size	Approx. Release Date	Location
Smolts	125,000	6.0	04-21	Coos River Basin
Unfed fry (STEP)	2,000	1400	5-1	Near Schools or classroom incubators

10.2) Specific locations of proposed releases.

Hodges Creek Acclimation: Acclimation/release site is located where Hodges Creek enters the East Fork Millicoma River near river mile 4.5. Legal description: T24S, R11W, sec. 34. Proposed release number is 45,000 smolts.

Big Creek Acclimation: Acclimation/release site is located where Big Creek enters the South Coos River near river mile 14.5. Legal description: T25S, R11W, sec. 23. Proposed

release number is 45,000 smolts.

Millicoma Interpretive Center/Millicoma Acclimation Pond (West Fork Millicoma River): Released from this acclimation facility is at river mile 13.0 on the West Fork Millicoma River. Legal description: T24S, R11W, sec. 16. Proposed release number is 35,000 smolts.

Unfed fry are the result of educational classroom incubators at multiple elementary schools in the Coos River Basin. Button-up fry are usually released as a "field trip" at small streams nearest the school. Typically, each school has up to a few hundred eggs.

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

(For proposed smolt releases, see, Section 1.12, Table 1- 2; and Section 10.1) Although the size at release for smolts has ranged from 5 to 7 fish per pound, the current target size is 6.0 per pound. Unfed fry are estimated at 1,400 fish per pound at release.

Table 10.3. Actual numbers and sizes of fish released and release dates of Coos River winter Steelhead, 2006 – 2015.

Release year	Number of smolts released	Avg. size (fpp)	Release date
2006	113,545	7.08	3/30 – 5/22
2007	0	N/A	N/A
2008	130,177	6.42	3/28 – 4/20
2009	146,094	7.28	3/25 – 4/28
2010	123,151	6.04	3/20 – 4/22
2011	105,374	7.18	3/15 – 4/22
2012	75,092	7.40	3/25 – 4/20
2013	45,061	6.26	4/16 – 4/20
2014	110,086	6.84	4/16 – 4/21
2015	129,924	5.55	4/21 – 4/22

Source: ODFW HMS database.

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

Steelhead smolts are transported back to the Coos Basin for acclimation and release (see Table 10.3 above for release dates). After the three-week acclimation period, smolts are allowed to volitionally leave acclimation stations for a period of a week or more. After about one week of volitional release, the remaining few steelhead are forced out. During the volitional phase, dam boards are pulled after a few days to encourage outmigration from the pond. Flows are increased if possible to further encourage outmigration. Steelhead smolts leaving the acclimation facilities enter main forks of South Coos River or Millicoma River.

10.5) Fish transportation procedures, if applicable.

Steelhead smolts are transported in ODFW liberation trucks to acclimation sites. Transport tank and receiving pond water temperatures are measured prior to release into acclimation

ponds. If the discrepancy between the two water temperatures is more than a few degrees, the water in the transport tank can be gradually "tempered" to more closely match the receiving water.

10.6) Acclimation procedures.

Once the steelhead are transported to the acclimation sites in the Coos River Basin the fish are contained in the holding ponds with the use of screens. They are fed one percent of their body weight per day for a period of three weeks. The smolts are allowed to get over the stresses of handling and hauling during the three-week acclimation period, which improves survival as demonstrated by research. The acclimation period also allows the smolts ample time to imprint on the stream and the facility to increase the rate of homing back to the station. High homing rate is desired to alleviate the risk of impacts that these hatchery steelhead may have on wild populations, and to increase their contribution to the freshwater fishery.

See section 5.6 for a description of release contingencies that may occur under extreme water conditions.

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

All smolts are marked prior to acclimation with an adipose fin clip.

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

Every effort to avoid producing surplus smolts is made prior to transportation and liberation. Eyed eggs are carefully inventoried to insure adequate, but not excessive number of fish will be reared. If the projected overage is minimal the excess fish have been included into releases. Options for larger excesses include: releasing excess steelhead into standing water bodies for trout fisheries, humanely killing and burying, use at OHRC or other experimental uses, or killing and using for wildlife projects such as wildlife feeding at aquaria or zoos.

10.9) Fish health certification procedures applied pre-release.

Fish are examined and certified by an ODFW fish health pathologist prior to transportation and liberation. See Appendix A for pathology monitoring standards.

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

During rearing, emergency release procedures at Cole Rivers Hatchery would start with contact of the District Fish Biologists in the Upper Rogue and Coos Basins. Options for water system failure include: (1) truck and release in the Coos Basin, (2) truck and release in an approved standing water body, or (3) truck to another hatchery facility. Coos River steelhead would not be released into the Rogue River Basin. Due to the physical topography of the hatchery grounds at Cole Rivers, flooding is extremely unlikely. A triple redundant

pump system protects the water supply of the hatch house.

If an emergency occurs during the time of acclimation within the Coos Basin, the screens can be pulled and the fish allowed to leave. Flooding of acclimation facilities would cause the early release of part, if not all, of the smolts. Premature release at acclimation sites is not expected to impact survival or homing to a large degree. See section 5.6 for a description of release contingencies that may occur under extreme water conditions.

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.

Risk aversion measures include those previously discussed including genetically similar broodstock, acclimation, volitional release, location of release, and fish health procedures.

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.

Methodologies for steelhead spawning ground counts and other abundance indicators are being developed and refined. Spawning surveys will assist in the monitoring of adult abundance.

In-basin statistical creel surveys, if funded, will monitor the contribution of hatchery fish to fisheries, and an index of wild steelhead abundance.

Habitat surveys and/or juvenile fish counts will be used to determine steelhead population health.

Fish Districts will document number and location of carcasses placed for nutrient enrichment and an annual statewide report will document compliance with DEQ permit requirements.

ODFW Fish Propagation Section will determine hatchery program costs.

ODFW Fish Health Services will sample hatchery smolts for disease before release.

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

As with all state programs, budgets are approved by the Legislature for a two-year period. No commitment of funds can be made past the approved budget period. Funds for various

projects associated with this HGMP come from a variety of sources including license dollars, state general funds, and federal Sport Fish Restoration funds as well as a variety of other federal funds (BLM, USFS, etc.). Funds are committed for portions of the HGMP monitoring but can change with relatively short notice. Some hatcheries in the local region periodically have been on lists to close due to general fund shortfalls. This may result in elimination or reduction in many hatchery programs depending on reprioritization by ODFW.

In July of 2015, the Coos-Coquille-Tenmile Fish District incurred the reduction of 2.0 FTE in staffing. As a result, additional performance standards may be difficult to meet given anticipated staffing and funding levels.

Other "ideal" monitoring (refer to sections 1.9 and 1.10):

- Conduct in-basin creel surveys and record location of hatchery catch, to assist in evaluating extent of hatchery occurrence near natural spawning areas.

- Operate rotary juvenile traps located at various sites throughout the basin, to monitor the number of wild smolts from major production areas in the Coos Basin.

- Determine that life history characteristics of the wild population do not change as a result of this hatchery program:
  (a) Monitor outmigration timing of juveniles.
  (b) Monitor juvenile size at outmigration.
  (c) Monitor adult return timing.
  (d) Monitor adult age and sex composition.
  (e) Monitor spawn timing and distribution.

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.

ODFW staff has not identified any potential genetic or ecological risks from our current and proposed monitoring program**.** Risks aversion measures associated with operation at Bandon and Cole Rivers hatcheries are identified above. Risk aversion measures associated with Oregon Plan monitoring activities (spawning ground surveys, juvenile traps, and snorkeling) are discussed under the ESA 4(d) rule, Research and Monitoring Application.

SECTION 12. RESEARCH

12.1) Objective or purpose.

No specific research is planned for the hatchery steelhead program in the Coos Basin.

12.2) Cooperating and funding agencies. N/A

12.3) Principal investigator or project supervisor and staff. N/A

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

12.5) Techniques: include capture methods, drugs, samples collected, tags applied. N/A

12.6) Dates or time period in which research activity occurs. N/A

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods. N/A

12.8) Expected type and effects of take and potential for injury or mortality. N/A

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

12.10) Alternative methods to achieve project objectives. N/A

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

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. N/A

SECTION 13. ATTACHMENTS AND CITATIONS

APPENDIX A. FISH HEALTH MONITORING

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 ODFW's qualified fish health specialists.
- 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), agent of bacterial kidney disease. Beginning in 2001, 100% of the Coos and Coquille coho female adults will be sampled for Rs antigen and culling or segregation of the progeny will be implemented. 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.

Five Year Disease History of Coos River Stocks at Morgan Creek, Millicoma and Noble Cr. facilities 1996-2000.

Disease/Organism	Stock/Species: 37 ChF	37 Co	37 StW
IHNV	no	no	no
CAD	no	no	no
Fl. psychrophilum	no	no	no
Fl. columnare	no	no	no
Aeromonas salmonicida	no	no	no
Aeromonas/Pseudomonas	yes	yes	yes
Yersinia ruckeri	yes	no	no
R. salmoninarum	yes	yes	no
Internal mycosis	no	no	no
External mycosis	yes	yes	yes
Ichthyobodo	no	no	no
Gyrodactylus	no	no	yes
Ichthyophthirius	no	no	yes
Gill Amoeba	no	no	no
Trichodinids	yes	no	yes

Disease Treatment

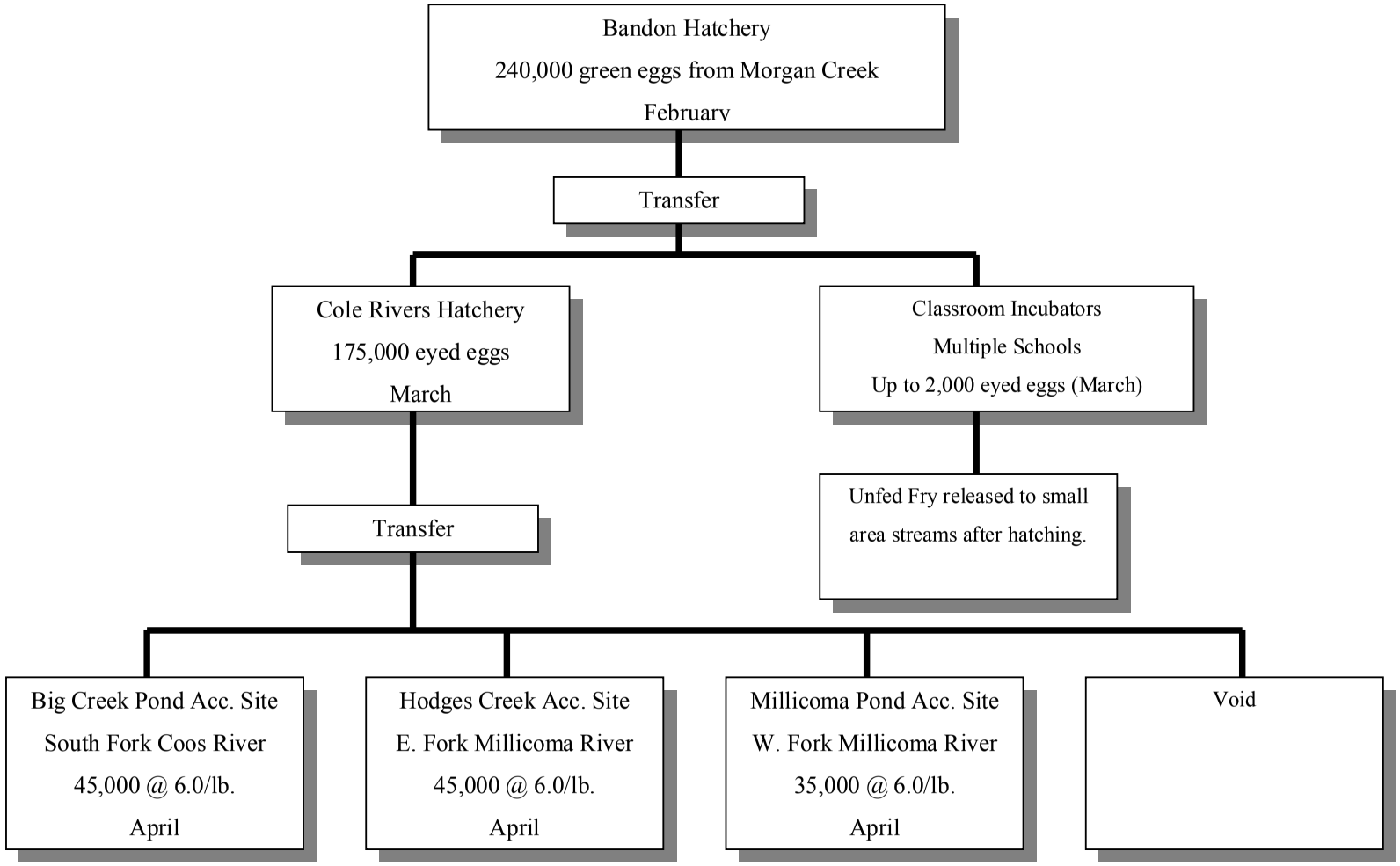
Treatments for disease at these facilities are rare. *Ichthyophthirius* may become a problem in the near future and will be treated with a prolonged formalin drip. On rare occasions it is necessary to treat a group of fish for bacterial pathogens and medicated food containing oxytetracycline is used.

Fish Health Inspection for Broodstock

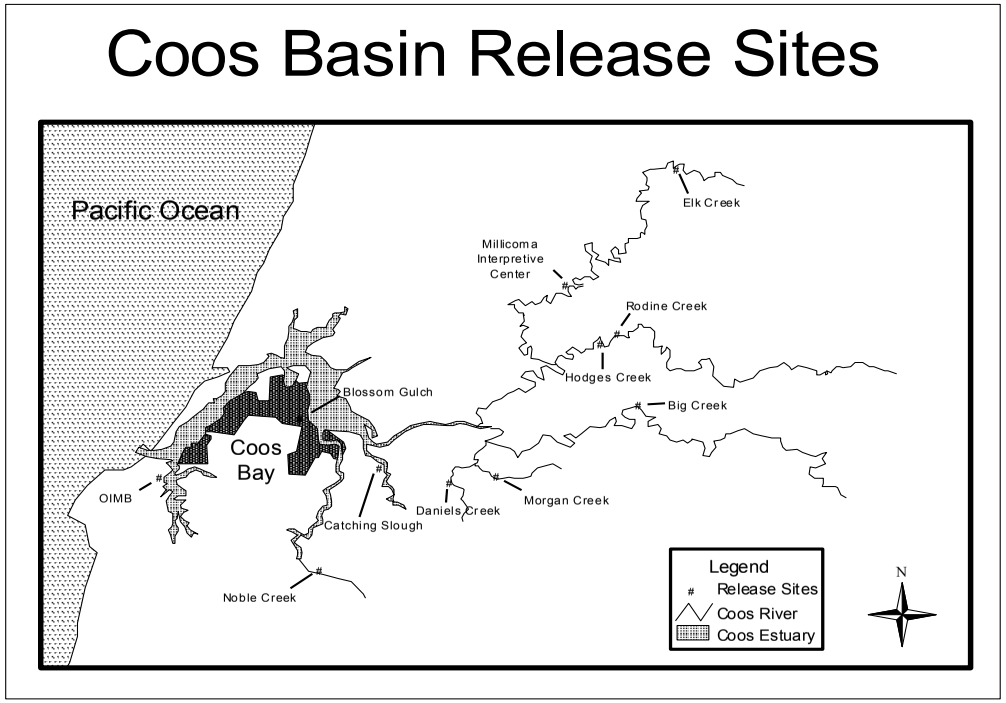
Fall Chinook and Coho Salmon are examined for the presence of viruses and are also sampled for bacterial kidney disease. Starting in 2001 all Coho Salmon females will be sampled for BKD and eggs from positive females will be culled or segregated to reduce the incidence of the disease in this stock. Steelhead trout are sampled for the presence of viruses.

APPENDIX B. Hatchery Fish Production Flow Chart

Winter Steelhead - Stock 37 (Coos River)



APPENDIX C. Map of Coos Basin Release Sites. Steelhead are released at Millicoma Interpretive Center, Hodges Creek, and Big Creek. Other locations are Chinook release sites or discontinued sites.



APPENDIX D. REFERENCES

Federal Register Notice. 1998. Endangered and Threatened Species; Threatened Status for the Oregon Coast Evolutionarily Significant Unit of Coho Salmon. Vol. 63, No 153, pp 42587-42591.

Fisher, J. P., and W. G. Pearcy. 1985. Studies of juvenile salmonids off the Oregon and Washington coast, 1985. Oregon State University Sea Grant College Program, ORESU-T-85-004, Corvallis.

Hartt, A. C., and M. B. Dell. 1986. Early oceanic migrations and growth of juvenile Pacific salmon and steelhead trout. International North Pacific Fisheries Commission Bulletin 46:1-105.

Jacobs S., J. Firman, G. Susac, E. Brown, B, Riggers and K. Tempel. 2000. Status of Oregon coastal stocks of anadromous salmonids. Monitoring Program Report Number OPSW-ODFW-2000-3, Oregon Department of Fish and Wildlife, Portland, Oregon.

Lewis, M.A. 2000. Stock assessment of anadromous salmonids, 1999. Oregon Department of Fish and Wildlife, Oregon Plan for Salmon and Watersheds, Annual Progress Report number OPSW-ODFW-2000-4, Portland.

Lister, D. B., and H. S. Genoe. 1970. Stream habitat utilization by cohabiting underyearlings of Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon in the Big Qualicum River, British Columbia. Journal of the Fisheries Research Board of Canada 27:1215-1224.

Moring, J. R., and R. L. Lantz. 1975. The Alsea watershed study: Effects of logging on the aquatic resources of three headwater streams of the Alsea River, Oregon. Part I - Biological studies. Oregon Department of Fish and Wildlife, Fishery Research Report Number 9, Corvallis.

Mundie, J. H. 1969. Ecological implications of the diet of juvenile coho in streams. Pages 135-152. *In* T. G. Northcote [ed.] Symposium on salmon and trout in streams. H. R. MacMillan Lectures in Fisheries. University. of British Columbia, Vancouver, B.C.

Nickelson, T.E. 1998. A habitat-based assessment of coho salmon production potential and spawner escapement needs for Oregon coastal streams. Oregon Department of Fish and Wildlife, Fish Information Report 98-4. Portland.

Nickelson, T.E. 2001. Population assessment: Oregon coast coho salmon ESU. Oregon Department of Fish and Wildlife, Fish Information Report 2001-2. Portland.

Nickelson, T. E., J. D. Rodgers, S. L. Johnson, and M. F. Solazzi. 1992a. Seasonal changes in habitat use by juvenile coho salmon (*Oncorhynchus kisutch*) in Oregon coastal streams. Canadian Journal of Fisheries and Aquatic Sciences 49:783-789.

Nickelson, T. E., M. F. Solazzi, S. L. Johnson, and J. D. Rodgers. 1992b. Effectiveness of selected stream improvement techniques to create suitable summer and winter rearing habitat for juvenile coho salmon (*Oncorhynchus kisutch*) in Oregon coastal streams. Canadian Journal of Fisheries and Aquatic Sciences 49:790-794.

ODFW, 1990. Coos River Basin Fish Management Plan. Oregon Department of Fish and Wildlife. Portland, Oregon.

ODFW. 1995. Wild fish management policy status review. Oregon Department of Fish and Wildlife. Portland, Oregon.

ODFW. 1999. Coastal salmonid and Willamette trout hatchery program review. Draft Final Report (March 19, 1999), Oregon Department of Fish and Wildlife, Portland, Oregon.

ODFW. 2015. Assessment of Western Oregon Adult Winter Steelhead and Lamprey—Redd Surveys 2015. The Oregon Plan for Salmon and Watersheds Report Number OPSW-ODFW-2015-09.

ODFW. 2016. Coho Abundance Data. OASIS website:
http://odfw.forestry.oregonstate.edu/spawn/cohoabund.htm

Pacific Fishery Management Council (PFMC). 1997. Draft Amendment 13 to the Pacific coast salmon plan. Fishery management regime to ensure protection and rebuilding of Oregon coastal natural coho. Pacific Fishery Management Council. Portland, Oregon.

Reiser, D. W., and T. C. Bjornn. 1979. Habitat requirements of anadromous salmonids. Ch. 1. *In* W. R. Meehan [tech. ed.] Influence of forest and rangeland management on anadromous fish habitat in the western United States and Canada. Pacific Northwest Forest and Range Experiment Station, USDA. Forest Service, Portland.

Rodgers, J. D., S. L. Johnson, T. E. Nickelson, and M. F. Solazzi. 1993. The seasonal use of natural and constructed habitat by juvenile coho salmon (*Oncorhynchus kisutch*) and preliminary results from two habitat improvement projects on smolt production in Oregon coastal streams. *In* Proceedings of the coho workshop, May 26-28, 1992 at Nanaimo, B.C.

Solazzi, M.F., S.L. Johnson, B. Miller, and T. Dalton. 2000. Salmonid Life-Cycle Monitoring Project 1998 and 1999. Monitoring Program Report Number OPSW-ODFW-2000-2, Oregon Department of Fish and Wildlife, Portland.

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: Timothy Walters, Umpqua Watershed District Manager

Signature: _____Date:_____

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

Signature: _____ Date:_____

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

Listed species affected: *Coho Salmon* **ESU/Population:** *Oregon Coast ESU* **Activity:** *Coos River Steelhead Program*				
Location of hatchery activity: *Coos Basin* **Dates of activity:** *Ongoing* **Hatchery program operator:** *Mike Gray (District Biologist)*				
Type of Take	**Annual Take of Listed Fish By Life Stage** ***(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)			25	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			1	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

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