HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Siletz River Summer Steelhead Program**
Species or Hatchery Stock:	**Summer Steelhead Trout *Oncorhynchus mykiss* (Stock 33)**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**North Coast Watershed District**
Date Submitted: **Updated Draft Submitted:** **Second Update Submitted:**	**August 3, 2005** **August 26, 2014** **July 1, 2016**
Date Last Updated:	**June 30, 2016**

SECTION 1

GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Cedar Creek and Roaring River hatcheries, Siletz River summer steelhead program.

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

Summer steelhead *Oncorhynchus mykiss*, stock 33. The hatchery stock is not listed under the Endangered Species Act (ESA). Natural-origin Siletz River summer steelhead are part of the Oregon Coast Steelhead DPS and listed as a candidate species under the federal Endangered Species Act (ESA).

1.3) Responsible organization and individuals.

Lead Contact:

Name (and title):	Scott Patterson, Fish Propagation Program Manager
Organization:	Oregon Department of Fish and Wildlife
Address:	4034 Fairview Industrial Drive SE, Salem, OR 97302
Telephone:	503/947-6218
Fax:	503/947-6202
Email:	Scott.D.Patterson@state.or.us

Onsite Lead Contact:

Name (and title):	John Spangler, District Fish Biologist
Agency or Tribe:	Oregon Department of Fish and Wildlife
Address:	810SW Alder St., Unit C, Newport, OR 97365
Telephone:	541-265-8306 x224
Fax:	541-997-2958
Email:	john.j.spangler@state.or.us

Hatchery Contact:

Name (and title):	Diane Deal, Roaring River Hatchery Manager
Agency or Tribe:	Oregon Department of Fish and Wildlife
Address:	42279 Fish Hatchery Drive, Scio, OR 97374
Telephone:	503/394-2496
Fax:	503/394-7261
Email:	RoaringRiver.Hatchery@state.or.us

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

None.

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

Both Cedar Creek and Roaring River hatcheries are funded through the State of Oregon general fund. Cedar Creek Hatchery has 3 FTE's and Roaring River Hatchery has 4 FTE's. The 2016 FY annual budget for Cedar Creek Hatchery is $370,000 and that of Roaring River Hatchery is $560,000.

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

This program collects hatchery summer steelhead adults from the Siletz Falls trap for broodstock. The adults are held and spawned at Cedar Creek Hatchery. Eggs are incubated to the eyed stage at Cedar Creek and then transferred to the Roaring River Hatchery where the eggs are hatched and reared to smolt stage for release into Siletz River.

Location of Cedar Creek Hatchery:
Cedar Creek Hatchery is located in the Nestucca River Watershed 1.5 miles east of Hebo and adjacent to Three Rivers, a tributary of the Nestucca River. It is at an elevation of 43 feet, at latitude 45° 12' 57" N and longitude 123° 50' 43" W.

Location of Roaring River Hatchery:
The Roaring River Hatchery is located on Roaring River, a tributary to the South Fork of the Santiam River, 19 miles east of Albany on Fish Hatchery Drive. It occupies 15 acres owned by ODFW at an elevation of 520 feet. GPS coordinates are 10 UTM, 0522318E, 4941136N. The Roaring River waterbody code is 0201220020. The regional mark processing code for Roaring River Hatchery is 5F33322 H22 21.

Adult Trapping Facility:
The Siletz Falls trap is located at river mile (RM) 64.5 on the Siletz River at approximately 720 feet above MSL. The trap is associated with a fish ladder around a 41-foot high falls.

1.6) Type of program.

Isolated harvest program.

1.7) Purpose (Goal) of program.

The goal of this Siletz summer steelhead program, as outlined in the Coastal Multispecies Conservation Plan, is to release of 50,000 hatchery summer steelhead for harvest while minimizing interactions with wild fish. The program goal is to achieve 3% adult return rate to the fishery and for broodstock.

1.8) Justification for the program.

This program provides steelhead for harvest while minimizing adverse impacts to wild fish, including listed Coho Salmon. Hatchery fish are necessary to meet public desires

for consumptive harvest because regulations require the release of wild steelhead, and the potential for natural summer steelhead production in the Siletz Basin is limited. Smolt releases in the Siletz are made in the mainstem Siletz in areas where the majority of the fishery occurs. Hatchery summer steelhead adults are collected at the Siletz Falls trap. The area above the falls is managed as a sanctuary for the wild summer steelhead population, which is a stock of concern, and no hatchery fish are passed into this area. This area upstream from Siletz Falls comprises about 25% of the entire Siletz Basin. Returning hatchery summer steelhead are collected for broodstock. Wild summer steelhead had not been used for brood in the recent past. Starting with brood year 2008, a small subset of wild summer steelhead was incorporated into the broodstock.

1.9& 1.10) List of program "Performance Standards" and applicable "Performance Indicators".

*The following are **key** performance standards and indicators identified to evaluate the success of this fish propagation program. Note: not all measurable standards are listed.* Additional hatchery standards will be evaluated using data gathered during adult collection, mating, incubation and rearing, and release of the winter steelhead. Data will confirm fish propagation procedures identified in Sections 7 through 10.

Sport Fishery Contribution

Standard 1.1: Provide for a release of 50,000 hatchery summer steelhead smolts in the Siletz Basin.
Indicator: Annual fish liberation reports indicate the proposed number of smolts have been released.

Impacts to Wild Fish

Standard 2.1: Timing of adult migration for natural population does not change as a result of this fish propagation program.
Indicator: Return timing of wild fish is consistent with historical return timing prior to establishment of the 033 broodstock.

Standard 2.2: Limit hatchery fish to 10% or less of the fish spawning in natural habitats in the Siletz and neighboring basins, except in the immediate area around the release site(s).
Indicator: Enumerate the total number of adult returns and the number of marked hatchery adult returns (stock 33 plus other stocks) to two traps within the Siletz Basin; on Mill Creek, and Schooner Creek. During surveys for spawning steelhead, make observations on the presence or absence of an adipose fin denoting if the fish is of hatchery or wild origin.
Indicator: Enumerate the total number of adult returns and the number of marked hatchery adult returns (stock 33 plus other stocks) at traps outside of the Siletz Basin at Bohannon Falls (Alsea), Cascade Creek (Alsea), Fall Creek (Alsea), Mill Creek (Yaquina), and Whittaker Creek (Siuslaw).

Standard 2.3: Impacts to listed natural Coho Salmon trapped at Siletz Falls are minimized.
Indicator: Confirm that trap is checked on a regular basis and wild Coho Salmon are promptly removed and released in appropriate habitat downstream.

Stock Identification

Standard 3.1: All hatchery smolt releases for this program will be marked so as to distinguish them from wild fish throughout their life. This mark or combination of marks will include an adipose fin-clip.
Indicator: Confirm that all smolts were marked with an adipose fin-clip prior to release. Pre-release mark quality checks, based on a sample of 200 smolts, indicate at least 98% of fish released have retained identifiable marks.

Program and Facility Operations

Standard 4.1: Timing of adult broodstock collection mimics the average wild steelhead migration.
Indicator: The proportion of broodstock collected each month is identical to the proportion of the natural population, on average, that enters Siletz trap during that month. Refer to Section 7 for details.

Standard 4.2: Adult selection, mating, and spawning are consistent with approved methods and procedures.
Indicator: Females and males are selected (and paired) randomly as they ripen for spawning.
Indicator: Fish are spawned at a 1:1 male-to-female ratio and are matrix spawned.
Indicator: If wild fish are incorporated into the broodstock, they will be live-spawned. Those that are cleared by ODFW Fish Pathologists are returned to the Siletz River.

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

Standard 4.4: Release 50,000 (plus or minus 5%) hatchery summer steelhead smolts at a size of six fish-per-pound annually at site(s) in the Siletz Basin from existing stock-33.
Indicator: Hatchery production will be inventoried prior to release to enumerate smolt size and release numbers. Juveniles that die in transport will be subtracted.

Standard 4.5: Achieve a 3% return rate of hatchery fish to the fishery, from the smolt release.
Indicator: Compare hatchery releases with harvest estimated from harvest tags to derive estimated return rate to the fishery**.**

Indicator: Compare return rate to the fishery in the Siletz River with return rates of hatchery summer steelhead programs in other basins to determine if factors that are out of ODFW's control (such as ocean conditions, climatically influenced angling conditions, or societal influenced angling effort) may be having strong influences on meeting the 3% target for this program.

Standard 4.6: Follow approved fish health disease and disinfection monitoring guidelines to minimize disease impacts on natural populations.
Indicator: Compliance with approved fish health standards and criteria.

1.11) Expected size of program.

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

This program currently uses hatchery and potentially small subsets of wild summer steelhead adults for the broodstock each year. A maximum of 45 pair of fish are needed to produce the 50,000 smolts. These fish will be collected in proportion to the historical wild run at the Siletz Falls trap, a mainstem trap, and should represent a random collection of the hatchery population.

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

Table 1-1. Proposed Annual Fish Release Levels.

Life Stage	Release Location	Annual Release Level
Eyed Eggs	NA	NA
Unfed Fry	NA	NA
Fry	NA	NA
Fingerling	NA	NA
Yearling	Siletz River - 4 sites	50,000

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

The only information on the performance of this program is harvest data and returns to the Siletz Falls trap. The harvest data prior to 1992 included the harvest of wild fish and cannot be used to determine hatchery fish harvest. The Siletz Falls trap was not operated continuously until 1994. Prior to then, only rough estimates of hatchery summer steelhead could be made.

The only program goal related to smolt survival is harvest rate. The goal for harvest of hatchery summer steelhead is 3% of smolts released. See Section 3.3.1 for most recent harvest levels.

Determining stray rates of the hatchery summer steelhead is difficult. The only information available consists of trapping data during the fall and winter when monitoring for winter steelhead is occurring (Table 1-2). It is suspected that some

hatchery summer steelhead may stray into natural areas in the fall and winter. However, determining which fish are hatchery summer steelhead is complicated by the fact that some winter steelhead hatchery programs use the same fin clip.

Table 1-2. Summary/numbers of steelhead strays in the Siletz basin.

Year	Wild	Schooner Cr. Hatchery	# Ad Clips	Wild	Mill Cr. Hatchery	# Ad Clips
1997-98	22	20	17	23	64	29
1998-99	17	19	16	12	97	69
1999-00	48	49	46	6	17	11
2000-01	26	9	8	13	19	0
2001-02	52	22	19	24	68	15
2002-03	71	34	32	28	45	36
2003-04	45	27	23	27	219	44
2004-05	41	1	1	11	142	34
2005-06	Not Operated		NA	29	103	21
2006-07	19	15	11	13	118	30
2007-08	28	5	1	19	50	4
2008-09	10	1	0	15	57	13
2009-10	61	5	4	14	44	13
2010-11	48	5	5	29	53	4
2011-12	66	16	16	38	97	21
2012-13	39	9	7	15	88	24

*It is unknown whether Ad clipped steelhead are summers or stray winters.

In 2014 and 2015 snorkel surveys were conducted by a consultant upstream of Siletz Falls. The intent of the surveys was to investigate whether there were any hatchery summer steelhead passing through the trap to the upper basin. In 2014 the surveys found a 5% stray rate upstream of the falls. The hatchery summer steelhead that passed the falls were thought to have been able to migrate through the trap during a short window when there was a gap under the main doors that allowed a few fish to get passed. This has been remedied. In 2015 the surveys were repeated and a 20% stray rate was found. The year 2015 was a very low flow year and at one time it was thought summer steelhead would not be able to migrate past the falls. What was observed is that Siletz summer steelhead were still able to navigate the falls to the upper basin. However, it's not a common phenomenon of low flow occurrence that attracts fish to migrate through the ladder. For about a two week period during 2015 there was not enough flow going through the ladder to attract fish into the trap so there was some migration over the falls. Once we diverted more flow through the trap we were capturing up to 100 hatchery steelhead a day. Most years the stray rate will be less than 5%. Summer steelhead stray rates below the falls are unknown. No trapping activities occurring below the falls during summer steelhead migration periods.

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

Hatchery summer steelhead have been stocked in the Siletz River since the early 1960's.

1.14) Expected duration of program.

The program will continue in the Siletz River indefinitely.

1.14) Watersheds targeted by program.

The Siletz watershed is the target of this program.

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.

One issue related to the Siletz hatchery summer steelhead program is recovery of the native summer steelhead population in the Siletz Basin. Compatibility between the hatchery program and wild summer steelhead recovery is achieved mainly by operating an adult fish trap at Siletz Falls and selectively passing only wild summer steelhead upstream. The area upstream from this falls encompasses what is considered to be the predominant freshwater habitat for these fish.

A second issue related to this hatchery program is the overall abundance of hatchery steelhead spawning in natural habitats occupied by winter steelhead in the Siletz Basin. Limited observations in tributaries of the Siletz River indicate a substantial proportion of hatchery spawners in winter steelhead habitats. Some of these hatchery spawners are thought to be Siletz summer steelhead. However, given these fish have only an adipose fin clip which is a very common mark among hatchery steelhead, it is uncertain to what extent hatchery Siletz summer steelhead stray. There is also concern that large numbers of hatchery steelhead smolts released in the Siletz Basin may create competition with wild fish or attract predators which could also affect wild fish.

A third issue related to this hatchery program is providing adequate harvest. The fishery for hatchery adult summer steelhead is very popular, and anglers would like to have more fish to harvest. An alternative that would address this issue is to release more hatchery steelhead smolts.

1.16.2) Potential Alternatives to the Current Program

Alternative 1 - *Discontinue the current hatchery summer steelhead program.*
This would pose the least risk to wild Siletz steelhead of any of the alternatives. There would be no hatchery smolt or adult interactions. Eliminating the program would eliminate the consumptive fishery for summer steelhead in the Siletz, as well as the objective of this program, which is to provide harvest. Discontinuing the smolt releases would also mean that the hatchery broodstock would not be maintained. This would eliminate a source of genetic material that could be used if the wild population were to become extremely depressed in the future.

Alternative 2 - *Reduce the number of hatchery smolts released.*

This would reduce the impact of smolt releases to the native winter and summer steelhead, and produce fewer hatchery adults that might spawn in natural areas. A reduction in adult return would reduce the number of hatchery summer steelhead harvested in the Siletz River.

Alternative 3 - *Develop a new hatchery summer steelhead broodstock with wild fish.*
ODFW's Hatchery Management Policy calls for the transition to local broodstocks for all hatchery programs, with infusion of wild fish annually to minimize impacts on wild populations. This could help minimize impacts of the hatchery program on wild Siletz summer steelhead. However, Chilcote (2003) found that "wild-type" steelhead broodstocks do not impact wild steelhead productivity any less than domestic broodstocks do. The initial development of a new broodstock would require the removal of significant numbers of wild adults, which would reduce the productivity of the wild population to some extent. Given that the current broodstock is derived from native Siletz summer steelhead, it is possible to achieve the intent of this alternative by incorporating a portion wild fish in the broodstock each year, perhaps 30%, rather than completely replacing the broodstock.

Alternative 4 - *Release more hatchery summer steelhead smolts.*
Releasing more smolts could increase the harvest of summer steelhead in the Siletz River. Any increase in smolts, and resulting adults, would increase the risk to wild fish in the Siletz River. This could lead to a violation of the objectives in the Siletz River Basin Fish Management Plan, and the interim criteria of the Native Fish Conservation Policy concerning the level of hatchery fish on the spawning grounds.

1.16.3) Potential Reforms and Investments.

Reform/Investment 1 -
Expand monitoring of wild and hatchery steelhead spawning in natural habitats in the Siletz Basin, and differentially fin clip summer steelhead to help understand the magnitude and sources of hatchery steelhead straying in the Siletz. The cost of operating a third adult steelhead trap (on Cedar Creek) is estimated at $10,000 annually.

SECTION 2

PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS

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

The HGMP for this program was submitted to NMFS on 6/27/2008 for approval and ESA authorization. This is an updated version of the previously submitted HGMP and is consistent with ODFW's Coastal Multi-Species Conservation and Management Plan.

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

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

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

The program has no intent to directly take any ESA-listed Coho Salmon.

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

The NMFS ESA-listed Oregon Coast Coho Salmon may be indirectly affected through competitive interactions with hatchery fish for food and space, as well as during wild summer steelhead brood collection. Coho populations that could be incidentally affected by this program are located to the north and south of the Siletz River, and would be the Devils Lake Basin and the Yaquina Basin populations.

Siletz Complex

The Siletz Complex consists of Coho Salmon inhabiting mid-coast streams located between Cascade Head on the north, and Cape Foulweather on the south (Nickelson 2001). These include Salmon River, Devils Lake tributaries, and the Siletz River. There is an estimated 170 miles of spawning habitat available to the Coho Salmon of this complex.

Coho Salmon Life History

Adult Coho Salmon migrate into fresh water in the fall to spawn. Spawning of wild Coho Salmon usually occurs from mid-November through February. Adult spawning Coho Salmon are typically 3 years old, and are often accompanied by 2 year old jacks (precocious males) from the next brood. Spawning occurs primarily in small tributaries located throughout coastal basins. The parents normally exhibit strong homing to their natal stream. The female digs a nest (redd) in the gravel and lays her eggs, which are immediately fertilized by accompanying adult males or jacks. The eggs are covered by digging and displacing gravel from the upstream edge of the nest. Each female lays about 2,500 eggs. The adults die soon after spawning. Sex ratios of spawning adults

tend to average around 50:50 at most locations (Table 2-1). However, Moring and Lantz (1975) observed 77% 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 for 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)
Alsea	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 that 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 their 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 their second summer in the ocean, a substantial percentage of the 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 takes place in small, low-gradient tributary streams (generally less than 3%), 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 between February and early June (Moring and Lantz 1975) and occupy backwater pools and stream margins (Mundie 1969; Lister and Genoe 1970;

Nickelson et al. 1992a). During the summer, Coho prefer pools in small streams. During winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex cover (Nickelson et al. 1992a, 1992b). 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% of the habitat (Nickelson 1998). When marine survival increases, as could occur with a changing climate regime, Coho will redistribute into freshwater habitats of lower quality. Thus, Coho Salmon population dynamics function with a classic "source-sink" relationship among stream reaches.

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

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

The Siletz Complex consists of Coho Salmon inhabiting mid-coast streams located between Cascade Head on the north and Cape Foulweather on the south. These include Salmon River, Devils Lake tributaries and Siletz River. There is an estimated 170 miles of spawning habitat available to the Coho Salmon of this complex. The critical population level for the Siletz Complex is 700 adult spawners. The habitat of this complex has the potential to support a viable population because high quality habitat is estimated to be present in 51 miles of stream, more than the 15 mile threshold (Nickelson 2001).

The abundance of Coho Salmon spawners of the Siletz Complex has ranged from about 400 to about 33,000, and has averaged about 7,300 since 1990 (Figure 2-1 and Table 2-2). In eight of those years, spawner abundance fell below the critical threshold of 700 fish.

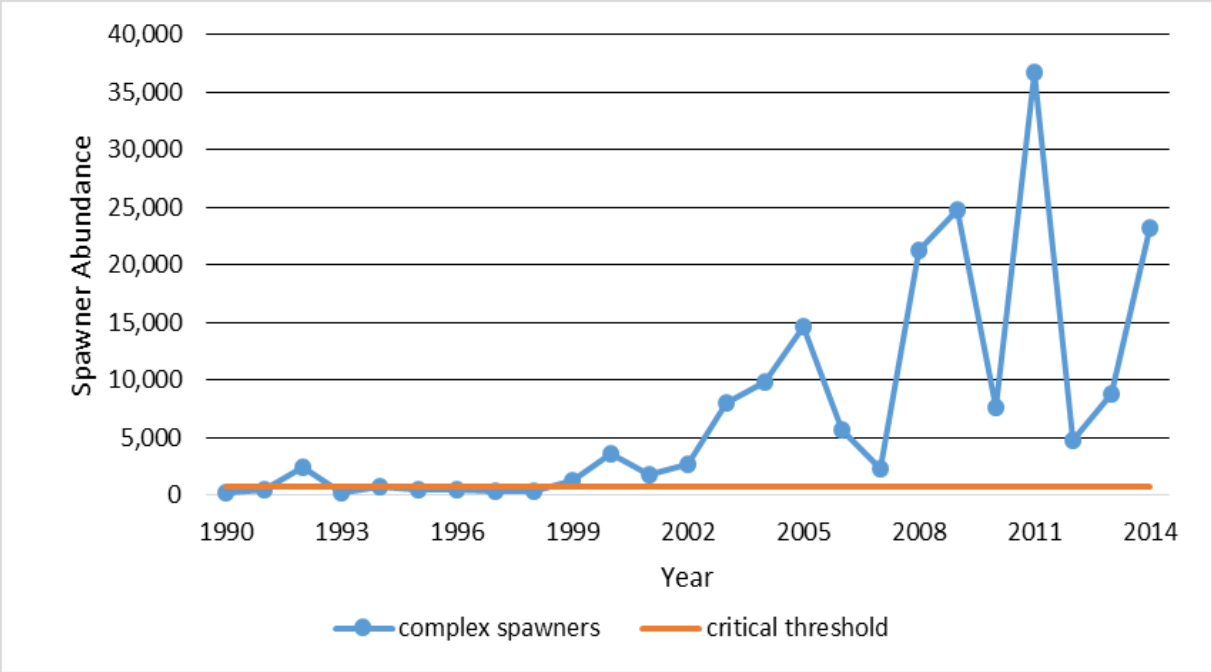

Figure 2-1. Trend in adult Coho Salmon abundance relative to the critical population level for the Siletz Complex. Error bars are 95% confidence limits.

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

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

- **Provide the most recent 12 year (e.g. 1990-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

Recruits per wild spawner have been highly variable, with six of the last 22 broods falling to below one (Table 2-2 above and Figure 2-2 below). However, the 1997 brood was very productive: a parent stock of about 700 produced an estimated 3,300 adults and 3,000 spawners in the 2000-2001 run-year.

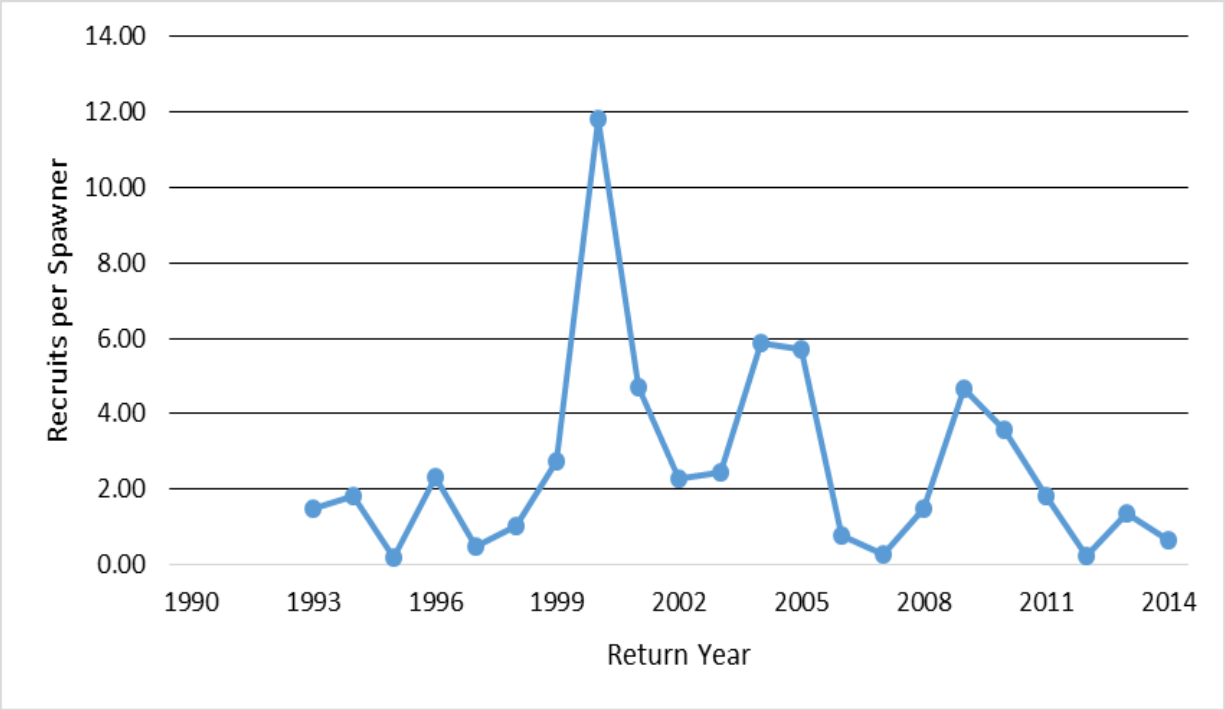

Figure 2-2. Trend in recruits per spawner for Siletz Complex wild Coho.

- **Provide the most recent 12 year (e.g. 1990-2002) annual spawning abundance estimates, or any other abundance information. Indicate source of these data.**

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

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

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

Table 2-4. Estimates of Abundance of Juvenile Life Stages Based on spawner abundance in the Siletz Complex. Estimates are in millions.

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

- Provide the most recent 12 year (e.g. 1990-2002) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

See Table below 2-5 for running 5 year average and yearly average pHOS data of steelhead. It's not identified the proportions of pHOS between summer steelhead and winter steelhead.

Table 2-5. Yearly average and 5-year running average data of spawning ground survey showing pHOS levels of steelhead, 2003-2015, without differentiating the proportion of pHOS between summer steelhead and winter steelhead.

Spawning Year	5-year avg pHOS	5-year observations (n)	Yearly pHOS	Yearly observations (n)
2003	NA	NA	8.5%	47
2004	NA	NA	4.3%	46
2005	NA	NA	9.1%	11
2006	NA	NA	15.0%	20
2007	11.8%	148	45.8%	24
2008	17.2%	110	33.3%	9
2009	26.1%	64	NA	0
2010	21.2%	57	0.0%	4
2011	22.7%	47	20.0%	10
2012	12.8%	44	9.5%	21
2013	12.2%	43	37.5%	8
2014	11.0%	54	0.0%	11
2015	13.1%	62	8.3%	12

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

- 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.

Broodstock Collection

The ESA-listed natural Siletz River Coho Salmon adults have been incidentally captured during the collection of summer steelhead broodstock. This occurs in October and November. The wild Coho Salmon are transported downstream, and released in appropriate tributaries. The area above Siletz Falls is a sanctuary for wild summer steelhead and no Coho Salmon or winter steelhead are passed into this area.

Wild Coho Salmon have also been incidentally captured in traps at winter steelhead monitoring stations, which are intended to track winter steelhead stray rates. These sites also monitor hatchery summer steelhead stray rates to some extent (not operated during entire summer steelhead migration period). Adult trapping is likely to incidentally take wild Coho Salmon by delaying upstream migrations, and invoking stress as a result of capture, handling, and upstream release. These impacts will likely occur in December and January. *Note: All incidental impacts from steelhead trapping have been identified under ODFW's 4(d) Research and Monitoring application.*

Smolt Releases

Hatchery summer steelhead smolts may interact with wild Coho Salmon smolts after their release. This impact should be minimal; most hatchery steelhead smolts will be out of the system before the majority of wild Coho Salmon smolts emigrate to the ocean.

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

Trapping at Siletz Falls has captured wild Coho Salmon in the past. Since 1994, when the practice of passing Coho Salmon above the falls stopped, the numbers of wild Coho being trapped has declined. Recent trap captures are in Table 2-5. All wild Coho captured were taken to a lower river tributary with good spawning habitat.

Table 2-5. Combined adult wild Coho Salmon captured at the Siletz Falls trap for summer and winter steelhead programs, 1994-2015.

Year	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
# Wild Coho	20	24	9	0	5	1	6	13	68	35	21	19	18	6
Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**						
# Wild Coho	13	14	20	18	2	1	30	6						

- 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 associated with broodstock collection and stray monitoring for summer and winter steelhead program is also covered under the ODFW's 4(d) Research and Monitoring application/permit. However, the projected total annual take levels both for summer and winter steelhead is presented below in take Table 2-6.

Table 2-6. The combined estimated listed salmonid take levels during trapping operations for summer and winter steelhead programs.

Listed Species Affected:	Coho Salmon	**ESU/Population:**	Oregon Coast/ Siletz River	**Activity:**	Summer & Winter Steelhead Trapping
Location of Hatchery Activity:	Siletz Falls and Palmer Creek traps	**Dates of Activity:**	January - May	**Hatchery Program Operator:**	Oregon Dept. of Fish and Wildlife

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)			0 - 80	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			5	
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.

- 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.

If the number of Coho Salmon captured in the traps is higher than expected, the trapping operations may be rescheduled to address the issue. Also, methods of handling will be reviewed and modified if there appears to be increases in injuries or mortality of 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 (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

- **Siletz River Basin Fish Management Plan -** (approved by the Oregon Fish and Wildlife Commission—November 14, 1997). The basin management plan identifies the existing summer steelhead broodstock program.

- **Native Fish Conservation Policy** - The Oregon Fish and Wildlife Commission has approved the Native Fish Conservation Policy (NFCP). The NFCP requires the development of a conservation plan for each native stock within the species management unit (SMU). The ODFW has completed an Oregon Native Fish Stock Status Report 2005. Information in the document will be used for the development of conservation plan as part of the NFCP. The conservation plan shall illustrate options for the responsible use of hatchery-produced fish within the SMU.

- **Fish Hatchery Management Policy** – This policy provides guidance for the responsible use of hatchery-produced fish. It outlines the best management practices for hatchery programs to ensure conservation and management of both naturally produced native fish and hatchery produced fish in Oregon. The FHMP calls for the development of Hatchery Program Management Plans (HPMPs) to outline the hatchery practices that will be followed for each hatchery program. A HPMP may be a Hatchery and Genetic Management Plan (HGMP) or an aspect of conservation plan developed under the Native NFCP.

- **Oregon Coast Multi-Species Conservation and Management Plan** – (adopted by the Oregon Fish and Wildlife Commission, June 2014) The Siletz River summer steelhead program is consistent with the coastal multi-species conservation and management plan.

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

- **Oregon Plan for Salmon and Watersheds** (Executive Order 99-01). The Oregon Plan for Salmon and Watersheds is a prescriptive set of measures for recovering threatened and endangered salmon and steelhead, and meeting federal water quality standards established by Executive Order of the Governor. The Oregon Plan includes measures linked to the hatchery production of summer steelhead in the Siletz 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.

- **Pacific Fisheries Management Council** (Section 7 Consultation).

3.3) Relationship to harvest objectives.

The sole intent of this program is to provide sport fishing opportunities in the Siletz Basin.

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

The Siletz River summer steelhead sport fishery benefits from this program. Since 1992, this program has been designed and managed as a hatchery summer steelhead targeted fishery; thus, all non-finclipped steelhead are released.

Estimated (not actual) harvest rates from 1993 to 2013 (run year) are presented in Table 3-1. Estimates are based upon returned harvest tags (from anglers); estimates have been adjusted to account for bias in returned tags.

Table 3-1. Harvest of hatchery summer steelhead in the Siletz River (from 1993-2013 run-year).

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Adult catch	857	1,024	613	1,740	1,191	2,696	1,344	1,245	1,281	1,810	3,288	2,195	1,363
Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**					
Adult catch	1,211	1,465	1,897	1,965	1,091	1,205	2,043	951					

The harvest levels depicted in Table 3-1 equate to 3% to 8% of the smolt release. It is estimated that future harvest levels will average 4% of the smolt release.

Impacts to listed wild Coho Salmon in the Siletz basin, from this fishery, are minimal. During the period when adult Coho Salmon are present in the basin, anglers would be targeting mainly the winter steelhead, not summer steelhead.

3.4) Relationship to habitat protection and recovery strategies.

Refer to Attachment A for ODFW habitat protection and enhancement policies identified in the Siletz River Basin Fish Management Plan (adopted November 14, 1997). Generally, habitat protection and recovery strategies are prioritized in areas with (potential) good/high quality habitat. Hatchery releases from this program are localized away from these areas to minimize potential adverse impacts to wild fish populations. Habitat protection and recovery strategies for Coho Salmon in the Siletz Basin focus on riparian areas and winter and summer rearing habitat. Progress has been made to

improve fish passage at road crossings. Most fish passage barriers blocking significant habitat reaches have been remedied.

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

3.5) Ecological interactions.

It is hoped that releasing summer steelhead smolts into the Siletz Basin at an appropriate size will minimize biological risks to wild fish. Limited monitoring is in place to determine the proportion of hatchery fish returning to two tributaries. During development of a Conservation Plan for coastal steelhead under the NFCP, modifications to the program can be made if stray levels are high, monitoring is inadequate, or other concerns are identified.

(a) Juvenile Interactions

Ecological interactions between hatchery steelhead smolts and listed Coho Salmon, as well as other native fish species, are likely to occur while hatchery smolts immigrate to the ocean. Most of these interactions (competition, disease introduction, and predator attraction) are likely to have negative impacts on native fish. Measures to lessen the amount (and severity) of these interactions have been implemented:

- Hatchery smolts are raised and released at optimal smolt size and condition factor to promote swift emigration.
- Hatchery smolts are released in April and emigrate before most wild Coho smolt emigration begins; however, hatchery smolts emigration overlap wild summer steelhead smolt emigrations.

The magnitude and impact that hatchery steelhead have on (or with) other marine dwelling organisms is not completely understood, and cannot be comprehensively defined at present.

(b) Adult Interactions

Adult hatchery summer steelhead are likely to interact with fish species present in the Siletz, including the listed Coho Salmon, at the time of their migration up the river. Stray adult hatchery summer steelhead are known to enter Coho Salmon spawning tributaries where they could interact with wild Coho. The characteristics and impacts of these interactions are not completely understood and cannot be comprehensively defined at this time.

Recycling adult summer steelhead downstream for additional angler opportunities has become a common practice but also increases risk to Coho Salmon. Research in other basins indicate that recycled steelhead do not return to capture sites or are caught at high rates but potentially stray into natural production areas.

In general:

(1) Species that could negatively impact program:

Competition for food between hatchery winter steelhead smolts and other hatchery and naturally produced salmon smolts in the Siletz Basin and near shore ocean environment may negatively impact this program. Avian and marine mammal predation may also negatively impact this program.

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

The competitive interactions with hatchery summerr steelhead smolts may negatively impact the listed natural Coho Salmon and other natural salmonid juveniles in the Siletz Basin and near shore ocean environment. Straying of hatchery steelhead adults to natural spawning habitats may have adverse ecological impacts to listed Coho Salmon or other native populations. Increased angling pressure on adult hatchery steelhead may increase incidental mortality on naturally produced Coho Salmon in Siletz Basin.

(3) Species that could be positively impact program:

Any hatchery- or wild-origin fish that dies naturally and recycled for nutrient enrichment in the basin may positively impact the program.

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

Spawned carcasses of steelhead wnenevr placed in Siletz Basin for nutrient enrichment will benefit other aquatic species or avian. 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.

Cedar Creek Hatchery

- Cedar Creek Hatchery has two different surface water supplies: Cedar Creek, which supplies year-round flow to the facility; and Three Rivers beginning in July through early November each year, from which 2,000 gallons per minute (gpm) is pumped. The facility has current water rights for 110.9 cubic feet per second (cfs) from Cedar Creek, and 5 cfs (pumped) from Three Rivers. Water availability limits the ability to maintain recommended pond densities between August and November.
- The facility is operated under the NPDES general permit 300-J, to maintain water quality standards of hatchery effluents set by the Oregon Department of Environmental Quality.
- NMFS fish screening criteria is in compliance at the Three Rivers pumping facility and the Main Intake No. 1 on Cedar Creek.
- During the winter months, Cedar Creek's water source fluctuates in water quality and temperature. During major freshets, there is heavy silt accumulation in the rearing ponds and raceways. Operational procedures during pond cleaning include utilizing abatement pond and lawns for filtering sand and silt before returning water back to Cedar Creek. Water temperature fluctuates between 40º and 50º F.
- During the summer months, Cedar Creek's water source consists of Cedar Creek and 2,000 gpm supplementation pumped from Three Rivers. Water temperature fluctuates between 50º and 67ºF. Pond cleaning operations are similar to winter.

Roaring River Hatchery

- All water used for fish culture purposes is pumped directly from the Roaring River.
- Inflow and effluent water is tested under normal and cleaning operations for flow, settlable solids, total suspended solids, temperature and pH, according to a NPDES permit: 0300-J State General Permit.
- Water flows are measured with a Francis formula method.
- Water temperatures are recorded by a thermograph.

Both Cedar Creek and Roaring River hatcheries are in compliance with the water rights, water withdrawals, and annual water uses reporting to Oregon Department of Water Resource.

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

Cedar Creek Hatchery

- Risk of take at the Cedar Creek facility is minimized because listed fish are not present in the Cedar Creek drainage upstream from Intake No. 1.
- During the summer months when pumping from Three Rivers, risk is minimized because pumps are protected with 3/32-inch mesh screens which meet the National Marine Fisheries Service (NMFS) screening criteria.

Roaring River Hatchery

- Intake fish screens have been upgraded to the NMFS fish screening criteria.
- Roaring River Hatchery is managed and operated to comply with water quality criteria, and monitoring protocols defined in the state general 0300J NPDES Permit. Water quality data is collected, analyzed, and reported quarterly on Discharge Monitoring Reports, and data and information is submitted to local Oregon Department of Environmental Quality (DEQ) officials at the end of each quarter.

SECTION 5
FACILITIES

5.1) Broodstock collection facilities (or methods).

Summer steelhead adults are collected for broodstock at the Siletz Falls trap. The trap is located in the top step of the Siletz Falls fish ladder at RM 64.5 on the Siletz River. The area where fish are collected and held is made of rock and concrete. It is approximately 8 feet by 20 feet, and the water is maintained at a 2.5 foot depth. Hatchery-produced summer steelhead not needed for brood are also collected here and removed from the basin. The adults are transported across the Siletz River, to a portable tank, by a hydraulic hoist system with a 100-gallon steel bucket.

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

Summer steelhead adults are transported to Cedar Creek Hatchery by ODFW, in a portable tank mounted in a pickup. The tank holds 300 gallons of water and utilizes two 12-volt aerators to maintain oxygenated water. The tank is also equipped with bottled oxygen. Maximum transport time is approximately 4 hours.

Transportation of the Siletz summer steelhead smolts from Salmon River Hatchery to the Siletz River is accomplished with the use of various size liberation truck units. The units range in size from 1,000 gallon to 2,500 gallon tankers. Some units utilize recirculatory refrigeration systems, which are used to maintain or cool the temperature of water taken at the hatchery site. Some units utilize insulated tanks equipped with aerators. Oxygen is added to all units at a rate of 1.5 liters per minute. All units haul steelhead at an average density of 1.2 pounds per gallon. Total length of time in transit averages 2 hours for this haul.

5.3) Broodstock holding and spawning facilities.

Once at Cedar Creek Hatchery, summer steelhead adults are held in Pond 6A where they are treated for three days each week with formalin to prevent fungus. Pond 6A is a concrete holding pond approximately 94 feet long by 20 feet wide by 3.5 feet deep.

5.4) Incubation facilities.

At Cedar Creek Hatchery, the incubation room is approximately 43 feet by 38.5 feet. It is a wooden structure, on a concrete foundation, with a composition roof. The building receives gravity fed water from Cedar Creek. The facility contains 6 shallow troughs, and 15 stacks of vertical incubator trays. Each stack contains 14 trays. The facility has the capacity to incubate 2.3 million eggs. Discharge water is returned to Cedar Creek. At Roaring River Hatchery, the egg incubation room is adjacent to the spawning deck. The Roaring River supplies water to the headbox and vertical stack incubators, via a 5 hp vertical turbine pump. There are presently 40 stacks of incubators, with 8 trays per stack.

Backup water pumps are stored in this room during incubation. Discharge water is routed to the Roaring River.

5.5) Rearing facilities.

Summer steelhead are reared in two 21-foot by 2-foot Canadian troughs, two 80-foot by 10-foot raceways, two 80-foot by 20-foot modified borrows, and four 80-foot by 20-foot raceways. Pond depths are adjusted with dam boards and flush gates. Water is supplied underground from the Roaring River through 40 hp and 25 hp vertical turbine pumps. Water flows are measured using the Francis formula and method. Average flows through the rearing units are as follows:

Canadian trough =	15 gpm
Raceway (80 feet by 10 feet) =	250 gpm
Raceway (80 feet by 20 feet) =	500 gpm

5.6) Acclimation/release facilities.

Summer steelhead smolts are released directly into the Siletz River.

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

Flood Events

In the past, Salmon River Hatchery was the rearing location for Siletz summer steelhead until 2015 and was built on an active flood plain. As a result, throughout the 1990's it has been subject to (moderate) flooding, averaging about every 3 years. During the winter of 1999-2000, an extreme flood occurred (quite possibly the highest floodwaters ever recorded in the Salmon River Watershed), which resulted in 21,714 summer steelhead (less than 30% of the total production) escaping to the Salmon River. Now, the rearing of summer steelhead has shifted to Roaring River Hatchery and so far no operational difficulties or disaster observed at Roaring River Hatchery that may led to significant fish mortality.

Ichthyophthirius

The summer steelhead can become severely inflicted with *Ichthyophthirius* (ICH) if daily flushing is not performed throughout the summer and fall months. When daily flushing occurs, the summer steelhead do not experience elevated levels of ICH.

Water Supply

On February 12, 1998, at Salmon River Hatchery (the previous location for rearing Siletz summer steelhead), a shaft broke on a 40 hp vertical turbine pump that supplies water to the production ponds. An inadequate alarm and check valve system did not allow the crew to recognize the problem as it happened. Subsequently, 78,000 summer steelhead (95% of the total fish on hand) died due to oxygen deficiency. Salmon River Hatchery is no longer used for summer steelhead rearing. The current location, Roaring River Hatchery, has not had any water supply issues since the program moved from Salmon River Hatchery.

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.

- Both hatchery facilities are staffed full-time; 24 hours per day, 7 days per week, 365 days per year, to address any issues related to equipment failure, water loss, alarm systems or flooding.
- Alarm systems allow instantaneous notice of water pump motor failure.
- A temporary pond water depth alarm has been recently installed. The intake head difference alarm needs complete overhaul and/or replacement.
- Two backup emergency generators are onsite in case of electrical failure.
- Fish loss (escapement to the river) resulting from flooding is controlled with screens and seines.
- Disease transmission is kept in check through stringent disinfection protocols and monitored pond loading densities.
- Mortality pickers and screen brushes are used per species and ponds.
- Portable pumps and hoses are available to restore water to incubation and early rearing troughs.

SECTION 6

BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

The Siletz summer steelhead hatchery program was initiated in 1958, with the collection of wild Siletz summer steelhead for broodstock. The program has continued every year since, with the collection of summer steelhead broodstock that return to Siletz Falls.

6.2) Supporting information.

6.2.1) History.

The Siletz River summer steelhead hatchery broodstock was created in 1958 with wild Siletz river summer steelhead adults. The numbers of wild fish used in the broodstock since 1958 is not known. Trapping and creel surveys done from 1969 through 1972 showed that hatchery summer steelhead made up most (84%) of the returns to the Siletz. It is believed that the numbers of wild fish used in the hatchery broodstock from that time on was small, and decreased, as did the wild population. Beginning in 1992, all returning hatchery steelhead were finclipped, and could be identified from wild fish. From 1992 through the 20015 brood year, only returning hatchery summer steelhead adults captured in the Siletz Falls trap have been used as broodstock. The exception was a small number (14) of wild adult summer steelhead incorporated into the hatchery broodstock in 2008.

6.2.2) Annual size.

A total of 45 pair of adult summer steelhead will be collected for this program. A minimum of 70% of the broodstock will be of returning hatchery adults. A potential of up to 30% of the broodstock will be of returning wild summer steelhead adults if the wild population is sufficient to provide broodstock.

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

From 1992 through the 20015 brood year, only hatchery summer steelhead had been collected for broodstock with the exception of 2008 when 14 wild summer steelhead were incorporated into the brood. Annual broodstock collection levels from 1993 through 2007 have ranged from 101 to 163 hatchery summer steelhead, with an average of 136 fish. The goal for this program is 90 fish (45 pair), taken by month in proportion to the natural run on the Siletz.

Wild summer steelhead may be used in the broodstock when the wild population rebuilds to >300 fish annually at Siletz Falls trap for several years. Following three consecutive years of naturally produced wild summer steelhead returns greater than 300, a total of 7 pair of wild fish were collected for the 2008 brood year.

6.2.4) Genetic or ecological differences.

There are likely to be genotypic differences between the wild Siletz summer steelhead, and the summer steelhead reared in a hatchery. There are also likely to be behavioral differences, due to the different environments the fish are raised in. The hatchery smolts are one year olds, as compared to the wild smolts which are usually two years old. These differences are not completely understood.

6.2.5) Reasons for choosing.

The current broodstock was chosen for the Siletz summer steelhead program because it originated from wild Siletz summer steelhead, which are adapted to the conditions in the Siletz Basin.

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

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

All broodstock selection practices followed for the Siletz Hatchery summer steelhead program were chosen to minimize the likelihood for adverse genetic and ecological effects to wild steelhead, while maintaining a healthy hatchery stock. The number and timing of broodstock collected and spawned are intended to maximize the genetic diversity of the hatchery stock. Efforts will be made to ensure the broodstock maintains as many of the characteristics of the wild population as possible. Efforts will also be made to limit the number of hatchery fish spawning in the wild, to avoid potential adverse genetic interaction to the wild Siletz steelhead populations.

SECTION 7

BROODSTOCK COLLECTION

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

Siletz summer steelhead adults are collected for this program.

7.2) Collection or sampling design.

Adult steelhead are collected at Siletz Falls trap. The timing of collection is based on the historical timing of wild summer steelhead arriving at Siletz Falls trap. The collection strategy is based on the percent of the run historically seen each month from June through November.

Wild Siletz Coho Salmon may be captured, incidental to summer steelhead trapping at Siletz Falls trap. The Siletz Falls trap is also run for hatchery winter steelhead management, and may capture wild Coho Salmon from December through January. The trap is checked 3 times a week, and any wild Coho Salmon found are carefully handled and released. Wild Coho are transported by portable tank to Bentilla Creek, a good stream for Coho Salmon is at RM 45, or to other suitable habitat, and released. Wild Coho Salmon are not passed above Siletz Falls because this area was not accessible to Coho Salmon prior to the building of the fish ladder in the 1950's and is being managed as a sanctuary for wild summer steelhead.

7.3) Identity.

Siletz Hatchery summer steelhead adults are identified by the absence of their adipose fin.

7.4) Proposed number to be collected:

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

The current goal for the Siletz summer steelhead program is to collect 90 adults for broodstock. This would include jacks (or 1-salt males) in the proportion seen in the population.

7.4.2) Broodstock collection levels for the last eighteen years (1989-2006), or for the most recent years available:

Table 7-1. Summer steelhead broodstock collection levels.

	Adults			Total	
Brood Year	**Females**	**Males**	**Jacks**	***Eggs**	**Juveniles**
1989	156	81	0	278,963	
1990	143	134	0	298,373	
1991	112	109	0	191,484	
1992	70	65	0	115,751	
1993	53	78	0	172,135	
1994	86	74	0	259,089	
1995	59	42	0	210,756	
1996	85	60	0	295,953	
1997	66	48	0	258,510	
1998	70	70	0	208,264	
1999	71	72	0	183,409	
2000	69	69	1	212,644	
2001	73	79		259,617	
2002	64	74		226,235	
2003	66	66		185,647	
2004	65	65		208,400	
2005	68	68		208,501	
2006	79	79		251,997	

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

Hatchery adults that are collected at the Siletz Falls trap, and not used in the broodstock, will be used in a number of ways. Most hatchery summer steelhead adults that are in good shape will be redistributed downstream to provide additional angling opportunities or donated to local food share programs.

Studies from other basins indicate that recycled steelhead do not return to the capture site at a high rate but stray into natural production habitats. The mechanism to review the practice of recycling summer steelhead lies within the ODFW conservation planning process.

Some hatchery summer steelhead adults will be planted in Olalla Reservoir (near Toledo) to be caught by trout anglers. Some of these fish will also be given to local foodshare organizations and the Siletz Tribe. Any fish that are of poor quality for human consumption will be killed and placed in the Siletz Basin for nutrient enrichment.

7.6) Fish transportation and holding methods.

Hatchery summer steelhead adults are transported to Cedar Creek Hatchery by ODFW in a portable tank mounted in a pickup. The tank holds 300 gallons of water and utilizes

two 12-volt aerators to maintain oxygenated water. The tank is also equipped with bottled oxygen. Maximum transport time is approximately 4 hours.

Once the adults reach Cedar Creek Hatchery, they are transferred to a 108 foot by 18 foot concrete pond at the hatchery until spawning, which begins in mid-February. All broodstock are handled and sorted prior to spawning in this pond.

7.7) Describe fish health maintenance and sanitation procedures applied.

Broodstock and developing eggs receive regular treatments with formalin to prevent/control fungus (*Saprolegnia parasitica*) outbreaks. The spawning area and equipment are routinely disinfected with an iodine solution to prevent disease outbreaks. Green eggs are water-hardened in an iodine solution to prevent disease or viral contamination.

7.8) Disposition of carcasses.

All Siletz Hatchery summer steelhead adults used for broodstock are kill-spawned, and buried or rendered. Wild summer steelhead are live-spawned and returned to the Siletz River following disease clearance from ODFW fish pathologists.

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

- Fish health inspections and sanitation procedures, as described under Integrated Hatchery Operations Team (IHOT) guidelines, will be followed to minimize increase in disease resulting from collection and holding of adult summer steelhead.
- All adult Coho Salmon of natural origin that are found in the trap at the time of sorting will be immediately removed from the holding area, and transported to Bentilla Creek or other suitable habitat.

SECTION 8

MATING

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

8.1) Selection method.

Hatchery adults are collected at Siletz Falls trap for broodstock. Fish are collected twice a month from June through November. The number of fish taken each month is based on the average percent of the wild run seen for that month at Siletz Falls since 1994. In 2005, for example, the percent of broodstock taken each month was 21% (28 fish) in June, 31% (42 fish) in July, 29% (40 fish) in August, 7% (10 fish) in September, 12% (16 fish) in October. Fish are spawned randomly as they ripen.

8.2) Males.

There will be no backup broodstock. Jacks will be included in the broodstock, and will be used as any adult male in the production egg takes.

8.3) Fertilization.

Summer steelhead are spawned using a 1:1 (male-to-female) ratio. The individual family groups are kept separate. There is a 100% sampling on all parents to facilitate culling if either or both parents have a high titer for virus.

8.4) Cryopreserved gametes.

Cryopreservation of summer steelhead gametes is not used in the Stock 33 Siletz 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.

This program does not utilize listed stocks. Broodstock are selected randomly throughout the summer steelhead run. Spawning is done randomly based on availability of ripe fish. Matings are done on a 1:1 sex ratio (one male and one female). Each fish is only used once in spawning, and is done on a 6-by-6 matrix and kept separate in individual family groups.

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.

Data for most recent 12 years of eggs taken, eyed eggs received, and survival rates to ponding are as shown in Table 9-1.

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

Table 9-1. Egg survival rates of Siletz summer steelhead.

Return Year	Eggs Taken	Eyed Eggs Received	Percent Survival
1989-90	278,963	115,902	97.1
1990-91	298,373	155,600	98.0
1991-92	226,454	60,192	92.6
1992-93	115,751	109,180	97.4
1993-94	172,135	156,221	99.0
1994-95	259,089	191,396	98.4
1995-96	210,756	141,761	98.4
1996-97	295,953	159,937	97.6
1997-98	258,510	181,694	98.7
1998-99	208,264	96,576	99.3
1999-2000	183,409	96,968	96.8
2000-2001	212,644	96,120	98.4
2001-2002	259,617	96,092	99.0
2002-2003	226,235	97,020	97.0
2003-2004	185,647	102,625	92.4
2004-2005	208,400	139,488	72.1
2005-2006	208,501	109,070	97.3
2006-2007	251,997	120,395	89.0

Eyed eggs are received from Cedar Creek Hatchery. In 1991-92 eggs were taken by Salmon River Hatchery for that year, and percent survival was based on green egg to ponding. In comparison, percent survival from all other years is based on eyed egg to ponding.

Egg takes at Cedar Creek Hatchery include eggs incorporated into the summer steelhead program at Cedar Creek. The program originated with Stock 33, and continues to infuse the broodstock with Siletz stock on an annual basis.

9.1.2) Cause for and disposition of surplus egg takes.

Extra eggs are typically collected to compensate for egg to smolt mortality resulting from poor egg quality, silt loading, and rearing mortality. From 1989 to 1998, a 50% or less

cap above production was received. In 1999, it was decided that only a 20% or less cap above production was needed to produce an effective summer steelhead program.

9.1.3) Loading densities applied during incubation.

- Average egg mass (measured as eggs per ounce) is approximately 160 to 170 eggs per ounce.
- Eggs are typically loaded at 8,000 to 9,000 eggs per tray.
- Typical water flow through the incubator trays is 4 to 5 gallons per minute.

9.1.4) Incubation conditions.

- Incubation water is monitored for temperature and flow
- When possible, silt is flushed from the incubator trays.

9.1.5) Ponding.

Fry are physically relocated from the incubator trays to the starting ponds in late April and early May, when fry are 100% buttoned-up (approximately 2,200 fish per pound). This generally occurs at 1,100 to 1,150 temperature units.

9.1.6) Fish health maintenance and monitoring.

Tray lids are brushed to ensure tray flows are effective.

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

We anticipate no genetic or ecological risks to wild Coho Salmon from the incubation techniques used for this summer steelhead program.

9.2) Rearing:

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

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

Table 9-2. Data of fish survival rate.

Run Year	Fry Ponded	Percent Survival (Fry to Smolt)
1989-90	112,571	87.7
1990-91	152,561	90.9
1991-92	165,488	86.1
1992-93	126,578	77.3
1993-94	107,961	86.8
1994-95	131,237	93.7
1995-96	110,158	93.4
1996-97	138,375	84.2
1997-98	114,282	15.8[a]
1998-99	115,419	85.8
1999-00	93,454	53.9[b]
2000-01	94,639	82.0
2001-02	95,156	75.4
2002-03	94,112	75.4
2003-04	94,899	58.4
2004-05	100,606	71.5
2005-06	106,129	61.1
2006-07	107,230	74.9

[a] 1997-98 pump failure; refer to Section 5, Item 5.7.
[b] 1999-00 extreme flood; refer to Section 5, Item 5.7.

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

Current, actual fingerling and smolt loading and rearing density levels are as follows:

- Fingerling loading = 3.9 pounds fish per gallon per minute. Fingerling rearing density = 0.75 pounds/cubic feet water
- Smolt loading = 7.9 lbs. fish per gallon per minute. Smolt rearing density = 1.6 pounds/cubic feet water

Table 9-3. Fingerling and smolt loading and rearing density goals.

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

9.2.3) Fish rearing conditions.

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

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

Weight data is collected, and is routinely reported in ODFW Hatchery Management System (HMS). Forklength (mm) and smolt condition factor measurements are collected shortly before liberation.

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

By early May, all fry are ponded, and are demand-fed until June 1. During this time, their weight generally doubles each month (Table 9-4). Late groups are caught-up with early groups through feed manipulation. By mid-June, the steelhead are on a standardized feeding schedule. Finally, through the winter to spring release, feed rates decline to match slower metabolic rates and target condition factors, in the cooler months. Data used for the standardized feed schedule comes from an ODFW growth program. The growth program is always considered just a guide.

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).

Wet and dry diets are used to grow Siletz summer steelhead juveniles. Rates and frequencies vary with fish size and age. For the first 60 days, the fish are fed on demand 6 to 12 times daily. For the next 90 days, they are fed 2 to 4 times daily. For the next 4 months, fish are fed 1 to 2 times daily. Throughout the next 5 months, fish may be phased into 1 to 2 times every other day.

Percent body weight (BW) per day starts at around 6% per day, and drops to 1% per day through the first half of the rearing period. The second half starts at around 0.9% per day, drops to 0.65% per day, and increases to an average of 0.8% per day at the end of rearing. Food conversions are generally at the food manufacturer's efficiency projections. Depending on the food brand, early food conversions average approximately 0.7 at the start, 0.9 midway, and reaches 1.1 at the end.

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

An ODFW fish pathologist monitors juvenile fish health, on average, once per month. Through fish health monitoring, a detailed history of pathogen occurrence has been documented at the Salmon River Hatchery. Procedurally, the ODFW pathologists and hatchery managers control pathogen outbreaks through refined fish culture techniques and methods, such as seasonal pond flushing, medicated feeds, and disease treatments with chemicals. In addition, during times of high pathogen susceptibility, an ODFW pathologist may monitor fish health bimonthly. Likewise, hatchery staff watch for disease outbreak indicators and communicate regularly with pathologists. These procedures help minimize disease outbreaks and their affects on the hatchery summer steelhead brood.

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

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

Condition factor and forklength measurement data is collected prior to release.

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

No natural rearing methods are applied. The following hatchery conditions may lend to some extent "naturalized" hatchery rearing experience.

- Raceways are flushed on a regular basis to represent changing water, light, and flow conditions.
- Predators, such as fish-eating birds, prey on the fish throughout all phases of their juvenile rearing, adding to their instinct of predator wariness.

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

Siletz summer steelhead is not an ESA listed population. We anticipate no genetic or ecological risks to wild Coho Salmon from the in-hatchery rearing techniques used. Effluents are monitored per NPDES permit terms, conditions and requirement. Dead fish are removed daily and not allowed to enter the water of the state. Fish health status is monitored each month and treated as necessary. Rearing ponds are cleaned weekly or as needed.

SECTION 10

RELEASE

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

10.1) Proposed fish release levels.

Table 10-1. Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling	50,000	6.0	Early April	Siletz River
Data source:				

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

Stream, river, or watercourse: Siletz River
Release point: Four locations on the main stem
Major watershed: Siletz River
Basin or region: Siletz

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

Table 10-2. Numbers and sizes of fish released by age class.

Release Year	Eggs/ Unfed Fry	Avg Size	Fry	Avg Size	Fingerling	Avg Size	Yearling	Avg Size	Release Date
1989					47,011	31.70	79,785	5.95	
1990					15,431	28.0	79,305	6.0	
1991			38,792	746.0	20,811	21.0	79,065	6.3	
1992			40,992	244.0	18,176	25.60	83,321	5.5	
1993					15,832	40.70	82,003	6.1	
1994							81,647	5.1	
1995					22,260	26.50	80,746	4.7	
1996					21,138	26.89	81,700	5.0	
1997					12,728	42.0	79,775	5.0	
1998					14,579	25.0	3,479	4.9 a	
1999							81,303	6.25	
2000							50,397	5.7 b	
2001							77,673	5.3	
2002							71,763	5.6	
2003							70,993	6.3	
2004							55,432	5.8	
2005							72,030	5.9	
2006							70,727	6.14	4/5
2007							80,416	5.87	4/23 - 4/24
2008							45,020	6.34	4/30 - 5/1
2009							57,695	6.40	4/16 - 4/17
2010							73,050	6.00	3/31 - 4/1
2011							77,368	5.92	4/26
2012							52,500	6.00	4/5
2013							73,499	6.31	4/8
2014							83,459	6.15	4/30
2015							49,157	5.67	4/6
Average			38,892	495.0	20,885	29.70	69,382	5.8	

Data source: ODFW Hatchery Management Information System.
[a] Pump failure; refer to Section 5, Item 5.7
[b] Extreme flood; refer to Section 5, Item 5.7

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

See Table 10-2 above for actual smolts release date from release years 2006 to 2015. Releases of Siletz summer steelhead smolts are based on the following criteria:

- Scheduled release times coincide with yearly production schedule.
- Smolt readiness in terms of appearance, crowding outlets, etc.
- Release times coincide with natural smolt out-migrants.

10.5) Fish transportation procedures, if applicable.

Summer steelhead smolts (50,000) are transported to four locations in the mainstem of the Siletz River for release. Fish are in transit approximately two hours. Temperatures are regulated to temperatures similar to the receiving water. Liberation trucks are equipped with insulated tanks, aerators, and an oxygen system to maintain acceptable oxygen levels in the water.

10.4) Acclimation procedures.

There is no acclimation of hatchery summer steelhead smolts on the Siletz River. Smolts are directly released into the mainstem Siletz River.

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

All hatchery summer steelhead smolts released in the Siletz River are 100% adipose finclipped.

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

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

10.7) Fish health certification procedures applied pre-release.

Policy dictates that all fish must pass a preliberation certification by an ODFW pathologist prior to release, and only certified fish are released.

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

Backup systems are in place at Roaring River Hatchery, to minimize the chances of emergency releases. In the event circumstances cause the water supply to be lost to the hatchery rearing ponds, any fish stocks that are normally released from Roaring River Hatchery can be prematurely released. Those stocks that are not normally released from the hatchery will be kept in their ponds. The total production of Siletz summer steelhead (50,000) would not be released. Water would be recirculated with various portable pumps at the hatchery, assuming that water recirculation and aeration would save some of the fish.

10.9) 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.

The Siletz hatchery summer steelhead program will target release of fish at an appropriate size, to assist migration and lessen contact time with natural populations in the upper watershed. The smolts are also released in early April, to avoid interaction with the majority of the wild Coho Salmon smolts out-migrating in May.

SECTION 11

MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

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

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

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

All of the measures identified in Sections 1.9 and 1.10 are being performed with existing staff and facilities.

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.

The only monitoring activity that could impact wild Siletz Coho Salmon is the operation of the adult traps. Measures to minimize the effects of operating the traps are identified in the Siletz winter steelhead HGMP.

SECTION 12

RESEARCH

No true research is being conducted on the Siletz River. The monitoring activities conducted under this steelhead program are described in Sections 1.9 and 1.10.

SECTION 13

ATTACHMENTS AND CITATIONS

References

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.

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.

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: Chris Knutsen, North Coast Watershed District Manager, ODFW

Signature: _____Date:_____

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

Signature: _____ Date:_____

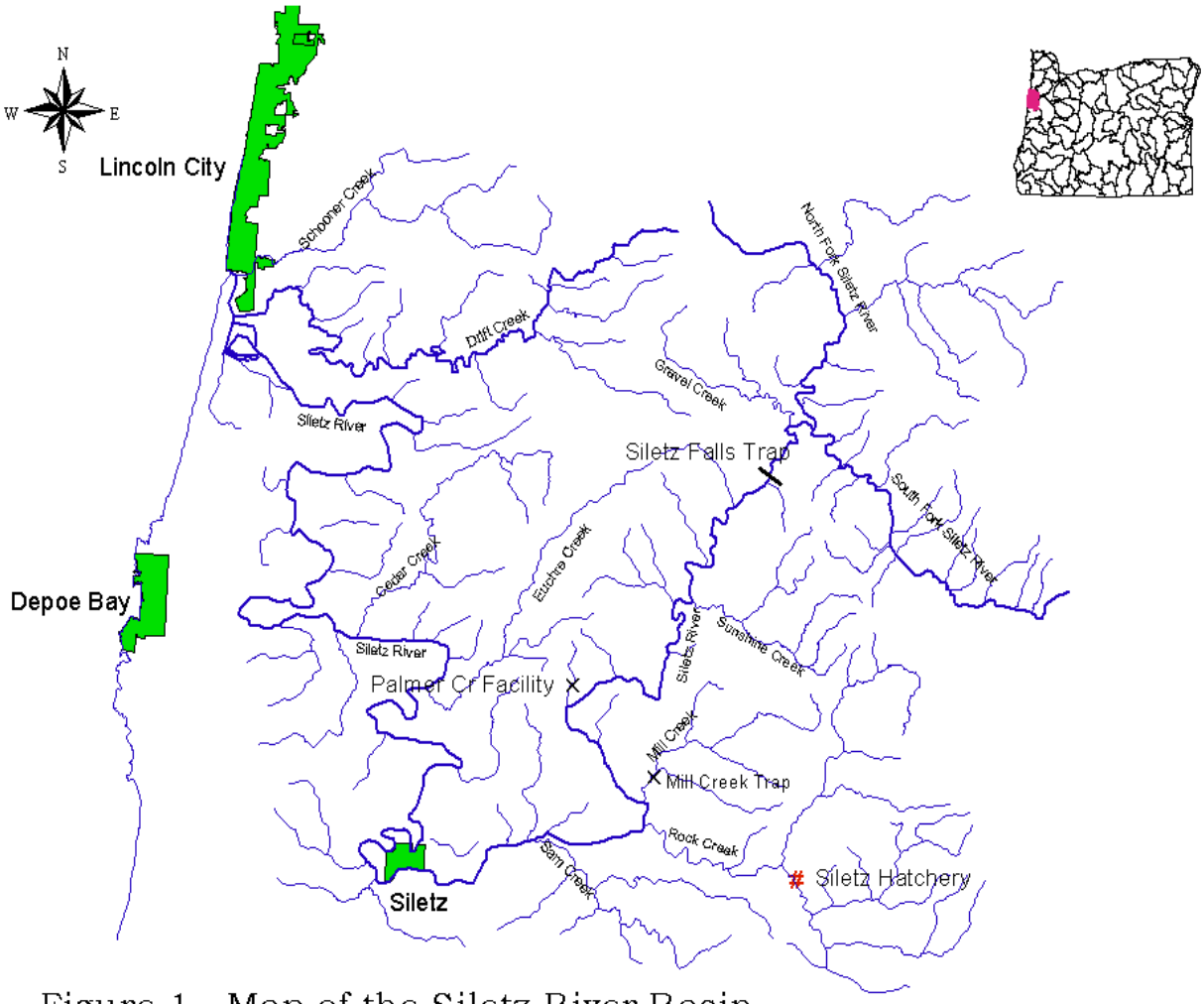

Figure 1. Map of the Siletz River Basin.