HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Cedar Creek Hatchery Spring Chinook Salmon Program**
Species or Hatchery Stock:	**Spring Chinook *Oncorhynchus tshawytscha* (Stock 47)**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**North Coast Watershed District, West Region**
Date Submitted: **First Update Submitted:** **Second Update Submitted:** **Third Update Submitted:**	**March 17, 2006** **July 14, 2008** **October 16, 2014** **July 21, 2016**
Date Last Updated:	**July 21, 2016**

SECTION 1
GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Cedar Creek Hatchery, Nestucca River basin spring Chinook Salmon (stock 47) program. The program is targeted for release of spring Chinook Salmon smolts in the Nestucca River basin.

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

Spring Chinook Salmon *Oncorhynchus tshawytscha* stock 47 will be propagated under this program. Nestucca River spring Chinook Salmon are part of the Northern Oregon Coast Evolutionary Significant Unit (ESU). Under the Federal Endangered Species Act (ESA) they are classified as not warranted for listing (Federal Register Notice 1998).

1.3) Responsible organization and individuals.

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

Cedar Creek Hatchery is currently supported by a combination of Oregon State funding sources. The facility has a staff of 3.0 permanent full-time employees. And the annual budget for the spring Chinook Salmon program is presented in Table 1-1.

Table 1-1 Cedar Creek Hatchery Stock-47 Spring Chinook Annual Budget, 2003-2006. FY 2015 budget is estimated with additional spring Chinook Salmon production per ODFW's CMP, 2014.

Year	Total Budget	Stock-47 Spring Chinook Budget	Percent of Total	Stock-47 Spring Chinook Smolts Produced
2003	$250,170	$97,566	39.0%	113,407
2004	$250,170	$80,054	32.0%	112,560
2005	$266,250	$94,519	35.5%	113,842
2006	$266,250	$89,194	33.5%	119,295
2015 (est)	$372,442	$127,748	34.3%	230,000
Note: Information provided by ODFW Cedar Creek Hatchery (2008)				

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

Cedar Creek Hatchery is located in the Nestucca River watershed, approximately 1.5 miles east of the town of Hebo on Highway 22. The hatchery facility is located on the Three Rivers at River Mile (RM) 2.25. The hatchery site is 35.33 acres in size, at an elevation of 43 feet above sea level. Fish propagation activities for this hatchery spring Chinook Salmon program (adult collection, spawning, egg incubation, and juvenile rearing) occur primarily at Cedar Creek Hatchery. Off-site adult broodstock collection may occur in some years. The ODFW waterbody code for the Nestucca River is 0100400000. The ODFW waterbody code for Three Rivers is 0100420000. The ODFW waterbody code for the Little Nestucca River is 0100410000. The mark processing code for Cedar Creek Hatchery is 5F22206 H6 21. Additional acclimation and adult recapture facilities may be developed elsewhere in the basin as needed in order to meet hatchery stray rate limits identified in ODFW's Coastal Multi-Species Conservation and Management Plan (CMP).

1.6) Type of program.

Harvest Augmentation – To increase sport harvest opportunities for adult hatchery spring Chinook Salmon by releasing artificially propagated spring Chinook Salmon smolts.

Salmon Trout Enhancement Program (STEP) – The use of stream side, or classroom incubators and rearing facilities to provide educational/learning opportunities to students and the public. In addition, volunteer involvement in STEP increases natural resource awareness and provides a volunteer base of individuals, and organizations, desiring to assist ODFW with natural resource program implementation activities.

1.7) Purpose (Goal) of program.

The purpose of this program is to release approximately 230,000 hatchery spring Chinook Salmon smolts in the Nestucca River watershed with the primary goal of providing hatchery spring Chinook adults for recreational harvest in the basin. Spring Chinook Salmon from this program are also harvested in ocean recreational and commercial fisheries. This HGMP describes increased stock -47 spring Chinook hatchery smolt production associated with adoption of ODFW's Coastal Multi-Species Conservation and Management Plan (ODFW 2014).

This includes a total smolt production for release in the mainstem and Three Rivers of 200,000 full-term smolts and new program of 30,000 full-term smolts to be released into the Little Nestucca River.

An additional purpose of this program is to provide educational learning opportunities to students and to encourage volunteer involvement from the public with natural resources through STEP activities. A portion of those activities includes the incubation of spring Chinook eggs and release of unfed fry. The stock 47 spring Chinook Salmon program provides up to 2,000 eggs to the STEP program for use in classroom incubators. The primary purpose of the classroom incubator program, when used, is to teach students about salmonid life history and their habitat requirements. Fry from classroom incubator programs are not marked.

1.8) Justification for the program.

The spring Chinook Salmon fishery in the Nestucca River basin is managed conservatively to reduce impacts to naturally produced spring Chinook populations. Retention of sport caught spring Chinook in the Nestucca River basin is limited to adipose fin-clipped hatchery fish. This program is therefore designed to support a consumptive recreational fishery in the Nestucca River basin. Additionally, spring Chinook Salmon from this program are harvested in ocean recreational and commercial fisheries. The program produces full-term smolts for release into the identified systems. Smolts are mass marked (100%) to allow selective harvest of hatchery adults in the Bay and river fisheries.

This program releases sub-yearling smolts at a size that encourages rapid migration to the ocean. This is intended to minimize residualism and ecological interactions with naturally produced juvenile spring Chinook Salmon and other naturally produced fish. Releases occur in locations that are relatively low in the watershed at a time that promotes spatial separation from naturally-produced spring Chinook Salmon juveniles. Standard fish health inspections are done for both adult and juvenile spring Chinook in this program, to minimize potential disease transmission concerns. The hatchery reared spring Chinook smolts are mass marked to allow positive identification of hatchery fish throughout their life cycle. The basin where this program releases hatchery spring Chinook is managed for selective harvest of marked (hatchery) spring Chinook adults, with the requirement that all unmarked spring Chinook caught in the river must be released unharmed.

Another important aspect of this program is to provide opportunities for public involvement with natural resources through STEP activities. The relatively small numbers of unfed fry that are released from STEP classroom incubators may have negligible impacts to the native species in the basin, while providing valuable educational opportunities.

This program will have minimal direct effect on Federal ESA (*Threatened*) natural Coho Salmon. Expected adult return timing of this stock is late March through July. Returns of adult Coho Salmon typically do not begin until late September or after the first fall rains. Incidental impacts from angling pressure are expected to be low during the coho smolt outmigration as spring Chinook Salmon angling gear typically precludes incidental catch of juvenile salmonids.

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

Indicator 1 – Harvest

Standard 1.1: Provide hatchery-produced spring Chinook Salmon for harvest in such a way that impacts to naturally produced salmonid populations are minimized during the spring Chinook sport fishery. **(Benefit)**

Indicator: Number of hatchery spring Chinook Salmon caught and number of angler days generated associated with this program. **(Benefit)**

Indicator: Estimated number or rate of wild Coho Salmon and wild spring Chinook Salmon caught and released. **(Risk)**

Standard 1.2: All hatchery juvenile spring Chinook will be externally marked. **(Benefit)**

Indicator: Mark rate by mark type for each release group. **(Benefit)**

Indicator: Pre-release quality checks indicate a minimum 95 percent retention of identifiable marks. **(Benefit)**

Indicator 2 – Life History Characteristics

Standard 2.1: Spring Chinook broodstock will be managed in a manner that approximates the distribution in timing, age, and size of stock 47 hatchery fish returning to Cedar Creek Hatchery. **(Benefit)**

Indicator: Temporal distribution of stock 47 adult spring Chinook returns and adults collected. **(Risk - unknown)**

Indicator: Age distribution of stock 47 adult spring Chinook returns and broodstock spawned. **(Benefit)**

Indicator: Size at age distribution of stock 47 adult spring Chinook returns and broodstock spawned. **(Risk - unknown)**

Standard 2.2: Releases of stock 47 spring Chinook will minimize impacts to naturally produced salmonids through control of hatchery release numbers and timing by minimizing spatial and temporal overlap with natural populations. **(Risk)**

Indicator: Number of stock 47 spring Chinook released. **(Risk)**

Indicator: Dates of stock 47 spring Chinook releases. **(Risk)**

Indicator: Location of stock 47 spring Chinook smolt releases. **(Risk)**

Standard 2.3: All stock 47 spring Chinook smolts will be released as sub-yearlings. **(Risk - unknown)**

Indicator: Beginning and ending dates of stock 47 spring Chinook smolt releases. **(Risk - unknown)**

Indicator: Size and length frequency of stock 47 spring Chinook smolts released. **(Risk - unknown)**

Standard 2.4: Stock 47 spring Chinook fry and/or fingerlings in excess of production needs will be released at times and locations that reduce impacts to naturally rearing salmonids. Any surplus stock 47 fry or fingerlings may be released into standing water bodies, or they may be destroyed. **(Benefit)**

Indicator: Location, number, and timing of stock 47 spring Chinook fry and fingerling releases. **(Benefit)**

Indicator 3 – Genetic Characteristics

Standard 3.1: The percent hatchery origin spawners (pHOS) in the Nestucca River basin will be consistent with goals identified in ODFW's Coastal Multi-Species Conservation and Management Plan. **(Benefit)**

Indicator: Estimated abundance of naturally produced spring Chinook spawning in the basin. **(Benefit)**

Indicator: Estimated abundance of naturally spawning spring Chinook in the basin that are of hatchery origin based on marks or tags. **(Benefit)**

Standard 3.2: Only stock 47 spring Chinook or adult returns from smolts released for this program will be used as broodstock. **(Risk - unknown)**

Indicator: Location of broodstock collection. **(Risk - unknown)**

Indicator: Fin clips on fish collected for brood. **(Benefit)**

Standard 3.3: Stock 47 spring Chinook broodstock will be spawned following appropriate mating and spawning protocols to maintain genetic diversity of the population. **(Benefit)**

Indicator: Number and ratio of males and females spawned. **(Benefit)**

Indicator: Mating will follow procedures as outlined and appropriate for the stock size, in the Fish Hatchery Management Policy, Fish Health Management Policy, Integrated Hatchery Operations Team (IHOT) fish health document, or as directed by the ODFW Fish Conservation and Recovery staff. **(Benefit)**

Indicator 4 – Operation of Artificial Production Program

Standard 4.1: The stock 47 spring Chinook program will be operated in compliance with the ODFW Fish Hatchery Management Policy, Fish Health Management Policy, and IHOT fish health guidelines (IHOT 1995). See Attachment A. **(Benefit)**

Indicator: Number of broodstock sampled and pathogens detected. **(Benefit)**

Indicator: Rearing survival rates, egg to fry and fry to smolt. Results of fish health examinations. **(Benefit)**

Indicator: Determine fish health status of juveniles prior to release, and release only certified fish. **(Benefit)**

Indicator: Release of full term smolts at the target size of 12 fish per pound. **(Benefit)**

Standard 4.2: Cedar Creek Hatchery effluent will comply with prescribed 300J general NPDES permit as required by the Oregon Department of Environmental Quality (DEQ). **(Benefit)**

Indicator: Water samples collected and results reported. **(Benefit)**

Indicator: Results within permit requirements. **(Benefit)**

Standard 4.3: Cedar Creek Hatchery water withdrawals will comply with NOAA Fisheries juvenile screening criteria. **(Benefit)**

Indicator: Screens inspected and are in compliance, or are brought into compliance. **(Benefit)**

Standard 4.4: Cedar Creek Hatchery stock 47 spring Chinook carcass placements for stream nutrient enrichment comply with ODFW established guidelines for loading densities. **(Benefit)**

Indicator: Number and location of spring Chinook carcasses distributed. **(Benefit)**

Indicator: Examine carcass health and use only pathogen free carcasses. **(Benefit)**

Standard 4.5: Naturally produced steelhead, Chinook, coho, chum, and cutthroat that enter the Cedar Creek Hatchery adult trap are handled and released in a manner that minimizes stress, injury, mortality, and delay in migration. **(Risk)**

Indicator: Number of unmarked adult steelhead, Chinook, coho, chum, and cutthroat collected and released alive from the Cedar Creek Hatchery trap. **(Risk - unknown)**

Indicator: Number of unmarked adult steelhead, Chinook, coho, chum, and cutthroat mortalities at Cedar Creek Hatchery during operation of the hatchery adult trap. **(Risk)**

Indicator: Dates of trap operation and frequency of handling steelhead, Chinook, coho, chum, and cutthroat. **(Benefit)**

Standard 4.6: Releases of stock 47 spring Chinook smolts will limit predation impacts to naturally produced salmonids through control of hatchery release numbers and by minimizing spatial and temporal overlap of naturally produced salmonid juveniles. **(Risk - unknown)**

Indicator: Location of juvenile spring Chinook releases. **(Benefit)**

Indicator: Record of the beginning and ending dates of Stock-47 hatchery spring Chinook releases. **(Risk)**

Indicator: Number of Stock-47 hatchery spring Chinook released. **(Benefit)**

Standard 4.7: Releases of stock 47 spring Chinook will limit impacts to naturally produced juvenile salmonids through control of hatchery release numbers and by minimizing spatial and temporal overlap with naturally produced juvenile salmonids. Sub-yearling smolt releases will be in late summer. Any fry or fingerlings in excess of needs for smolt production may be released into standing bodies of water without natural coho production or may be destroyed. **(Benefit)**

Indicator: Location of juvenile spring Chinook releases. **(Benefit)**

Indicator: Record of the beginning and ending dates of stock 47 hatchery spring Chinook releases. **(Risk)**

Indicator: Number of stock 47 hatchery spring Chinook released. **(Benefit)**

Indicator 5 - Socio-Economic Effectiveness

Standard 5.1: Estimated harvest benefits will equal or exceed hatchery production costs for stock 47 spring Chinook, based on the benefit-cost model in ODFW (1999), or an updated version of that model. **(Benefit)** Note: Spring Chinook were not mass marked until the 2003 return-year, and it was not possible to quantify the contribution of program fish to recreational fisheries. The current marking system will help to determine socio-economic effectiveness of this program.

Indicator: Annual budget expenditures. **(Benefit)**

Indicator: Estimated harvest benefits. **(Benefit)**

1.11) Expected size of program.

The program goal is to produce approximately 230,000 full term smolts for release annually. All smolts are for release in the Nestucca River basin.

Approximately 2,000 eggs may be provided to the STEP program annually for use in classroom incubators. Releases will vary annually depending on egg survival.

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

Existing program requires a minimum 80 females and 80 males for broodstock needs. Additional adults may be collected as necessary to cover shortages resulting from, but not limited to, fecundity variation, early egg mortality, positive disease test, etc.

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

Table 1-2. Proposed Annual Fish Release Levels through Cedar Creek Hatchery Stock-47 Spring Chinook Program.

Life Stage	Release Location	Annual Release Level
Eyed Eggs	NA	NA
Unfed Fry[1]	Standing waters Nestucca River or tributaries (STEP)	Hatchery production excess, varies 2,000 (est.)
Fry[2]	Standing waters	Varies, excess
Fingerling[2]	Standing waters	Varies, excess
Sub-Yearling Smolt	Nestucca Basin	230,000

Data source: HMIS

1. Releases of unfed fry from classroom incubators varies depending on the annual egg survival. The specified release level is a maximum number, based on the number of eggs provided to the program.
2. This program does not produce fry or fingerlings for release as a program goal for stock 47 spring Chinook. In any given year there may be surplus fry or fingerlings (typically from above average fry and/or fingerling survival). These will be released to standing water bodies or destroyed.

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

Note: This section may be updated as results from monitoring production changes associated with the Coastal Multi-Species Conservation and Management Plan become available.

Estimates of adult spring Chinook Salmon production from the Cedar Creek hatchery for the 1990-2000 brood years are presented in Table 1-3. Estimates reflect program performance in relation to the harvest (ocean and freshwater) program goal. The estimated number of total adult hatchery spring Chinook Salmon produced was derived from a variety of data sources.

The "Ocean Commercial" and "Ocean Sport" columns were estimated by expansion of coded-wire tag (CWT) recoveries to reflect total production as follows: {(Estimated CWT recoveries / number of CWT smolts released) * total fish released}. Recoveries of CWT fish are reported through preliminary 2004 returns. This data represents landed catch only. No Cedar Creek hatchery spring Chinook smolts were coded-wire tagged for the 1990 brood year. Thus, there is no estimate of ocean catch for that brood year. Harvest card estimates of sport catch for this time period in the Nestucca Basin cannot be separated into hatchery and wild fish because fisheries were not restricted to hatchery fish only until 2002 when most of the returning hatchery adults were mass marked. Therefore, the "Freshwater Sport" column of Table 1-3 is not available. However, over the period 2002 through 2005 Nestucca Basin spring Chinook catch based on angler harvest cards averaged 955 fish, and ranged from 723 to 1,440. The "Hatchery Return" column depicts the actual count of adult spring Chinook returns at Cedar Creek hatchery. The adult spring Chinook returns for each run year were allocated to a brood year based on the age composition of hatchery recoveries of CWT spring Chinook. Spring Chinook spawning surveys did not begin in the Nestucca Basin until 2005 and data for population estimates have not yet been attained. Therefore, the "Spawning Areas" column is not available. Smolt to adult survival is calculated as the sum of the prior 5 columns divided by the "Smolt Release" column. This is a minimum survival estimate as there are no estimates of the number of hatchery spring Chinook caught in freshwater fisheries or straying to spawning areas.

Table 1-3. Estimated Adult Spring Chinook Produced by Cedar Creek Hatchery Spring Chinook Smolts (Stock 47) Released in the Nestucca Basin, 1990 to 2000 Brood Years. Derived from CWT Expansions and Hatchery Return Data. n.a. = not available. Data in italics is incomplete, because it is missing age 5 fish.

Brood Year	Smolt Release	Estimated Total Adult Hatchery Spring Chinook Produced					
		Ocean Comm.	Ocean Sport	Freshwater Sport	Hatchery Return	Spawning Areas	Smolt to Adult
1990	106,492	n.a.	n.a.	n.a.	152	n.a.	0.14%
1991	139,112	26	53	n.a.	145	n.a.	0.16%
1992	73,096	107	0	n.a.	171	n.a.	0.38%
1993	102,442	72	8	n.a.	243	n.a.	0.32%
1994	126,338	39	13	n.a.	163	n.a.	0.17%
1995	112,312	109	26	n.a.	192	n.a.	0.29%
1996	120,651	162	17	n.a.	314	n.a.	0.41%
1997	122,222	92	39	n.a.	504	n.a.	0.52%
1998	119,800	446	26	n.a.	1,173	n.a.	1.37%
1999	113,401	922	39	n.a.	1,324	n.a.	2.01%
2000	107,636	*511*	*13*	n.a.	*986*	n.a.	*1.40%*

Source: ODFW HMS database (M. Lewis)

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

Cedar Creek Hatchery was originally constructed in 1924. It is likely that spring Chinook releases have occurred in the Nestucca basin at least periodically since the 1920's. Wallis (1963) reported that Trask Hatchery collected spring Chinook eggs from the Nestucca basin, and fish were liberated in the Nestucca in the late 1920's and early 1930's. Wallis (1963) also reported fish transferred to Cedar Creek Hatchery. It is unclear if the fish liberated/transferred to the Nestucca basin were descendents of adults collected from the Nestucca basin, of Trask River origin, or a combination of each. Historical records from Cedar Creek Hatchery are incomplete. However, releases of Chinook occurred during the late 1950's, although the race (spring or fall) was not identified. Spring Chinook Salmon are first specifically identified in liberation records in 1962, and releases of spring chinook have occurred annually since 1968. Stock 47 spring Chinook Salmon have been used since at least 1975.

The STEP program was established in 1981.

1.14) Expected duration of program.

The Cedar Creek Hatchery stock 47 spring Chinook program is currently an ongoing annual program. The hatchery spring Chinook program is expected to continue into the future.

The STEP program is ongoing, and eggs will be made available when requested by program participants.

1.15) Watersheds targeted by program.

Nestucca River, a tributary of the Pacific Ocean on the north Oregon coast.

Three Rivers, a tributary of the Nestucca River.

Little Nestucca River: a tributary of Nestucca Bay

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

Note: This section will be updated as results from monitoring production changes associated with the Coastal Multi-Species Conservation and Management Plan become available.

1.16.1) Brief Overview of Key Issues.

(1) Status of naturally produced spring Chinook populations – Nestucca Basin spring Chinook Salmon are considered to be a life history variant of a Chinook Salmon population that returns from the spring through early winter. The 2014 Coastal Multi-Species Conservation and Management Plan identifies this population as "*Strong-Guarded"* meaning that it is widely distributed, has little if any viability concerns across populations and a lower level of immediate threats that may affect viability in the future. However, either a lack of robust data relative to all VSP parameters or conflicting indications of viability warrant a cautious management approach when providing societal benefits and fisheries, especially with respect to potential threats and limiting factors. Monitoring efforts are being increased to develop a better understanding of this population.

(2) Recycling adult spring Chinook Salmon - Recycling adult spring Chinook Salmon through the sport fishery provides for increased angling opportunity and some level of harvest on hatchery fish. Recycled hatchery spring Chinook may interact with naturally produced fish if they are not caught and/or do not return to the hatchery. The recycling program is very popular with anglers.

(3) Three Rivers Weir- The weir spanning Three Rivers provides a mechanism for separating hatchery fish from naturally produced fish by preventing the upstream migration of hatchery fish. Opportunity for unrestricted passage of naturally produced fish is reduced, and the need to physically handle by trapping and passing is increased. The weir may restrict passage at low flows, even if lowered to allow passage. Juvenile passage is also impacted, particularly upstream movement. Naturally produced adult spring Chinook currently are passed above the Three Rivers weir. These issues are being addressed part of the reforms and investments discussed in Section 1.16.3. Also, see Attachment B.

1.16.2) Potential Alternatives to the Current Program

Alternative 1 - Reduce program size

Description and Implications: This alternative would reduce the number of smolts released. The reduction in program size would reduce the budget at Cedar Creek Hatchery and allow savings to be used elsewhere for other programs. Lower release numbers would reduce potential impacts of hatchery spring Chinook on wild populations and could increase wild productivity. This alternative would decrease the consumptive angling opportunity for spring Chinook Salmon in the Nestucca Basin, as the fishery is currently restricted to retention of hatchery-produced fish only. This could disenfranchise local and out of area volunteers and anglers. There would be unknown impacts to ocean sport and commercial fisheries. If the wild spring Chinook Salmon population is at extremely low levels, the population may be currently supported in part by hatchery supplementation.

Alternative 2 - Increase program size

Description and Implications: This alternative would increase the size of the hatchery spring Chinook program at Cedar Creek Hatchery. Increasing the program size would increase the consumptive angling opportunity for spring Chinook salmon in the Nestucca Basin, as the fishery is currently restricted to retention of hatchery-produced fish only. This could enhance participation by some out of area volunteers and anglers. Increase in program size may increase the budget and workload at Cedar Creek Hatchery unless other programs were reduced. This alternative could increase potential adverse impacts of hatchery spring Chinook on wild populations and could decrease productivity.

Note: Per recommendation of the ODFW's CMP 2014, the program area is expanding to Little Nestucca River with the release of 30,000 smolts annually.

Alternative 3 - Eliminate program

Description and Implications: This alternative would eliminate all spring Chinook production at Cedar Creek Hatchery. Loss of the program would reduce the budget at Cedar Creek Hatchery and allow savings to be used elsewhere for other programs. This alternative would eliminate potential impacts of hatchery spring Chinook Salmon on wild populations and could increase population productivity. Eliminating hatchery releases would substantially decrease the consumptive angling opportunity for spring Chinook Salmon on the North Coast, as the fishery is currently restricted to retention of hatchery-produced fish only. This could disenfranchise local and out of area volunteers. Impacts to ocean sport and commercial fisheries are unknown. If the wild population is at extremely low levels, the population may be currently supported in part by hatchery supplementation.

Note: The alternatives listed are draft. They are presented here as a forum for further discussion. This list is not exhaustive, other ideas are welcome. The alternatives listed may not represent final decisions by ODFW.

1.16.3) Potential Reforms and Investments.

(1) Cedar Creek Hatchery's ladder and trapping facility on Three Rivers has been identified for major modifications. The present configuration of the facility does not provide for Three Rivers water to flow through the ladder; it receives all its flow from Cedar Creek water. The ability to

use either water source or to combine them, to operate the ladder would be expected to increase the ability to attract fish to the ladder and trap. In addition, the existing ladder does not extend above the weir. If the ladder was also rebuilt as part of this project, it would allow fish to directly bypass the weir facility during periods when hatchery fish are present in low numbers. It is desirable to allow passage of wild fish above the facility without additional handling. The current trap and holding facility consist of two small concrete ponds, one associated with the trap, the other across an alleyway as a holding pond. The holding pond is divisible, but small, so when multiple species are present some stocks must be handled and transported up to additional ponds on the hatchery proper. In September, 2006 ODFW teamed with U.S. Fish & Wildlife, NOAA and an independent engineering consultant; Tetra Tech/ KCM to develop the Three Rivers Trap & Passage study. This study outlines needs and options for a trapping, holding and passage facility to replace the existing trap. The design would incorporate Three Rivers attractant water as well as Cedar Creek water with options to separate or mix flows as needed. While several options were covered in this study, the main goals were to improve trapping efficiency while minimizing handling of wild stocks, improve upstream and downstream passage, and improved handling and holding of hatchery stocks. Cost estimates were approximately $1.9 million.

(2) Alternative hatchery operations, facilities and techniques, in regard to conservation and restoration of wild fish populations, will be one of the areas of research questions at ODFW's Hatchery Research Center. In the future, the results of this and other research efforts may lead to additional reforms and investments at Cedar Creek hatchery and its satellite facilities.

Note: The reforms and investments listed are draft. They are presented here as a forum for further discussion. This list is not exhaustive, other ideas are welcome. The reforms and investments listed may not represent final decisions by ODFW.

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 spring Chinook Salmon program was submitted to NMFS on 3/17/2006 for approval and ESA coverage. This is an updated version of the previously submitted HGMP, and is consistent of the ODFW's Coastal Multi-Species Conservation and Management Plan 2014.

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.

Oregon coastal Coho Salmon populations currently are listed under the ESA as *Threatened*. These listed Coho Salmon inhabit the Nestucca River basin which may be indirectly affected by the stock 47 spring Chinook Salmon program through competitive interactions for food and space, and water withdrawal for hatchery operations. Direct take of listed natural Coho Salmon is not intended due to this spring Chinook Salmon propagation program, but incidental take may occur during spring Chinook brood collection.

Nestucca Complex

The Nestucca Complex consists of streams that are inhabited by listed natural Coho Salmon and is located between Cape Lookout on the north and Cascade Head on the south (Nickelson 2001). These streams also include the Nestucca River, Sand Lake tributaries, and Neskowin Creek. There is an estimated 190 miles of spawning habitat available to wild Coho Salmon of this complex.

Coho Salmon Life History

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

The eggs hatch in about 35 to 50 days, depending upon water temperature (warm temperature speeds hatching). The alevins remain in the gravel 2 or 3 weeks until the yolk is absorbed and then emerge as fry to actively feed in the spring. Most juvenile Coho Salmon spend one summer and one winter in fresh water. The following spring, approximately one year after emergence, they undergo physiological changes that allow them to survive in seawater. They then migrate to the ocean as silvery smolts about 10 to 12 centimeters (cm) in length.

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

Population Complex	Percent Males	Percent Females	Location	Run Years	Data Source
Nehalem	52%	48%	North Fork trap	1998-1999	Life Cycle Monitoring
Siletz	50%	50%	Mill Creek trap	1997-1999	Life Cycle Monitoring
Yaquina	51%	49%	Mill Creek trap	1997-1999	Life Cycle Monitoring
Alsea	77%	23%	Drift Creek tributaries	1959-1972	Moring & Lantz (1975)
	50%	50%	Cascade Creek trap	1997-1999	Life Cycle Monitoring
Umpqua	55%	45%	Smith River trap	1999	Life Cycle Monitoring
Coos	63%	37%	South 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 (53° 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 summer, Coho Salmon fry 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). Habitat complexity, primarily in the form of large and small wood is an important element of productive Coho Salmon streams (Nickelson et al. 1992b; Rodgers et al. 1993). Little is known about residence time or habitat use of estuaries during seaward migration. It is usually assumed that Coho Salmon spend only a short time in the estuary before entering the ocean. However, recent research is finding that rearing in the upper ends of tidal reaches can be extensive.

The distribution of Coho Salmon within a basin is primarily determined by two factors: marine survival, and the distribution of freshwater habitat of different levels of quality. When marine survival has been very poor, coho will be found in only the highest quality habitats. Coastwide, these habitats comprise about 22 percent of the habitat (Nickelson 1998). When marine survival increases, as could occur with a changing climate regime, coho will redistribute into freshwater

habitats of lower quality. Thus Coho Salmon population dynamics function with a classic "source-sink" relationship among stream reaches.

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

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

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

Indirect or incidental take of listed Coho Salmon may occur due to competitive interactions for food and space between the program fish and listed coho. Minimal indirect impact to listed coho may also occur due to water withdrawal for hatchery operations, and a few incidental take (catch and release) of listed coho may occur during spring Chinook Salmon brood collection. Oregon coast steelhead populations are considered a "species of concern", and may also be indirectly affected by this program. There are no other ESA listed populations in the basin affected by this program.

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

The Oregon Native Fish Stock Status Report (ODFW 2005) includes the status of coastal coho. Some of the following information about the status of the Nestucca Complex's coho population was taken from Nickelson (2001), which is consistent with the coho population status described in the Oregon Native Fish Stock Status Report.

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

The Nestucca Complex consists of Coho Salmon inhabiting streams located between Cape Lookout on the north and Cascade Head on the south. These include the Nestucca River, Sand Lake tributaries, and Neskowin Creek. There is an estimated 190 miles of spawning habitat available to the Coho Salmon of this complex. The critical population level for the Nestucca Complex is 800 adult spawners (Nickelson 2001).

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

The abundance of Coho Salmon spawners of the Nestucca Complex has ranged from less than 400 to about 10,100 and has averaged nearly 3,400 since 2003 (Figure 2-1 and Table 2-2). In two of those years, spawner abundance fell below the critical threshold of 800 fish.

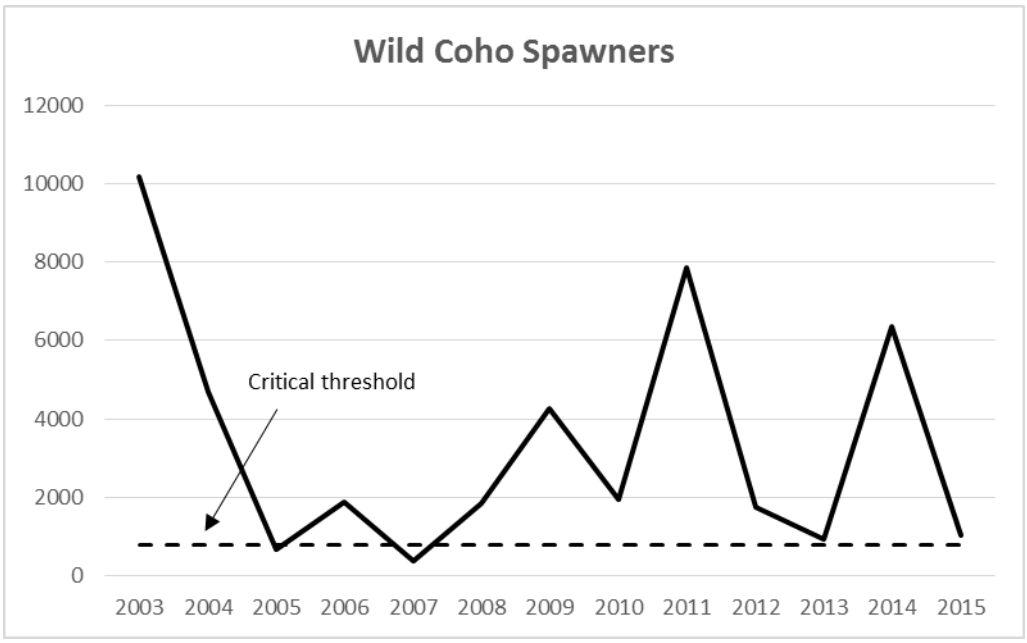

Figure 2-1. Trend in adult wild Coho Salmon spawner abundance relative to the critical population level for the Nestucca Complex, 2003-2015.

Table 2-2. Population parameters of Coho Salmon showing recruit per spawner for the Nestucca Complex, 2003-2015.

Year	Wild Spawners	Hatchery Spawners	Percent Hatchery Spawners	Pre-harvest Wild Population	Recruits Per Spawner
2003	10,194	109	1%	11,080	9.1
2004	4,695	73	2%	5,087	1.2
2005	686	9	1%	718	0.04
2006	1,876	19	1%	2,030	0.2
2007	394	5	1%	447	0.1
2008	1,844	0	0%	1,880	2.7
2009	4,252	0	0%	4,557	2.4
2010	1,947	93	5%	2,039	5.2
2011	7,857	0	0%	8,350	4.5
2012	1,751	0	0%	2,143	0.5
2013	946	37	4%	1,104	0.6
2014	6,369	0	0%	7,440	0.9
2015	1,029	0	0%	1,285	0.7
Avg.	**3,372**	**27**	**1.1%**	**3,704**	**2.2**

Smolt production was estimated for the 1997 through 1999 broods. Estimated smolt abundance ranged from 29,000 to 89,000 for the Nestucca Complex (Table 2-3).

Table 2-3. Estimates of the Abundance of Coho Salmon Juveniles of Different Life Stages Based on Spawner Abundance in Nestucca Complex.

Population	1997 Brood (millions)				1998 Brood (millions)				1999 Brood (millions)			
Complex	Eggs	Fry	Parr	Smolts	Eggs	Fry	Parr	Smolts	Eggs	Fry	Parr	Smolts
Nestucca	0.415	0.270	0.105	0.036	0.211	0.137	0.084	0.029	2.694	1.751	0.315	0.089
Data source: Nickelson (2001)												

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

Recruits per wild spawner have been highly variable, with seven of the last thirteen broods falling to one or below (Table 2-2 above and Figure 2-2 below).

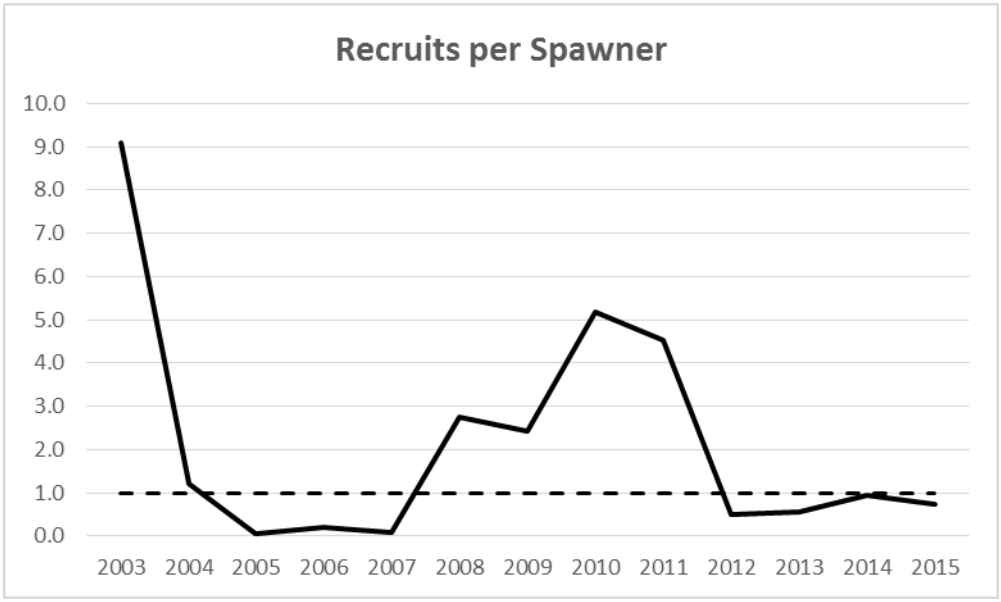

Figure 2-2. Trends in Recruits per Spawner for Nestucca Complex Wild Coho Salmon, 2003-2015.

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

Hatchery Coho Salmon production in the Nestucca Basin was terminated in 1992. Hatchery fish are still observed at times on the spawning grounds. Surveys since 2003 have averaged about 1% hatchery coho observed on spawning grounds. In all years during that period, hatchery fish made up 5% or less of the fish sampled, with no hatchery fish observed in six of the thirteen years (Table 2-2). No data is available for the progeny of naturally spawning hatchery-origin Coho Salmon in natural rearing areas.

Also, data of the proportion hatchery spring Chinook Salmon to natural spawning grounds (pHOS) are not available due to the fact that monitoring of naturally spawning Spring Chinook is not routinely conducted.

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.

Hatchery adult trapping/broodstock collection – Adult spring Chinook Salmon are trapped at Cedar Creek Hatchery from May through September/early October annually. The hatchery trap is generally operated year round, however spring Chinook Salmon are not typically captured before May or after early October. Spring Chinook adults may also be collected for broodstock by seining in Three Rivers. Generally, this activity occurs in August or early September. Spring Chinook Salmon adults may also be seined from May to July for the purpose of recycling fish through the sport fishery in the mainstem Nestucca River (except unmarked adults are typically released in the mainstem Nestucca above Three Rivers to facilitate migration to upper river holding/spawning areas).

Naturally produced Coho Salmon may be handled if they enter the trapping facility or are captured during seining operations. Unmarked Coho Salmon (and unmarked winter steelhead, fall Chinook Salmon, and Cutthroat Trout) trapped or caught are passed above the hatchery facility. Handling mortality may occur during this process, although no mortalities have been observed. No Coho Salmon have been captured during seining or trapping operations for collecting spring Chinook Salmon broodstock to date.

Hatchery water withdrawals- Cedar Creek Hatchery may pump water from Three Rivers during summer low flow periods to meet hatchery water supply needs. Intake screening is in compliance with NOAA Fisheries standards. It is possible that the operation of the pumping facility could occasionally injure or kill naturally produced salmonids. No injuries or mortalities have been observed as a result of this activity.

Three Rivers Weir- It is possible that a few downstream migrant juveniles may be injured or killed crossing the full spanning weir structure during low-flow years. The weir is likely a barrier to upstream juvenile salmonid migration also. Juvenile passage will be addressed during the reforms and investments discussed in Section 1.16.3. A temporary weir (vertical picket type design) has been used in recent years to prevent access for adult spring Chinook to the holding pool immediately below the permanent weir structure. This is done in order to prevent accumulations of adults in this area. The temporary weir is not a barrier to juvenile fish movement, and no mortalities of juvenile fish have been observed. The temporary weir is removed prior to the arrival of adult Coho Salmon and fall Chinook Salmon.

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

Data on past take is shown for return years 1998-99 to 2004-05 and is provided in Table 2-4: Note: Cedar Creek Hatchery also traps summer steelhead, winter steelhead and fall Chinook. The unmarked coho trap figures presented (Table 2-4) are not cumulative take but are total take for the trapping season (all stocks combined). Coho are rarely if ever trapped during spring Chinook collection activities.

Table 2-4. Number of unmarked coho captured at Cedar Creek Hatchery and Bays Creek Trap. Note: The Bays Creek trap is operated as part of the Cedar Creek Hatchery Stock 47 and 47W winter steelhead program. Further details are provided in those HGMP's.

Return Year	Cedar Creek Hatchery		Bays Creek Trap[1]	
	Unmarked Adult Coho	Unmarked Jack Coho	Unmarked Adult Coho	Unmarked Jack Coho
1998-99	0	0		
1999-00	4 males, 1 female – passed above weir	1 – passed above weir		
2000-01	3 males – passed above weir	0		
2001-02	1 male, 1 female – passed above weir	0		
2002-03	3 males - passed above weir	3 - passed above weir		
2003-04	13 males, 10 females – passed above weir	3 – passed above weir		
2004-05	4 males, 2 females - Passed above weir	2 – Passed above weir	1 male – passed above weir	0
2005-06	3 Passed above weir	0	5 male, 3 female – passed above weir	0
2006-07	1 male - Passed above weir	1 – Passed above weir	0	0
2007-08	2 males, 3 females passed above the weir	1 – passed above the weir	1 – male, passed above weir	0

Data source: HMIS & District files

1. First winter of operation was 2004-05, and trap was only operated part time. In subsequent years during extreme high flow conditions fish are able to pass over, or around the weir structure.

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).

See Table 2-5.

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

Listed Species Affected:	**Coho Salmon**	**ESU/Population:**	**Oregon Coast Coho Salmon**	**Activity:**	**ChS Trapping**
Location of Hatchery Activity:	**Cedar Creek Hatchery**	**Dates of Activity:**	**Apr. 15 – Oct. 15**	**Hatchery Program Operator:**	**ODFW**

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)		0-100*	0-200**	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)		<10*	<10***	
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.

*** Juvenile coho are typically not handled during hatchery operations, but are present and could occasionally be encountered**

**** All unmarked, naturally produced coho adults trapped are passed upstream of the hatchery facility.**

***** No direct mortalities have been observed during trap and pass operations.**

Note: The take figures are not cumulative take but are total take for the trapping season. Collection occurs during trapping of spring Chinook, fall Chinook, summer steelhead and winter steelhead. Adult coho are rarely if ever trapped during spring Chinook collection activities. The number of unmarked coho handled represents an annual total, and is not additive to numbers presented in other HGMPs.

- 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.

The Cedar Creek Hatchery trap facility and handling procedures will be modified immediately if take of naturally produced Coho Salmon is exceeding, or is projected to exceed, levels specified in this HGMP, and appears to be related to operation of the facility. This may include, but is not limited to, additional staff training or review of proper procedures, trap modifications, cessation of trapping, modified operation by hatchery personnel, etc.

SECTION 3
RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

Native Fish Conservation Policy - The Oregon Fish and Wildlife Commission has approved the Native Fish Conservation Policy (NFCP). The NFCP required the development of a conservation plan which was completed in 2014 (CMP) and is described below.

Fish Hatchery Management Policy (FHMP) – 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.

Coastal Multi-Species Conservation and Management Plan (CMP) – This plan addresses conservation and management of anadromous salmonids (salmon, steelhead and trout) on the Oregon coast from Cape Blanco to Seaside. The CMP is unique from other conservation plans in that it addresses both conservation and utilization of six distinct groups of fish species, none of which are listed under the ESA. In addition to meeting requirements of the Native Fish Conservation Policy, the CMP provides long-term management direction for species which are relatively healthy, with the intent to help ensure the continued existence of wild fish and the fisheries which wild and hatchery fish support. The Cedar Creek Hatchery spring Chinook Salmon hatchery program is consistent with ODFW's CMP 2014.

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

Oregon Plan for Salmon and Watersheds, Governors Executive Order EO 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 spring Chinook Salmon in the Nestucca River watershed, including nutrient enrichment, acclimation and other separations of hatchery and natural production, and monitoring of hatchery and naturally produced runs.

NPDES Permit:
The Cedar Creek Hatchery is operated under the NPDES 300-J general permit to maintain environmental standards of hatchery effluents.

3.3) Relationship to harvest objectives.

Cedar Creek stock 47 hatchery spring Chinook Salmon are mass marked (100%) as a means of integration of hatchery and harvest management. Mass marking allows for selective harvest of hatchery fish while allowing release of all naturally produced spring Chinook. Mass marking also allows for better monitoring and control of impacts of the hatchery program on naturally produced spring Chinook Salmon populations. Incidental take of naturally produced Nestucca basin Coho Salmon in harvests is limited by the ESA Section 4(d) rule. The 4(d) rule requires development of Fishery Management and Evaluation Plans (FMEP). Such plans have been developed and are guided by the Pacific Coast Salmon Plan, specifically Amendment 13 (Pacific Fisheries Management Council [PFMC] 1999). Under recent conditions of marine survival and abundance, the take is limited to less than 15 percent of the total pre-harvest Oregon Coast ESU natural coho abundance. Take could increase to 35 percent if conditions improve (PFMC 1999). This standard is adopted as adequate for controlling incidental harvest impacts in this plan, pending completion of FMEPs. All further address of harvest impacts will occur under the FMEPs. Estimated harvest impacts (ocean and freshwater combined) on naturally produced coho for the period 1994 through 1999 averaged 9.2 percent and ranged from 6.8 percent to 12.4 percent (PFMC 1999). Adult Coho Salmon are typically not encountered by anglers targeting hatchery spring Chinook Salmon because adult coho usually do not enter the Nestucca basin until well after spring Chinook sport fisheries are closed. The Nestucca River basin is currently closed to angling for non fin-clipped Coho Salmon above tidewater.

The spring Chinook Salmon artificial production program is designed to have minimal biological impacts to naturally produced species. Likewise, fish culture practices are designed and carried out to rear full-term smolts to limit impacts to naturally rearing fish species.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1990-2001), if available.

Freshwater recreational fisheries in the Nestucca River basin benefit from this program. Freshwater recreational spring Chinook Salmon fisheries are selective for marked hatchery fish. Therefore this program supports the only consumptive harvest opportunity for spring Chinook Salmon in this basin. Cedar Creek stock 47 spring Chinook Salmon are also harvested in ocean recreational and commercial fisheries. Past harvest data is presented in Table 1-2.

3.4) Relationship to habitat protection and recovery strategies.

This harvest augmentation program is not directly related to habitat protection or recovery. It is designed to provide hatchery spring Chinook Salmon for harvest in freshwater fisheries, while other actions are taken to protect and restore habitat. Management of the hatchery program will focus on attaining harvest objectives using methods that minimize impacts to naturally produced fish and their habitats.

Major factors affecting natural production in the Nestucca River are unknown; however, it is suspected that ocean survival may be the largest contributing factor. In general, habitat condition in the basin is slowly improving. The Nestucca watershed has historically been subject to forest fires of varying severity. Several fires occurred from the mid 1800's to the early 1930's, including the 50,000 acre Hebo fire in 1910 (McDonald and Schneider, 1992). The upper Nestucca Basin was again severely impacted by a series of forest fires in the mid-late 1930s, collectively known as the "Tillamook Burn". Each of the forest fires impacted habitat with loss

of shade, increased sedimentation, and loss of stream complexity. The basin is in the process of recovering to a forested condition with shade and sedimentation impacts greatly reduced. Dominant land use in the basins in which this program operates is industrial forestland (although much of the basin is also in federal ownership and timber harvest has been greatly reduced in recent years) and agriculture. Natural events (such as flooding) are common in the basin and can have short term detrimental effects on egg depositions and juvenile rearing. However, these events also provide some long term benefits in the form of gravel and large woody debris recruitment.

Habitat restoration projects over the past twenty-five years (on federal and private timberlands, which make up the majority of the basin ownership) have begun to address in-stream complexity concerns. Fish passage structures believed to impede migrations (primarily culverts) are being evaluated on most county, state, and privately owned timberlands. Major highways and county road systems have been inventoried and priority ranked. Some sites have been addressed and others are in various planning stages; however, all are subject to funding availability. Oregon fish passage laws require fish passage to be addressed at all impediments to migration. As such, fish passage in these basins is likely to continue to improve over time.

3.5) Ecological interactions.

(1) Species that could negatively impact program

Competition for food and space between stock 47 spring Chinook Salmon smolts and other salmonids (naturally produced and hatchery) in release streams, their estuaries, and near shore ocean environment may negatively impact this program. Predation by avian and marine mammals on program fish may negatively impact the overall performance of this program.

(2) Species that could be negatively impacted by program

Competition for food between stock 47 spring Chinook smolts and naturally produced salmonid juveniles in release streams, their estuaries, and near shore ocean environment may negatively impact naturally rearing salmonids. Large concentrations of hatchery reared fish may attract predators, which may cause increased predation on naturally produced salmonid juveniles. Increased angling pressure on hatchery spring Chinook may increase incidental mortality of naturally produced spring Chinook.

(3) Species that could positively impact program

Increased abundance of naturally produced adult salmonids, primarily Chinook and Coho Salmon, and their eventual death after spawning, will increase stream nutrient levels and biomass productivity of the prey base used by hatchery and naturally produced fish. Use of hatchery salmon carcasses for stream enrichment activities will further enhance this nutrient base and positively influence the spring Chinook program.

(4) Species that could be positively impacted by program

Adult stock 47 spring Chinook carcasses are used in stream enrichment activities. The nutrients provided by these carcasses will benefit salmonid and non-salmonid fishes in the streams where the carcasses are placed.

General Information

Interactions between migrating hatchery spring Chinook Salmon smolts and naturally produced Coho Salmon are likely to be minimal. Spring Chinook Salmon are reared to smolt size and expected to migrate upon, or soon after release. Smolt releases occur relatively low in the basin.

Target release size is 12 fish per pound with release timing of late July (possibly early August). Fish health is examined prior to release by an ODFW's fish health specialist and only certified fish are released per ODFW's Fish Health Management Policy. It is possible that some may residualize after release, but it is anticipated that interactions with naturally rearing Coho Salmon and other species are minimal based upon their species-specific rearing and life history characteristics. Furthermore, unfed fry and fingerlings from hatchery production are released into habitat locations (standing water) that are unlikely to overlap with rearing salmonid fry/fingerling. Hatchery spring Chinook Salmon carcasses are used in the stream enrichment program to further improve freshwater rearing habitat.

Monitoring of naturally spawning Spring Chinook is not routinely conducted, thus little information on the proportion of naturally spawning hatchery fish is available. Grant funded surveys were conducted from 2005-2008 in north coast basins (ODFW 2008; ODFW 2013). Additional surveys were conducted in the Wilson River in 2015 by the Tillamook District (ODFW unpublished data). Observed hatchery fish on spawning grounds generally exceeded 50% of the naturally spawning population. However, spring Chinook hatchery releases were modified in 2015 with the implementation of the Coastal Multi-Species Management Plan 2014. Thus, in the future the proportion of hatchery fish is likely to differ from the previous surveys. No data will be available for several years until returns include all year classes from these modified hatchery releases.

The ODFW has had a Salmon and Trout Enhancement Program (STEP) in place and operational since 1981. Spring Chinook Salmon are seldom used in the "classroom incubator" educational component of the STEP program.

Habitat Above Hatchery Facilities

THREE RIVERS

There has been no ODFW aquatic habitat inventory completed on Three Rivers above the hatchery weir site. The United States Forest Service (USFS) has done some minor survey work on headwater tributaries of Three Rivers that are on Federal land; however, these areas are small and not representative of the basin as a whole.

In general, Three Rivers above the weir/trap facility, including Alder Creek, provide approximately 14 miles of habitat for salmonids. Overall gradient is low to moderate in most of the area. The area typically lacks deep holding pools but does appear to have a reasonable amount of shallower pools. Substrate is a mix of gravels and cobbles suitable for use by Cutthroat Trout, Coho Salmon, Chinook Salmon and steelhead. Most of the system is paralleled by State Route 22, a significant arterial highway from the Willamette Valley to the coast area. Much of the area has residential development along the system. The system lacks large wood in any significant amount. Development and the highway placement have heavily impacted the riparian vegetation.

ODFW has worked cooperatively with the local watershed council and landowner(s) in the basin on habitat enhancement projects and will continue to conduct habitat enhancement projects in conjunction with timber management operations.

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 has two different surface water supplies: Cedar Creek which supplies year-round flow to the facility; and Three Rivers, where approximately 2,000 gallons per minute (gpm) is pumped when necessary during low flow periods (generally July to as late as November). The facility has current water rights for 110.9 cubic feet per second (cfs) from Cedar Creek, and 5 cubic cfs (approx. 2,250 gpm) from the Three Rivers. The facility is in compliance with the water right permits, water withdrawals, and annual water uses reporting to Oregon Department of Water Resource.

The Three Rivers pumping facility and the Main Intake No. 1 on Cedar Creek are in compliance with NOAA Fisheries fish screening criteria. Auxiliary water intakes on Cedar Creek that supply water to the adult holding pond(s) and the hatchery trap are screened, but not to NOAA criteria. These intakes are used during low flow periods only to supplement flow to these locations. Only Cutthroat Trout are currently present in Cedar Creek above the hatchery intake. Due to the size and steep gradient, it is possible that steelhead may have used this system historically, but unlikely that Coho Salmon utilized the system.

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 50ºF.

During the summer months, Cedar Creek's water source consists of Cedar Creek and approximately 2,000 gpm supplementation pumped from Three Rivers when necessary. Water temperature fluctuates between 50º and 67ºF. Pond cleaning operations are similar to methods used in the winter.

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.

Risk of take from hatchery water withdrawals is minimized because no listed fish are present in Cedar Creek above the main hatchery intake. The main intake on Cedar Creek is screened, and the screens are in compliance with NOAA screening criteria. During low flow periods when the hatchery supplements the water supply by pumping from Three Rivers, risk of take is minimized because the pumping station is screened, and the pump screens are in compliance with NOAA screening criteria.

Cedar Creek Hatchery currently operates and discharges effluents under the NPDES 300-J permit (Table 4-1). All conditions of the permit are administered within ODFW and regulated by the Oregon Department of Environmental Quality. More than 12 years ago, Cedar Creek

Hatchery has had a substantial number of violations, however upon review a very high percentage of those were found to be errors in reporting and procedural errors associated with sampling. Actual effluent violations had been limited and many were coupled with periods of flooding and high flow events that were beyond human control. In those years, effluent discharge from the rearing lakes (used for steelhead production) was also a source of some violations. Consequently, hatchery staff were trained by the DEQ and ODFW staff on fish rearing and pond cleaning methods. As a result, no violations have occurred since December 2002.

All hatchery effluent is monitored and reported quarterly under a National Pollutant Discharge Elimination System (300J) permit. The hatchery takes samples quarterly during the months of heaviest production to test for settleable solids (SS) and total suspended solids (TSS) both during normal operations and during cleaning operations. Individual samples evenly spread over the day are taken and combined to form a composite. Contents from the composite are used to measure SS and TSS. Cedar Creek Hatchery also has a pollution abatement settling pond.

Cedar Creek Hatchery has two large, asphalt lined, rearing lakes. The largest lake (approximately 360,000 cubic feet) is not currently in use for rearing because of effluent discharge issues related to discharge permit compliance and reductions in programs. This pond has recently been converted to a settling / abatement pond. A pump station was installed in the existing abatement pond with a pipeline running up to the large asphalt pond. Cleaning water from production ponds will be diverted to the old abatement pond and pumped to into the large pond. This modification will allow for more efficient pond cleaning to meet discharge requirements.

Since January 2003 the Region has instituted a process of checks and balances, as well as necessary training, to assure proper sampling procedures and reporting practices are followed.

Table 4-1. NPDES Permit 300-J Limitations

Samples	Maximum Levels
Settleable Solids during normal	Max = 0.1 ml/l (monthly average)
Settleable Solids during cleaning	Max = 0.2 ml/l (daily maximum)
Total Suspended Solids during normal	Max = 10 mg/l (daily maximum)
Total Suspended Solids during cleaning	Max = 15 mg/l (daily maximum)
pH during normal and cleaning	Range = 6.0 to 9.0
Source: Cedar Creek Hatchery 300J NPDES Permit	

5.1) Broodstock collection facilities (or methods).

The Cedar Creek Hatchery trap is located in the Three Rivers watershed approximately 1.5 miles east of Hebo off Highway 22 (RM 2.25). The hatchery sits at an elevation of 43 feet, at 45º 12' 57" N latitude and 123º 50' 43" W longitude. The adult fish ladder and trap is located at the hatchery and is supplied with water from Cedar Creek as an attractant. The entrance of the ladder is located downstream of a hydraulic weir facility spanning Three Rivers, which helps guide fish into the ladder/trap building.

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

Broodstock are collected and held in the Cedar Creek Hatchery adult holding ponds or in separate holding areas within or adjacent to the trap facility, including Three Rivers. All off station transfers are done with the use of a large liberation truck or a portable liberation tank (see description below).

Eggs are transferred on station in buckets with lids shortly after spawning is complete. The transfer of juvenile fish from the hatch house to the raceway at the time of ponding is done via plastic garbage cans or the hatchery's portable tank as they are moved a very short distance.

Carcasses for stream enrichment are transported in plastic totes in the back of full size pickup trucks or on a trailer. Haul time varies depending on the location, but is usually less than 1 hour.

Adult fish are transported in liberation trucks, or in a portable liberation tank either carried in a full-size pickup truck or trailer mounted. Liberation trucks are typically 1,000-2,500 gallon capacity units, either mounted on a large flatbed truck, or a tanker style truck. The liberation trucks are equipped with oxygen diffusing systems, water re-circulation pumps, and dissolved oxygen meters. The portable liberation tank(s) has a capacity of 200-430 gallons of water, and may be equipped with an oxygen diffusion system and circulation pump.

Adult fish passed upstream of the hatchery are released immediately upstream of the weir facility by hand, or are transported a short distance upstream (approximately 2 miles) in a liberation tank and returned to the river. Adult fish recycled downstream are transported less than 10 miles, with a haul time generally less than 20 minutes.

5.3) Broodstock holding and spawning facilities.

Adult facilities consist of a trap located on Three Rivers across Highway 22 from the main hatchery facility, a holding area in Three Rivers located between the permanent hatchery weir and a temporary weir, and two holding ponds on the hatchery grounds (of which only one is typically used for spring Chinook adults). The trap consists of two concrete tanks (approximately 10' by 20' by 5'). One tank is used as the trapping facility and the other to hold fish. The trap and tank can be subdivided. The tanks are supplied with gravity fed water from Cedar Creek. Water flow can be adjusted but is normally supplied at 2,000-2,500 gpm. Water

flow exits through the adjacent trap and fish ladder. Water flow measurements are taken weekly and the trap monitored at least once a day. The trap and tanks are located in an approximately 30-foot by 50-foot building. The building has a concrete floor and metal walls and roof. The building can be secured to protect fish and equipment. The building has electrical service for lighting. Auxiliary pumps can supply additional water during low-flow periods. All necessary supplies for spawning can be stored in this building. The trap has a capacity of approximately 300-500 fish.

There are two adult holding ponds located at the hatchery. One pond is typically used to hold spring Chinook adults (the other is used to hold summer steelhead adults). The ponds are 100'x20'x4', with flow of approximately 408 gpm. These ponds have the capacity to hold 500-1,000 adult spring Chinook Salmon.

5.4) Incubation facilities.

Egg incubation is conducted in a 43' by 38.5' building at the hatchery. 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 aluminum troughs and 15 stacks of vertical incubator trays. Each stack contains 14 trays. The facility has the capacity to incubate 2.3 million eggs. Flow through heaters and a small capacity chiller allow for limited temperature manipulation of selected groups of eggs. This allows for acceleration or deceleration of development in order to close the gaps between eggs taken on different dates. The heaters can raise the water temperature about 3^{o}F above ambient and is equipped with an automatic shut off if water flow is restricted. The chiller unit is a recirculation system of limited capacity, but can maintain water temperatures around 39^{o}F. Discharge water is returned to Cedar Creek. Spring Chinook eggs are incubated in baskets suspended in the aluminum troughs, but could be incubated in vertical stacks if necessary.

Incubation of eggs for the STEP classroom projects is done in small aquariums with a natural substrate bottom. Systems usually have a standard aquarium pump and filter setup. Temperature control is accomplished by insulation around the tank and the addition of bottles of frozen water. Some classrooms are equipped with chiller units which maintain a constant temperature. Water is partially changed on a regular basis to keep it "fresh".

5.5) Rearing facilities.

The incubation building contains concrete tanks and fiberglass Canadian-style deep troughs. These facilities are used to start fish on feed. The concrete tanks have a rearing capacity of 90 pounds and the troughs 100 pounds. The hatchery also has 7 concrete ponds. Three of the concrete ponds have a capacity of 10,000 ft^3; three have a capacity of 8,000 ft^3, and one a capacity of 4,500ft^3.

After hatching, swim-ups are typically transferred directly to an outside concrete raceway, although fry may be reared in Canadian style or concrete starter tanks in the hatch house if necessary. Starter tanks are approximately 14'x3'x2.25', with an approximate volume of 90-100 ft^3. Water is supplied at the rate of approximately 50 gpm.

Raceways measures 114 feet long, 20 feet wide, and 4 feet deep, with a typical water depth of approximately 3.5 feet (about 8000 $ft^3$of water). The raceways are single pass, with a solid

center wall down the length of the pond, except for 8 feet at the head and tail ends of the pond. Thus, each pond can essentially be divided lengthwise into 2 raceways by blocking the openings at the head and tail ends of the pond.

Each raceway currently used has a maximum capacity of approximately 8,000 pounds of fish. Cedar Creek Hatchery stock 47 spring Chinook Salmon production is split as needed into multiple raceways to maintain density requirements.

5.6) Acclimation/release facilities.

Stock 47 spring Chinook Salmon are not currently acclimated but may be in the future as needed to meet fishery contribution and stray rate goals. All rearing currently takes place on-site at the hatchery. Releases into Three Rivers, Nestucca River, and the Little Nestucca River are direct releases via liberation truck until such time that acclimation is warranted.

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

There have been no operational difficulties or disasters that have led to significant fish mortality. Potential operational difficulties that could result in significant fish mortality include high flows that deliver large amounts of debris, which may plug intake screens or deposit silt on eggs; or disease outbreaks; or failure of the Three Rivers pumps which supply water to the hatchery during low flow periods (although flow from Cedar Creek would still be available). Thus far, hatchery staff and/or fish health staff have been able minimize the effects of these events and substantial fish mortality has been avoided.

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.

Spring Chinook Salmon that are propagated under this program are not listed. Any operational failures would be anticipated to have minimal or no effect on listed or other naturally produced species.

To minimize the risk to propagated fish, the hatchery is staffed full time, 24 hours per day. Alarm systems are in place to warn employees of low water, plugged intakes, and other problems. Employees work schedules are adjusted as conditions warrant (i.e. during large storm events) to maintain hatchery operations. The Three Rivers pump that supplies water to the hatchery during low flow periods is electric, but a propane-operated backup pump is available in the event of a power outage. The pumps receive regular maintenance to ensure they remain operational. The hatchery trap is supplied by gravity flow and is monitored regularly.

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.

Adults used for broodstock are descendant of Nestucca River origin stock. Stock 47 spring Chinook Salmon are part of the Oregon Coast ESU and are not listed under the Federal ESA. Broodstock is collected at Cedar Creek Hatchery trap, by seining in Three Rivers, or in other areas within the Nestucca River basin with concentrations of hatchery adults. Additional trapping facilities may be used elsewhere in the basin to meet broodstock collection goal and stray reduction target.

6.2) Supporting information.

6.2.1) History.

Cedar Creek stock 47 origin is from Nestucca River natural spawners. The stock 47 program has existed since at least 1975, and the current program utilizes only hatchery spring Chinook Salmon returning to the Nestucca basin. Trask River stock spring Chinook may have been transferred to the Nestucca basin in the late 1920's or early 1930's, although the extent is unknown (see section 1.13).

6.2.2) Annual size.

The existing stock 47 spring Chinook Salmon program requires a minimum of 80 females and 80 males for broodstock needs. Additional adults may be collected as necessary to cover shortages resulting from, but not limited to, fecundity variation, early egg mortality, positive disease test, etc.

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

Prior to 1995 Nestucca stock 47 smolts were not differentially fin-marked prior to release to identify them from natural origin adults. With the return of mass marked fish back to the facility, no unmarked (naturally produced) adults have been used for broodstock purposes. Unmarked spring Chinook Salmon trapped are transported and released in the mainstem Nestucca River to spawn naturally. Incorporating unmarked, naturally produced adults may be implemented as necessary to meet fish management goals (see section 1.16.2).

6.2.4) Genetic or ecological differences.

The current broodstock are likely to exhibit similar genetic and ecological traits to naturally produced Nestucca basin spring Chinook Salmon. Broodstock is collected randomly from fish that have returned throughout the run and is comprised of several age classes to maximize genetic diversity within the hatchery population. Stock 47 spring Chinook Salmon are derived from locally adapted spring Chinook populations, and appear to exhibit many similarities to the natural population (run timing, spawn timing, age structure, etc.). Trask River stock spring

Chinook may have been transferred to the Nestucca basin in the late 1920's or early 1930's, although the extent is unknown (see section 1.13). It is assumed that any genetic or ecological effects of this transfer (if it occurred) are extremely minor and likely would not be detectable over 75 years later.

6.2.5) Reasons for choosing.

Stock 47 eggs have been used for spring Chinook Salmon production at Cedar Creek Hatchery since the current program started. It was felt the use of a locally adapted stock was likely to reduce out-of-basin straying and provide broodstock better suited to the basin of release. The Nestucca stock 47 appears to be a good contributor to angling success. Stock 47 hatchery spring Chinook have only been mass marked since 1995. It is likely that some naturally produced adults were used for broodstock prior to full returns of mass marked hatchery fish.

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.

Stock 47 spring Chinook hatchery broodstock selection should have minimal ecological or genetic impacts to naturally produced Coho Salmon. Naturally produced coho may be trapped during spring Chinook Salmon broodstock collection (particularly late in the season), although this has rarely occurred in the past. Any unmarked Coho Salmon that is trapped is passed upstream of the hatchery facility to spawn naturally. Juvenile coho may be encountered during seining operations to collect broodstock. However, large mesh seines which easily pass juvenile fish are used, and few, if any coho juveniles have been observed during this operation. Any juvenile fish captured would be immediately released.

Additional risk aversion measures associated with the Cedar Creek Hatchery stock 47 spring Chinook broodstock collection (and selection) are discussed in Section 7.9.

SECTION 7
BROODSTOCK COLLECTION

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

Adult stock 47 hatchery spring Chinook Salmon are collected to meet the objective of 230,000 smolts production for release annually, STEP egg requests, and to meet genetic guidelines.

7.2) Collection or sampling design.

Adult spring Chinook Salmon begin returning to the Nestucca basin in late March or April and are present in the system throughout the spring and summer. Adult spring Chinook are collected in the hatchery trap or by seining in the Nestucca basin. Fish are collected periodically from throughout the run (May to September) and held for broodstock. Fish are held in the adult holding pond at the hatchery, in the hatchery trap or in Three Rivers between the permanent and temporary weir. Future collection of adults may be conducted at trap sites elsewhere in the Nestucca Basin in order to meet broodstock or stray rate objectives.

7.3) Identity.

The hatchery reared spring Chinook have a distinctive external fin clip that distinguishes them from the unmarked, naturally produced fish in the Nestucca River basin. The adipose fin clip is used to mark stock 47 hatchery spring Chinook, although other marks may be considered if necessary.

7.4) Proposed number to be collected:

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

This program utilizes a minimum of 80 females and 80 males for broodstock to meet production goals and genetic guidelines. Additional adults may be collected as necessary to cover shortages resulting from, but not limited to, fecundity variation, early egg mortality, positive disease test, etc. Approximately 300,000-500,000 eggs will be taken for this program, to meet the new production goal of 230,000 smolts and to provide eggs for STEP activities. Additional eggs may be taken if necessary. Once spawning is complete, surplus eggs may be culled randomly across egg take groups and destroyed (see section 9.1.2).

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

Table 7-1. Broodstock Collection Levels of the past for Stock 47 Spring Chinook Salmon (1992-2006 brood years)[1]. Adult collection and smolt production numbers shown are pre-CMP levels.

Brood Year	Females	Adults Males	Jacks	Eggs	Smolts released[2]
1992	67	103	10	150,854	73,096
1993	70	86	3	182,143	102,442
1994	83	75	1	220,709	126,338
1995	63	66	8	300,991	112,312
1996	79	73	2	282,662	120,657
1997	159	107	9	287,161	122,222
1998	68	81	12	231,562	119,800
1999	121	112	15	255,956	113,401
2000	149	140	62	228,864	119,664
2001	99	199	105	225,851	103,969
2002	643	638	54	235,369	110,467
2003	585	688	122	225,649	113,395
2004	573	572	71	225,176	112,560
2005	113	114	12	218,564	113,842
2006	332	343	106	232,210	119,295

Data source: ODFW HMS database, Cedar Creek Hatchery.

[1] Broodstock collection represents all 47 stock ChS collected. At least 50 pairs are spawned from throughout the run.

[2] Nestucca River and Three Rivers releases.

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

Hatchery spring Chinook Salmon broodstock are currently collected at the Cedar Creek Hatchery trap facility and by seining in the Nestucca Basin. Surplus green adults not needed for the program may be recycled back into the Nestucca River to provide additional angling opportunity or may be used for food donation programs. In addition, spawned adults may be used for stream enrichment. Naturally-produced spring Chinook Salmon (unmarked) adults collected are typically passed upstream of the Three Rivers weir, although some may be retained for broodstock to maintain genetic diversity or cover broodstock shortfalls. The amount of wild spring Chinook retained for broodstock will generally be proportional to the percentage encountered in the hatchery trap.

7.6) Fish transportation and holding methods.

Adult hatchery spring Chinook collected for brood are held until ready to spawn. Spawning activities take place at the Cedar Creek Hatchery adult holding pond or in the hatchery trap facility. See Sections 5.2, 8.3, and 10.5 for description of transportation equipment and procedures.

7.7) Describe fish health maintenance and sanitation procedures applied.

Developing eggs receive regular treatments with formalin or other approved treatments to prevent/control fungus (*Saprolegnia parasitica*) outbreaks. Green eggs are water-hardened in an iodine solution to prevent disease or viral contamination. Juveniles are treated (usually with medicated feed, hydrogen peroxide, or possibly formalin) as directed by ODFW fish health staff if necessary. Adult spring Chinook Salmon broodstock held at the hatchery may receive injections of antibiotics to control furunculosis. Adult spring Chinook broodstock are treated regularly (typically with hydrogen peroxide, or potentially formalin) in the holding pond. Additional sanitation procedures are described in section 9.2.7. Also, see Attachment A for fish health management protocol.

7.8) Disposition of carcasses.

Hatchery spring Chinook Salmon carcasses may be used for stream enrichment activities in the Nestucca River basin. Carcasses suitable for human consumption may be used for food programs, or carcasses may be sold for processing into fish food or other products. Carcasses not used for stream enrichment, food programs, or sold, are buried or disposed of in a landfill.

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.

It is unlikely that spring Chinook Salmon broodstock collection will have any genetic effects on naturally produced salmonids. To minimize genetic and ecological effects between hatchery produced and naturally produced spring Chinook Salmon, as well as to minimize adverse ecological effects on listed naturally produced Coho Salmon, the following measures will be taken:

- Naturally produced Coho Salmon that enter the Cedar Creek Hatchery trap will be released alive above the trap and weir facility. The hatchery trap will be visually checked at least

daily, and fish sorted at least weekly (or as needed) to minimize delay and potential harm to naturally produced Coho Salmon. The weir and trap facility is further being operated as indicated in the attached letter from Tom Stahl to Lance Kruzic (Attachment B). Adult coho are rarely, if ever, observed during spring Chinook Salmon broodstock collection activities.

- A disease monitoring plan will be implemented (Attachment A).
- To safeguard against catastrophic loss of broodstock, excess adults are retained.

SECTION 8
MATING

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

8.1) Selection method.

Collection of spring Chinook Salmon for use as broodstock occurs throughout the run. Spawning usually occurs during September. Spawning is done randomly based on availability of ripe fish at the time of spawning. It is assumed that the spawning population is representative of the entire run of hatchery spring Chinook Salmon, since adults are collected randomly from the returning population. Excess eggs may be collected to assure meeting the production goal. Excess eggs may be culled randomly across egg take groups after spawning is completed if necessary (see section 9.1.2).

8.2) Males.

Males are generally only used once during spawning. If necessary, in the case of a shortage of males, individual fish may be spawned more than once. Jacks will be included in the broodstock when available.

8.3) Fertilization.

Spring Chinook Salmon are kill-spawned with the goal of a 1:1 male-to-female ratio. Each fish is typically only used once in spawning, however if necessary, in the case of a shortage of males, individual fish may be spawned more than once.

Spawning is conducted using a modified matrix. Eggs from females are spawned into a single plastic bucket and mixed. The eggs are then divided into separate buckets. Males are spawned, one into each of the buckets of eggs. These groups are held separate and transferred to the incubation facility in the plastic buckets. Once in the incubation facility, the fertilized eggs are water hardened in a solution of iodophore and placed in the incubation baskets. Each family group is incubated in separate baskets or trays. This matrix-spawning regime provides for the possibility of multiple family groups per female spawned.

Ovarian samples are taken from all spawned females and visceral (kidney, spleen) samples are collected from the first 60 fish spawned for viral analysis. Eggs that test positive for disease may be kept or destroyed, at the direction of ODFW fish health staff.

8.4) Cryopreserved gametes.

Cryopreservation of spring Chinook gametes is not used 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.

No genetic or ecological effects to naturally produced listed fish species is expected from the mating scheme of the stock 47 hatchery spring Chinook Salmon program. However, to maintain the genetic diversity within the propagated spring Chinook Salmon population, broodstock is

randomly selected from throughout the entire run. Spawning is done randomly based on availability of ripe fish. Matings are done with a goal of a 1:1 sex ratio (i.e. one male and one female) using a spawning matrix. Each fish is only used once in spawning, however if necessary, in the case of a shortage of males, individual fish may be spawned more than once. Naturally-produced spring Chinook Salmon from the Nestucca Basin may be incorporated into the broodstock as needed to meet genetic goals. The number of naturally-produced spring Chinook Salmon used in the broodstock will generally be proportional to the number of non fin-clipped fish entering the adult trap.

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. Stock 47 Spring Chinook Salmon Egg Takes and Survival Rates, 1995-2006 Brood Years. Values shown are pre-CMP levels.

Brood Year	Egg Take	Eyed Eggs	Percent Survival to Eye-up Stage
1995	300,991	279,442	92.8
1996	282,662	250,530	88.6
1997	287,161	258,360	90.0
1998	231,562	211,418	91.3
1999	255,956	239,512	93.6
2000	228,864	210,384	91.9
2001	225,851	217,532	96.3
2002	235,369	201,340	85.6
2003	225,649	213,160	94.5
2004	225,176	209,240	92.9
2005	218,564	196,128	89.7
2006	232,210	225,860	97.3

Data source: ODFW HMS database, Cedar Creek Hatchery files.

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

Additional spring Chinook Salmon eggs may be collected in order to compensate for egg to smolt mortality and genetic considerations, such as increased family size to promote genetic diversity, etc. Surplus eggs are later culled, usually at the eyed stage. Eggs are culled randomly across the egg take groups to retain diversity among those adults spawned. Eggs that are used for production are randomly taken from the family groups based on a percentage to ensure equal representation throughout the population. For example, if one egg-take date consists of 4 family groups and will make up 25 percent of the total population of the brood, then an equal number of eyed eggs will be retained from each of the 4 family groups to achieve the 25 percent of the total population goal.

Mortality and culled eggs are disposed of by freezing and then burial. Culled eggs (which are rendered non-viable by freezing) may also be used in the stream enrichment program if permitted.

9.1.3) Loading densities applied during incubation.

Spring Chinook Salmon egg average size at spawning is 60 eggs per ounce. The baskets used to incubate spring Chinook eggs are suspended in shallow troughs. Water flow is supplied at a rate of 12 gpm. The standard loading density per tray from green to eyed is approximately 13,200 eggs per unit. When eggs eye-up they are shocked, picked, inventoried, and densities are reduced to approximately 6,000 eggs per unit. Eggs may also be incubated in vertical stacks at a rate that conforms to IHOT standards.

Loading densities for STEP classroom incubators varies with the size and setup of equipment being used but typically runs from 200 to 1,000 eggs. A standard aquarium re-circulating type pump supplies flow. No flow rates have been calculated but the flow is sufficient for the small number of eggs used in these programs.

9.1.4) Incubation conditions.

The water supply to the egg incubator is supplied by Cedar Creek, and may be supplemented by water pumped from Three Rivers if necessary. The water is monitored for flow and temperature daily. The incubating eggs are held in water that is generally 45º to 55ºF. Dissolved oxygen (DO) levels are not monitored during incubation. Water temperature may be manipulated if necessary to bring egg groups together for common ponding dates. The incubation facility is equipped to chill water, but on a limited basis and only during incubation. Water can be chilled and delivered to no more than two incubation stacks or one shallow trough. Temperature manipulation for heated water is achieved by using up to three, in-line, single-pass, spa heaters. The incubation facility is subject to silting problems, as the incoming water will carry fine materials during heavy rain events. Incubating eggs are treated with formalin to control fungus.

Students will sometimes monitor temperature in the STEP classroom incubators; however, it is likely to vary significantly between incubators, rooms, and schools. Typically, these systems run at ambient room temperatures, but have ice added daily to keep temperatures in the optimum range of 50º to 60º F, but below the prolonged exposure lethal level of 63º F or higher. A standard aquarium re-circulating pump supplies flow.

9.1.5) Ponding.

Fry are physically relocated from the incubator trays to an outside raceway (or possibly to starter troughs in the hatch house) when the majority of the fry are visually estimated to be fully buttoned up. This occurs with approximately 1,800 temperature units. Spring Chinook Salmon fry average approximately 1,000 fish per pound at this point.

9.1.6) Fish health maintenance and monitoring.

See Attachment A regarding state approved fish health protocols.

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

Incubation of stock 47 hatchery spring Chinook Salmon eggs should have no genetic effect on naturally produced fish species. To minimize ecological effects to the receiving stream and the inhabiting natural fish populations, hatchery personnel check incubating eggs daily to remove

dead eggs, treat eggs for disease/fungus, and keep the incubation facility clean to prevent transmission of diseases.

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.

Average survival for stock 47 spring Chinook Salmon at Cedar Creek Hatchery from fry to the time of marking and release is presented Table 9-2. Survival rates have generally been very high, approaching 100% in some years. Actual survival rates are difficult to calculate, as inventory methods vary by life stage. Fish are hand counted at marking, whereas other numbers are estimated by using average weight samples. Differences in the accuracy of each counting method (and the equipment used) sometimes leads to more fish at marking and/or release than were estimated at the time of ponding.

Table 9-2. Stock 47 Spring Chinook Salmon Survival Rates at Cedar Creek Hatchery, 1992-2006 Brood Years. Values shown are pre-CMP implementation period.

Brood Year	Fry Ponded	Juveniles at Marking	Fish Released[1]	Percent Survival to Marking[2]	Percent Survival to Release[2]
1992	102,860	95,382	73,119	92.7	71.1
1993	161,604	154,212	144,427	95.4	89.4
1994	126,568	128,329	137,161	101.4	108.4
1995	118,170	112,456	112,354	95.2	95.1
1996	121,172	123,243	120,673	101.7	99.6
1997	124,130	121,012	122,273	97.4	98.5
1998	122,268	123,384	119,800	100.9	97.1
1999	130,857	117,994	124,662	90.2	95.3
2000	128,588	126,087	128,138	98.1	99.7
2001	133,918	115,245	120,346	86.2	96.7
2002	133,729	115,277	129,332	86.2	96.7
2003	115,962	116,089	118,480	100.1	102.2
2004	132,888	117,718	126,762	88.6	95.4
2005	134,299	118,085	132,882	87.9	98.9
2006	134,433	119,175	124,095	88.6	92.3

Data Source: ODFW HMS database; Cedar Creek Hatchery files

[1] Includes fry and/or fingerling releases to standing water bodies

[2] Juveniles are hand counted at marking. All other counts are estimated by weight sampling, and are approximate counts. Differences in the accuracy of the counting methods likely accounts for more fish at marking and/or release than were ponded.

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

The criteria for Cedar Creek Hatchery fish density and loading varies considerably through the various life stages and by rearing container. Rearing densities are below goals set by Piper (1982).

Fry are typically ponded into concrete raceways at about 1,000 fish/lb. after they button up. When rearing densities near the maximum, usually in June, approximately 27,000 fingerlings (the coded wire tag group) are split off into a second raceway. Excess fingerlings are released to standing water bodies after marking is completed, usually in March.

The raceways currently used to rear spring Chinook at Cedar Creek Hatchery are managed for a maximum of 8,000 pounds of fish per raceway (about 1.0 lb/ft^3). Flow through the raceway varies depending on the size of the fish. Typically, flow will average approximately 250-300 gpm early in the rearing cycle (after ponding) and increase to 1,000-1,200 gpm at the time of

release. Maximum density occurs at release when the fish are at their largest size (target size is 12 fish/lb).

Maximum density levels from fry to smolt (reared in raceways at Cedar Creek Hatchery) is 1.0 pounds fish per cubic feet water (rearing space). Actual density levels are at about 0.26 and 0.88 pounds of fish per cubic feet water at release. Maximum loading level criteria for rearing is 10 pounds of fish per gpm. Actual target pond loading level at smolt release time is about 7.0 pounds of fish per gpm.

Off-site rearing and acclimation facilities may be used in the future as needed to meet fishery management goals. Density and loading criterion at these sites will be as described above.

9.2.3) Fish rearing conditions.

Spring Chinook Salmon reared at Cedar Creek Hatchery grow on incoming river water; hence, rearing water temperatures vary with seasons and with natural fluctuations. Water temperatures range approximately from 45º to 65º F during spring and summer and from 36º to 45º F during the fall and winter. Dissolved oxygen (DO) levels coming into the facility are typically between 10.0 ppm and 11.0 ppm in the fall and winter. However, in the summer, DO levels can be as low as 7.0 ppm. Re-circulation of effluent water through the ponds is possible in extreme drought conditions.

Monitoring of the pond conditions is done daily at feeding time. While feeding fish, personnel are observing for signs of stress, disease, water clarity, and general fish behavior. Pond mortality is picked and recorded daily. During late summer and early fall, the fish are closely monitored by ODFW Fish Health staff for external parasites. Water quality is monitored under the prescribed 300-J general NPDES permit as required by the DEQ (see Section 4).

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 samples are collected monthly and reported on ponded fish reports in the ODFW Hatchery Management System (HMS) database. Length frequency and condition factor measurements are made at the time of liberation (see section 9.2.8); mark quality observations are also made at this time. Table 9-3 shows average monthly weights for stock 47 spring Chinook Salmon from ponding to release.

Table 9-3. Average Monthly Fish Size for Cedar Creek Stock 47 Spring Chinook.

Week	Size in fish/pound*
September	--
October	--
November	--
December	625
January	300
February	145
March	75
April	46
May	26
June	15
July	12
August	--

Data Source: ODFW HMS database; Cedar Creek Hatchery files

* Numbers represent end-of-month averages

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

Once the fry have been ponded, their weight increases substantially (approximately doubles) each month (see Table 9-3) until the time of marking when their feed is programmed to ensure that the fish do not exceed pond density limitations and are on target to meet production size goals. Growth rates slow as fish reach the pre-smolt and smolt stages.

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*).

Cedar Creek stock 47 spring Chinook Salmon juveniles are fed a fish food diet at a rate and frequency that varies with fish size. The fish are typically fed a dry feed, and most feeding is done by hand. Fry are fed 8-10 times per day. As the fish grow, frequency of feeding is reduced gradually until the fish are being fed only two to three times per day as the time of release approaches. The fish are fed at a programmed rate to control their growth in order to meet the desired size and condition factor at release.

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

Fish health of rearing juvenile spring Chinook Salmon is monitored regularly by Cedar Creek Hatchery staff and ODFW fish health staff. ODFW fish health staff diagnoses disease problems and prescribes the appropriate treatments to eliminate or control disease. See Attachment A for description of treatments.

Tools and equipment used for spring Chinook Salmon spawning are disinfected between family groups using an iodine antiseptic (100ppm). Nets and sampling equipment used for spring Chinook is also disinfected in this manner. Some tools and equipment used for rearing are not routinely disinfected (other than allowing to air dry) because they are kept separate from other fish at the hatchery. For further description, see Attachment A.

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

Weight samples of the fish are taken monthly to ensure proper growth rate (Table 9-3). Prior to release, length frequencies are taken (Table 9-4) and condition factors are calculated. A visual mark quality check is completed on a representative sample of the fish targeted for release.

Table 9-4. Average Fork Length Frequency Percentages at Release.

Fork Length Size Range	Average Percentages at Release
< 14 cm.	12.9%
14 – 17 cm.	87.1%
> 17 cm.	0.0%
Data Source: ODFW HMS database; Cedar Creek Hatchery files	

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

No “natural” rearing methods are applied in this program.

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

Stock 47 spring Chinook Salmon reared in this program are not listed under either the Federal or State ESA. However, fish will be reared to full-term smolt size and released directly to the selected release sites.

Spring Chinook Salmon smolts are currently hauled and direct released in the mainstem Nestucca River basin, Three Rivers, and the Little Nestucca River. All release sites are relatively low in the river system or are associated with an adult recapture facility. The majority of smolts should quickly migrate downstream, minimizing the amount of time spent in the freshwater portions of these basins. Off-site rearing and acclimation facilities may be used in the future as needed to meet fishery management goals.

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	Target Size (fpp)	Release Date	Location
Eggs				
Unfed Fry (STEP)	~2,000	1,000-2,000	December	Nestucca River or tributaries[1]
Fry[2]	Surplus	1,000-2,000	Dec.-Feb.	Standing Water
Fingerling[2]	Surplus	15-30	March-April	Standing Water
Sub-yearling smolts	~175,000	12.0	July-August	Nestucca River basin
Sub-yearling smolts	~25,000	12.0	July-August	Three Rivers
Sub-yearling smolts	~30,000	12.0	July-August	Little Nestucca River

Data Source: ODFW hatchery production schedules; District files; Cedar Creek hatchery files

[1] Releases of unfed fry from classroom incubators vary depending on the annual egg survival. The specified release level is a maximum number, based on the number of eggs provided to the program

[2] This program does not produce fingerlings for release as a program goal for stock 47 spring Chinook. In any given year there may be surplus fingerlings (typically from above average fry and fingerling survival). These will be released to standing water bodies, or destroyed.

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

Stream, river, or watercourse: *Nestucca River (ODFW waterbody code 0100400000)*
Release point: Various access points or tributaries up to RM 25
Major watershed: Nestucca River
Basin or Region: Nestucca River, North Oregon coast

Stream, river, or watercourse: *Three Rivers (ODFW waterbody code 0100420000)*
Release point: Cedar Creek Hatchery (RM 2.25)
Major watershed: Nestucca River
Basin or Region: Nestucca River, North Oregon coast

Stream, river, or watercourse: *Little Nestucca River (ODFW waterbody code 0100410000)*
Release point: Estuary to Stella Falls (~RM 5)
Major watershed: Nestucca River
Basin or Region: Nestucca River, North Oregon coast

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

Table 10-2. Past Releases of Stock 47 Spring Chinook Salmon into Nestucca River Basin (1992-2006 brood years). Values shown are mostly pre-CMP implementation period except BY 2014-2015.

Brood Year	Eggs/ Unfed Fry[1]	Avg size (fpp)	Fry[2]	Avg size (fpp)	Fingerling[2]	Avg size (fpp)	Sub-Yearling	Avg size (fpp)
1992	3,750	~1,000					73,096	11.0
1993					41,984	67.5	102,442	12.3
1994					10,823	55.5	126,338	12.4
1995							112,312	13.6
1996	123,677	~1,000					120,651	12.6
1997	125,019	~1,000					122,222	12.7
1998	84,798	~1,000					119,800	13.8
1999	101,821	~1,000	11,246	150			113,401	14.2
2000	56,968	~1,000			8,447	96.0	119,664	13.0
2001	64,972	~1,000	16,377	103			103,969	14.2
2002	61,975	~1,000	18,800	100			110,467	13.6
2003	64,920	~1,000			5,073	89.0	113,395	11.9
2004	63,072	~1,000	14,202	126			112,560	12.0
2005	56,196	~1,000	19,040	119			113,803	11.4
2006	62,501	~1,000			4,800	75.0	119,230	11.7
2007					21,924	84.0	113,261	12.2
2008	59,996	~1,000	10,900	100			115,468	12.3
2009	63,044	~1,000			14,767	48.4	112,977	11.6
2010	64,495	~1,000			9,600	48.0	111,097	13.5
2011	61,355	~1,000			23,115	67.0	111,026	11.6
2012	63,290	~1,000			19,716	53.0	110,682	12.3
2013	34,820	~1,000			12,450	62.5	114,045	13.5
2014					21,781	55.0	73,648	11.3
2015							244,093	18.4
Average[3]	**67,593**	**~1,000**	**15,094**	**113**	**16,207**	**62.6**	**116,235**	**12.9**

Data source: HMS; Cedar Creek Hatchery files; District files

[1] STEP releases

[2] Fry and fingerling releases were to various standing water bodies

[3] Average is calculated based on years when releases occurred

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

Spring Chinook Salmon smolts are released annually in late July or August. All Nestucca basin smolts are hauled in liberation trucks and direct released although acclimation sites may be used in the future. Examples of recent release dates are presented in Table 10-3.

Table 10-3. Past release dates of spring Chinook Salmon into Nestucca River Basin, 1999-2016.

Year	Nestucca River	Little Nestucca River	Three Rivers
1999	19-Jul		19-Jul
2000	17-Jul		17-Jul
2001	6/11[1]; 7/23		23-Jul
2002	15-Jul		15-Jul
2003	21-Jul		21-Jul
2004	20-Jul		20-Jul
2005	25-Jul		25-Jul
2006	31-Jul		24-Jul
2007	6-Aug		6-Aug
2008	28-Jul		28-Jul
2009	27-Jul		27-Jul
2010	26-Jul		26-Jul
2011	25-Jul		25-Jul
2012	30-Jul		30-Jul
2013	22-Jul		22-Jul
2014	23-Jul		23-Jul
2015	14-Jul	13-Jul	NA
2016	6/20 - 6/21	20-Jul	20-Jul

Data Source: ODFW HMS databse; Cedar Creek Hatchery files

[1]Additional fish above production needs were inadvertently fin-marked. Decision was made to hold as long as possible and release as pre-smolts since the fish had been marked.

Note: Unless directed otherwise by fish health or Department staff, date(s) of release is determined annually based on the ODFW production schedule and the size of the fish.

STEP fry are usually released in mid-December. Releases occur in the Nestucca River basin, typically near the classroom site. Transportation (when necessary) is typically done in buckets (some with aeration) to the site. The fry are released directly into the stream. Transportation time is typically very short, less than 20 minutes.

10.5) Fish transportation procedures, if applicable.

Stock 47 spring Chinook Salmon smolts released in the Nestucca basin are hauled in liberation trucks to the selected release sites. Liberation trucks are typically 1,000-2,500 gallon capacity units, either mounted on a large flatbed truck, or a tanker style truck. The liberation trucks are equipped with oxygen diffusing systems, water re-circulation pumps, and dissolved oxygen meters.

Juvenile spring Chinook Salmon in excess of production needs are released to standing water bodies at or prior to the time of marking. Juveniles are hauled in liberation trucks (as above) to the selected release site.

10.6) Acclimation procedures.

Currently, no acclimation of juvenile spring Chinook Salmon occurs prior to release. Acclimation may be used as part of the new Little Nestucca River program and may be used in conjunction with mainstem releases to help enhance fishery performance and to meet pHOS targets identified in the Coastal Multi-Species Conservation and Management Plan 2014.

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

All stock 47 spring Chinook Salmon smolts are mass marked (100%) with an adipose fin clip (although alternate clips may be used if necessary). Approximately 25,000 smolts are also marked with ad-clip and a coded wire tag (Ad-clip + CWT) for stock assessment purposes. Fry released from STEP programs are unmarked.

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

Any juvenile fish surplus to production are released into standing water as fry or fingerlings, prior to or at the time of marking, not at the time of smolt release. Smolt releases have generally been within programmed and approved levels.

10.9) Fish health certification procedures applied pre-release.

See Attachment A.

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

In the event of a water system failure an emergency release of spring Chinook Salmon juveniles will only occur after:

- The hatchery crew has exhausted all possibilities for retaining the fish.
- The hatchery crew has consulted with the ODFW District Fish Biologist.
- The release will be into the Nestucca River basin, or into a closed water body, as directed by the District Fish Biologist.

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.

Spring Chinook Salmon smolts are full-term, sub-yearling smolts and released shortly before the majority of naturally produced Chinook smolts typically emigrate. This is approximately three months after peak outmigration of naturally produced Coho Salmon and steelhead smolts, which typically occurs during late April or early May (Solazzi et al, 2003). The hatchery spring Chinook Salmon smolts are released low in the river system, and are expected to migrate upon or shortly after release, which should keep freshwater and estuarine residence time to a minimum.

This release strategy should minimize potential interactions and adverse ecological effects that may occur between hatchery spring Chinook Salmon and juvenile salmonids rearing or migrating through these systems.

11.11) 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.

Information on Nestucca basins wild and hatchery spring Chinook Salmon spawner abundance, spawn timing, and proportion of hatchery strays will be obtained from the District's monitoring program, as well as *The Oregon Plan for Salmon and Watersheds (OPSW)* monitoring projects: Coastal Salmonid Inventory project (Jacobs, et. al. 2000). These activities will directly measure performance standards and indicators previously described in Sections 1.9 and 1.10. Information on the catch of spring Chinook Salmon is compiled from returned salmon/steelhead tags and is available from Fish Division in the Salem office of ODFW. Specific economic data for sport caught fish is not routinely developed for all stocks. Economic data that is compiled is available in the Salem Headquarters. Salmon and steelhead populations' status goals are currently being addressed through *Oregon Plan for Salmon and Watersheds* activities and through the Coastal Multi-Species Conservation and Management Plan. New performance standards (and subsequent M&E) may be prescribed in the future as these population health goals are established. Information regarding the number of naturally spawning of hatchery-origin spring Chinook Salmon may become available in the future.

Monitoring of in-hatchery performance and adult returns at Cedar Creek Hatchery will be conducted by the hatchery crew. This information is stored on the ODFW mainframe computer in the Hatchery Management System (HMS) database. This will include at least the following information:

Adults

- The number of females, males, and jacks collected at Cedar Creek Hatchery, (Standard 2.1; 3.3).
- Number of unmarked winter steelhead, unmarked Coho Salmon, fall Chinook Salmon, Chum Salmon, and Cutthroat Trout handled and released from Cedar Creek Hatchery, (Standard 4.5).
- Any observed mortalities of unmarked winter steelhead, unmarked Coho Salmon, fall Chinook Salmon, Chum Salmon, and Cutthroat Trout handled at Cedar Creek Hatchery (Standard 4.5).
- Date of entry into the Cedar Creek Hatchery trap (or collected by seining), specified by hatchery and naturally produced fish, (Standard 2.1; 4.5).
- Date of entry into the Cedar Creek Hatchery trap (or collected by seining) for fish retained for broodstock, (Standard 2.1).
- Dates of spawning at Cedar Creek Hatchery, (Standard 2.1).
- The number of males, jacks and females spawned, (Standard 3.3).

- Fecundity of females spawned, (Standard 2.1).
- Disposition (spawned, sold, stream enrichment, etc.) of all spring Chinook Slmon collected, (Standard 4.4).
- Relative abundance of hatchery and wild spring Chinook Salmon on the spawning grounds (Standard 3.1)

Juvenile Rearing

- Monthly number of eggs/fish on hand, mortality, feeding rate, and growth, (Standard 4.1).
- Results of fish health checks and any incidence of disease occurrence, (Standard 4.1).
- Results of water quality sampling, (Standard 4.2).

Release

- Number of fish released, by mark type, (Standard 1.2, 2.2).
- Fish age and size at release; average weight, and length frequency distribution, (Standard 2.3).
- Location of releases, (Standard 2.2; 2.3).
- Date releases started and ended, (Standard 2.2).

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

Funding and staffing are available as part of normal hatchery operation for those activities associated with hatchery operations.

However, as with all state and federal programs, budgets are approved by the Legislature, and no commitment of funds can be made past the approved budget period. Funds for various projects associated with this HGMP come from (or could come from) a variety of sources, possibly including license dollars, state general funds, and federal funding sources. Funds are committed for certain activities; but can change with relatively short notice. This could result in elimination or reduction in the hatchery program and associated monitoring and evaluation activities.

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.

Neither the in-hatchery monitoring program nor other monitoring activities (i.e. life cycle monitoring, coastal salmonid inventories) is expected to increase risks to naturally produced fish above those imposed by operation of the program. Thus, risk aversion measures for the monitoring program are the same as those discussed under prior sections of this document.

SECTION 12
RESEARCH

No research activities are currently associated with this program. ODFW conducts annual resting hole surveys in the Nestucca River to monitor trends in abundance of spring Chinook Salmon (and summer steelhead and sea-run Cutthroat Trout). Spawning ground surveys were initiated in 2005 for four years to monitor hatchery/wild ratios and determine distribution of natural spawners in the Wilson, Trask, and Nestucca river basins. Data from these surveys are available from the ODFW Tillamook District office.

SECTION 13
ATTACHMENTS AND CITATIONS

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SECTION 14

CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name and Title Applicant: Chris Knutsen, Watershed District Manager, West Region, ODFW

Signature: _____ Date: _____

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

Signature: _____ Date:_____

Attachment A

Table A-1. Five-Year Disease History[a] (1996 to 2000) by Fish Stock at Cedar Creek Hatchery.

Disease or Organism	47 CHS	47 STW	47 STS	33 STS[b]	33 StW[b]	72 Rb	47 CHF[c]
IHN Virus	No	No	No	No	No	No	No
EIBS Virus	No	No	No	No	No	No	No
Aeromonas salmonicida	No	Yes	Yes	No	No	No	No
Aeromonas/Pseudomonas	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flavobacterium psychrophilum	Yes	Yes	Yes	No	No	Yes	No
Fl. columnare	No	No	No	No	No	No	No
Fl. branchiophilum	No	No	No	No	No	No	No
Renibacterium. salmoninarum	Yes	No	No	No	No	No	Yes
Yersinia ruckeri	No	No	No	No	No	No	No
Ichthyobodo	Yes	Yes	Yes	No	No	Yes	Yes
Gyrodactylus	No	Yes	Yes	No	No	Yes	No
Ichthyophthirius multifilis	No	Yes	Yes	No	No	Yes	No
Gill Ameba	No	No	No	No	No	No	No
Trichodinids	No	Yes	Yes	No	No	Yes	No
Loma sp	No	No	No	No	No	No	No
Nanophyetus salmincola	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coagulated Yolk Disease	Yes	Yes	Yes	No	No	Yes	No
External Fungi.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Internal Fungi	Yes	Yes	No	No	No	Yes	No

[a] Yes indicates detection of the pathogen but in many cases no disease or fish loss was associated with presence of the pathogen. No indicates the pathogen has not been detected in that stock.
[b] These stocks are held at Cedar Creek Hatchery as adults only.
[c] The 47 stock fall Chinook fry are reared at Cedar Creek Hatchery and then transferred to Rhoades Pond for further rearing until release.
CHS = Spring Chinook Salmon
STW = Winter Steelhead
STS = Summer Steelhead
Rb = Rainbow Trout
Stock 047 = Nestucca River
Stock 033 = Siletz River
Stock 072 = Roaring River

The fish health monitoring plan is identical to that developed by the Integrated Hatchery Operations Team for the Columbia Basin anadromous salmonid hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. Bonneville Power Administration).

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

Disease Treatment

Treatments for disease at Cedar Creek Hatchery include: green eggs are routinely water hardened in diluted buffered iodophor; flush treatments of 1:600 formalin for 15 minutes given three to five times per week for fungi prevention on eggs; and juvenile fish are treated with formalin. Depending on species of fish, parasite treating and water temperature, formalin is used at 1:15,000 to 1:6,000 for one hour static bath for three to five consecutive days. Treatments of winter or summer steelhead juveniles in the large rearing lakes require hydrogen peroxide flush treatments introduced into the water supply for 4 to 6 hours. Juvenile fish are treated for bacterial infections with florfenecol, oxytetracycline or Romet medicated feed according to label or under an Investigational New Animal Drug Permit (INAD). During the summer, on rare occasions the winter and summer steelhead juveniles may require an oxytetracycline, florfenecol or Romet medicated food treatment for furunculosis as directed by fish health professionals. The steelhead broodstocks are given hydrogen peroxide flush treatments at 1:3500 for one hour plus turnover three to five times per week. The spring Chinook Salmon adults are given antibiotic injections of erythromycin and oxytetracycline under a veterinary prescription to prevent bacterial infections such as furunculosis and bacterial kidney disease. They are also treated with hydrogen peroxide flush treatments at 1:3500 to1:5,000 for one hour three to five times per week as needed for external fungi infections. One hour Formalin bath treatments at a concentration of 1:12,000 – 1:6000 for adult brood fish may be an option if planned modifications allow proper chemical dilution.

Attachment B

Oregon
Theodore R. Kulongoski
Governor

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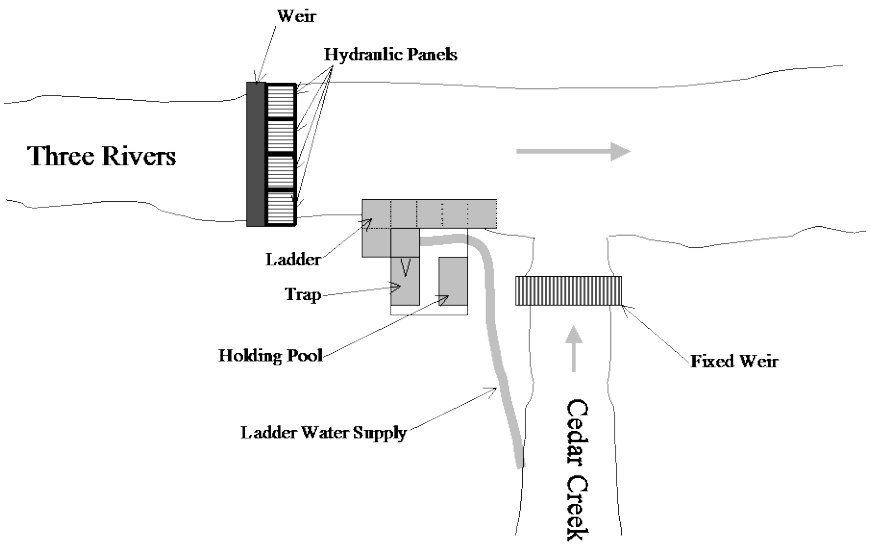
May 27, 2003

Lance Kruzic
NOAA Fisheries
lance.kruzic@noaa.gov

Dear Lance:

In your e-mail to Bill Otto dated 4/22/03, you asked if ODFW has done an operational assessment of the weir on Three Rivers associated with Cedar Creek Hatchery to determine whether it is being operated in the best manner possible for coho passage. At the local and Regional level, ODFW has thoroughly reviewed the operation of this weir and an internal, written operational plan was developed and distributed in late 2002 and early 2003. This operational plan put on paper the practices which have been in place for a number of years. After your correspondence with Bill, I was asked to review the operation of the weir from the perspective of the statewide fish passage program.

After reviewing the operational plan, talking with our local District Biologist and the Hatchery Manager, and visiting the site, I conclude that the weir is being operated in the best manner possible for passage of wild coho, as well as other wild native species, given the existing structures and hatchery fish management objectives. In fact, the weir is in place primarily for purposes of natural production (i.e., pass wild fish and prevent passage of hatchery fish) because it is our opinion that, without the weir, hatchery production needs could still be met with returns to the existing trap. A plan view (not to scale) of the structures involved follows:



With these structures, passage up Three Rivers is provided in several ways:

- At high flow levels, the weir automatically drops to prevent damage to it. Passage is possible and observed at these times, which last from one to several days.
- The hydraulic weir is lowered at certain times of the year and/or certain portions of days to allow wild fish passage. The weir's 4 panels can be operated independently to concentrate flows on one panel if needed.
- A portable denil fishway may be placed to span a lowered weir panel for very low flows. This concentrates flows and provides better water depth across the span.
- The ladder and trap operate year round with the exception of times where it is temporarily shut down for cleaning or repair. Any wild fish entering the trap are passed above the weir, or hauled up Three Rivers to a suitable release location, based on passage direction provided in the operational plan.
- If personal safety hazards are not too great, staff seine the pool directly below the weir to collect and pass fish if they are observed to be holding in the pool without passing.

Adult coho passage in Three Rivers starts in October with the initial fall rains and has been observed through later November, though passage continues in the rest of the Nestucca through late January. During parts or all of this period, fall Chinook (hatchery and wild), winter steelhead (hatchery and wild), and hatchery summer steelhead (not indigenous) are or may be moving upstream as well. All of the methods described above are used to pass coho, with the exception of denil placement, which only occurs in early spring if low flow conditions necessitate. However, the weir is only lowered about twice a day (morning and evening) early in the migration when few hatchery steelhead are present. It is not lowered all of the time due to the possible presence of hatchery fish, which we do not want to move above the weir.

We feel that the lack of coho production in Three Rivers is not due to passage issues at the weir, but to a general lack of returns to Three Rivers. If steelhead and fall Chinook can pass the weir when it is automatically or manually lowered, as is observed, then there is no reason to believe that coho could not pass the weir. In addition, very few coho have been observed or trapped in any part of Three Rivers. With recent improvement in wild coho returns, District personnel are considering options to supplement coho production in the Three Rivers sub-basin should adult returns remain low to this basin.

Although I believe our weir operation passes coho as effectively as possible given the circumstances, fish passage could definitely be improved at this site. In-stream passage over the weir is not ideal at all flows. The ladder "dead ends" into a trap (i.e., does not have the option of volitional in-ladder passage above the weir). The trap and holding pool are not user or fish friendly. The ladder does not have any attraction flow from Three Rivers. Given funding, we would clearly design trapping and passage at this site differently. Plans have even been made to address some of the concerns at this site, but given the lack of funds and all of the other hatchery upgrade/maintenance and fish passage

needs across the state, they have not been implemented.

In summary, it is our intent to pass all wild fish above the Three Rivers weir and we are providing the best passage possible at this site given existing structures and management objectives. Operations have been worked out by our staff after years of experience. Only with very significant investment, which we are unable to make at this time, could passage be improved. Please let me know if you have any questions.

Sincerely,

Tom Stahl
Fish Passage Coordinator

cc: Wheaton, Otto, Klumph, Braun, Traynor, Krake, Thorpe, Hartlerode