HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Coos River Coho Program**
Species or Hatchery Stock:	**Coho Salmon (Stock 37)**
Agency/Operator:	**Oregon Department of Fish & Wildlife**
Watershed and Region:	**Coos River Watershed-Southwest Region**
Draft Submitted:	**August 7, 2001**
Updated HGMP Submitted:	**October 28, 2013**
Date Last Updated:	**October 18, 2013**

SECTION 1. GENERAL PROGRAM DESCRIPTION

Note: much of the information contained in this updated HGMP was provided in the original "direct take" HGMP developed by ODFW in 2001. Since that original HGMP was submitted, hatchery coho smolt production was discontinued for the Coos Basin. This updated version retains pertinent information from the 2001 version (e.g. coho life history information), while providing more current information on the remaining, down-sized hatchery program.

1.1) Name of hatchery or program.

Coos River Coho Program

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

Oregon Coast Coho salmon ESU, *Oncorhynchus kisutch* – Threatened status (Federal Register Notice 1998). These fish are also a sensitive species under Oregon's Sensitive Species Rule (OAR 635-100-0040).

1.3) Responsible organization and individuals.

Lead Contact:

Name (and title):	Mike Gray, District Fish Biologist
Agency or Tribe:	Oregon Department of Fish and Wildlife
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Hatchery Contact:

Name (and title):	Sam Woods, Bandon Hatchery Manager
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program: Coos River STEP Association, Millicoma STEP,

South Coast Anglers STEP, and the Coquille Tribe, as well as numerous unassociated students and volunteers assist with broodstock collection, spawning, and operation of the STEP facilities. Volunteer efforts are conducted under the supervision of an ODFW STEP biologist or other ODFW fish district and hatchery personnel.

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

Funding source - State dollars from the sale of fishing licenses and tags (100% "Other Funds"). STEP budget for Coos-Coquille-Tenmile District is from the Sport Fish Restoration program (Federal/State match). Fish District program is from license and tag sales (100% Other Funds).

Bandon Hatchery Staffing Level - One hatchery manager 1, one senior hatchery technician, and one hatchery technician.

Bandon Hatchery operating costs: The current biennium budget for Bandon Hatchery is $564,747. Approximate facility annual operating costs for the past 4 years are: 2012-$248,237; 2011-$228,237; 2010-$238,703; 2009-$218,703. Estimates based on biennium costs, with 5% less than average the first year, 5% more than average the second year. These costs include all species, not just coho production.

Coos Coho Program Operational Costs:

This information is not readily available. Since the coho smolt program has been discontinued, and only egg/fry incubation has occurred, program costs at Bandon Hatchery are minimal.

In addition to ODFW facility costs, there is a matching value to the volunteer labor, materials, and other aspects of the operation of Noble Creek, Morgan Creek, and Millicoma STEP facilities, and volunteer labor involved in broodstock collection, that contribute to the overall production of Coos River hatchery coho. With the Coos coho program reduced to minimal numbers eggs released (EI), overall program cost is low.

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

Bandon Hatchery is located in the Coquille watershed, one mile east of the city of Bandon, at latitude 43º 06' 58" N (43.11611)and longitude 124º 23' 57" W (124.3992). The hatchery sits at the confluence of Geiger and Ferry Creeks, which run into the Coquille estuary at RM 1. Watershed code for Bandon Hatchery is 1700301000.

Spawning and egg incubation

Spawning occurs at Noble Creek STEP facility and Millicoma Interpretive Center. Incubation of eggs to eyed stage occurs at Bandon Hatchery or Noble Creek facilities.

Egg incubation and rearing

Currently, no rearing programs occur for Coos coho. The Coos coho smolt program was discontinued after the 2006 release.

Release sites

The Coos River coho program was reduced to only "early life stage" releases (unfed fry and eggs injected into spawning gravels), once the smolt program was discontinued in 2006. For the 2010 through 2012 brood years, approximately 45,000 unfed fry were released into Fourth Creek, above a reservoir/dam that blocked fish passage for several decades. A state-of –the-art

fish ladder was installed on Fourth Creek in 2005. The unfed fry release of 2012 BY (2013 spring release) into Fourth Creek (Coquille Tribal Lands) was complete by the time this HGMP is being updated. The Coquille Tribe is interested in "jumpstarting" coho recolonization into other tributaries on tribal lands in the lower Coos Bay area, and other unseeded habitats that may be identified by ODFW in the future. With this HGMP, only the experimental egg injection project is proposed, and "jumpstart" unfed fry releases will not occur without updating the HGMP.

The egg injection (EI) experiment is proposed for tributaries of the Catching Creek system, which empties into Catching Slough, in the tidewater of Coos Bay.

Locations:
Catching Creek and tributaries (EI) —Township 26 South; Range 12 West; multiple sections in the western half of the township.

1.6) Type of program.

Integrated Recovery Program (gravel-injected eggs project)

1.7) Purpose (Goal) of program.

The purpose of the coho egg injection project (EI) is to experimentally investigate the technique of injecting eyed eggs into stream gravels of consistently-underseeded stream reaches, to determine the efficacy of this technique toward re-building wild coho runs.

1.8) Justification for the program.

The egg injection experiment was developed in order to respond to public demand for testing this technique toward re-building coho salmon runs and restore commercial coho fisheries. The technique and technology has been used in Alaska to re-build salmon runs. Local commercial fishers have requested that ODFW undertake widespread "early life history releases" in order to restore historic coho numbers to commercial harvest levels.

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

1. <u>Broodstock Use</u>

Standard 1: Use only wild x wild parental crosses to produce eyed eggs for gravel injection.

Indicator (a): Utilize only unmarked adult coho for broodstock. With elimination of the coho hatchery smolt release program, the incidence of stray hatchery coho adults in the basin is extremely low.
Indicator (b): Current/proposed size of egg injection program is not conducive to exceeding overall basin wide stray rates.
Standard 2: Capture wild coho adults for broodstock in a manner that does not threaten the

persistence/rebuilding of the wild population in the Coos Basin.

Indicator (a): Track postseason estimates of wild coho annual escapement in the Coos Basin.
Indicator (b): Verify no more than 25 wild adults were captured and removed for broodstock.

Standard 3: Adult broodstock collection does not significantly alter spatial and temporal distribution of natural coho population.

Indicator (a): Adults will be collected primarily from returns to Noble Creek and Morgan Creek STEP facilities, supplemented with coho collected at remote traps such as Dellwood Trap, West Fork Millicoma Trap, or captured during Chinook salmon broodstock netting operations.
Indicator (b): Wild adult broodstock collection number is maintained at a low percentage of wild annual escapement so as not to significantly alter overall basin spatial and temporal distribution of naturally-produced coho.

Standard 4: Adult selection, mating, and spawning is consistent with approved methods and procedures.

Indicator (a): Ripe females and males are selected and paired randomly for spawning.
Indicator (b): Fish are spawned at a 1:1 male to female ratio.

2. <u>Facility Operations for Higher Eggs Survival and Minimize Disease Risks</u>

Standard 5: Follow approved fish health management policy and disinfection guidelines provided by ODFW's Pathology Section to minimize disease impacts to natural populations.

Indicator (a): Verify compliance with approved fish health standards and criteria.

Standard 6: Achieve higher green-egg to eyed-egg survival rates for listed coho in the hatchery incubation system.

Indicator (a): Enumerate survival rates from green egg to eyed egg, by maintaining optimal incubation/rearing conditions and practices.

3. <u>Nutrient Enrichment Program</u>

Standard 7: Carcasses of spawned broodstock will be placed in wild coho spawning streams for nutrient enrichment. This is being identified as an Oregon Plan for Salmon and Watershed restoration measure.

Indicator (a): Distribution of carcasses and other products for nutrient enrichment is in compliance with DEQ/ODFW guidelines.

1.11) Expected size of program.

Production for the 2013 brood year in the Coos River coho program is approximately 30,000 eggs injected into gravels of Catching Creek tributaries.

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

Annual broodstock collection objectives for this program are maximum 25 fish of which 100% are wild fish. The goal for egg injection is currently 30,000 eggs, or approximately the eggs from ten female coho. A few extra fish, up to 25 maximum, may need to be collected as fecundity is measured, in order to approach 30,000 eggs.

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

Table 1.11.2. Proposed number of eyed egg injection levels under the current Coos River coho program.

Life Stage	Release Location	Annual Release Level
Eyed Eggs	Catching Creek tributaries	Approx. 30,000
Unfed Fry	----------	0
Fry	----------	0
Fingerling	----------	0
Yearling	----------	0

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

Following discontinuation of the hatchery smolt program in the Coos Basin, the only program carried forward was the unfed fry "jumpstart (UF) program. Because these fish were unmarked, evaluation of returns has been primarily observational spawning surveys to determine whether formerly blocked stream reaches have been colonized by coho salmon. A trap on the ladder at Fourth Creek has also been instrumental in verifying that coho are now returning to this basin.

Evaluation of the experimental EI program will be accomplished via otolith marking of developing embryos in the egg. Spawning surveys with carcass recovery will be used beginning in year four, to evaluate for the return of otolith marked fish. Pre-return spawning surveys are already occurring, to use as a pre-project monitoring baseline.

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

The first broodstock fish were collected in the fall of 2012. The first eggs were then injected into the gravel in the late winter of 2012-'13.

1.14) Expected duration of program.

The experimental EI project began with eggs from the 2012 brood. The proposal is to conduct the egg injection for three years (2012 through 2014 broods), and then track returns through spawning surveys and otolith analysis in 2015 through 2017. These would be the return years for the three years of egg injection. Baseline spawning surveys began in 2011.

1.15) Watersheds targeted by program.

This program is targeted at streams of the Catching Creek subwatershed of the Coos River watershed.

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

Alternative actions to this program may be unfed fry releases and/or adult outplanting for coho reintroduction into unseeded habitats. However, these alternatives are not being considered at this time because we have been requested to experimentally test the egg injection technique.

One alternative to the otolith analysis for evaluation of returns from egg injection was to evaluate based simply on adult return numbers. Due to the fact that juveniles may move around within the basin, prior to emigration as smolts, it was deemed that otolith analysis is needed to detect returns from experimental releases.

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 the Coos River Coho program was developed and submitted to NMFS in 2001. At that time, the program included smolt releases and unfed fry ("jumpstart") releases, which has been concluded in 2006. This HGMP is being written for ESA authorization for the eyed egg injection program that began with the 2012 brood year, for EI release in 2013, using broodstock from the in-basin wild coho sport fishery quota established with NOAA in August 2012.

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 affected by the program.

This information was originally developed for the 2001 Coos Coho HGMP—where available, updated status information has been added.

Coos Complex

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

Coho Salmon Life History

Adult coho salmon migrate into fresh water in the fall to spawn. Spawning of wild coho salmon usually occurs from mid-November through February. Adult spawning coho salmon are typically 3 years old and are often accompanied by 2-year-old jacks (precocious males) from the next brood. Spawning occurs primarily in small tributaries located throughout coastal basins. The parents normally exhibit strong homing to their natal stream. The female digs a nest (redd) in the gravel and lays her eggs, which are immediately fertilized by accompanying adult males or jacks. The eggs are covered by digging and displacing gravel from the upstream edge of the nest. Each female lays about 2,500 eggs. The adults die soon after spawning. Sex ratios of spawning adults tend to average around 50:50 at most locations (Table 2.2.1 and text below the table). However, Moring and Lantz (1975) observed 77 percent males in three small Alsea River tributaries over a period of 14 years. They concluded that males tend to move around a lot and visit multiple streams.

The eggs hatch in about 35 to 50 days, depending upon water temperature (warm temperature speeds hatching). The alevins remain in the gravel 2 or 3 weeks until the yolk is absorbed and emerge as fry to actively feed in the spring. Most juvenile coho salmon spend 1 summer and 1 winter in fresh water. The following spring, approximately 1 year after emergence, they undergo physiological changes that allow them to survive in seawater. They then migrate to the ocean as silvery smolts about 10 to 12 centimeters (cm) in length.

Table 2.2.1. Observations of Coho Salmon Sex Ratio at Adult Traps

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

More recent adult coho sex ratio information from two of ODFW's Life Cycle Monitoring traps on the West Fork Smith River (lower Umpqua Basin) and Winchester Creek (South Slough/Coos Basin) are as follows:

West Fork Smith River, run years 2008 through 2012. Sex ratio is based on trap catch.

2008: Female 41 percent, Male 59 percent
2009: Female 49 percent, Male 51 percent
2010: Female 45 percent, Male 55 percent
2011: Female 36 percent, Male 64 percent
2012: Female 51 percent, Male 49 percent
Average: Female 44.4 %; Male 55.6 %

Winchester Creek, run years 2008 through 2012. Sex ratio is based on trap catch.
2008: Female 62 percent, Male 38 percent
2009: Female 52 percent, Male 48 percent
2010: Female 60 percent, Male 40 percent
2011: Female 64 percent, Male 36 percent
2012: Female 80 percent, Male 20 percent
Average: Female 63.6 %; Male 36.4 %

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. Ocean migration patterns during the fall and winter are unknown. Those fish remaining at sea grow little during winter but feed voraciously during the next spring and summer, growing to about 60 to 80 cm in length. During this second summer in the ocean, a substantial percentage of these maturing adults are caught in ocean troll and sport fisheries, usually to the south of their natal stream (Lewis 2000). The survivors return to their home streams or neighboring streams where they spawn and die to complete the life cycle.

Habitat Use and Freshwater Distribution
Spawning and rearing of juvenile coho salmon generally take place in small, low-gradient (generally less than 3 percent) tributary streams, although rearing may also take place in lakes where available. Coho salmon require clean gravel for spawning and cool water temperatures (53º to 58°F preferred, 68°F maximum) for rearing (Reiser and Bjornn 1979). Fry emerge from February to early June (Moring and Lantz 1975) and occupy backwater pools and the stream margins (Mundie 1969; Lister and Genoe 1970; Nickelson et al. 1992a). During the summer, coho prefer pools in small streams, 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 as in recent years, coho will be found in only the highest quality

habitats. Coast-wide, these habitats comprise about 22 percent of the habitat (Nickelson 1998). When marine survival increases, as could occur with a changing climate regime, coho will redistribute into freshwater habitats of lower quality. Thus, coho salmon population dynamics function with a classic "source-sink" relationship among stream reaches.

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

The Coos Complex consists of coho salmon inhabiting the Coos Basin. There is an estimated 220 miles of spawning habitat available to the coho salmon of this complex. The critical population level for the Coos Complex is 900 adult spawners. The habitat of this complex has the potential to support a viable population because high quality habitat is estimated to be present in 56 miles of stream, more than the 15-mile threshold (Nickelson 2001).

The abundance of coho salmon spawners of the Coos Complex ranged from about 1,100 to about 16,500 and averaged about 8,100 between 1990 and 2000 (Figure 1). The abundance from 2001 through 2012 ranged from 1,329 to 33,595 and averaged 19,565 fish (Figure 2.). Abundance since 1990 has never fallen below the critical threshold of 900 fish, and in only two years fell below 2,000 fish. Hatchery fish were found on the spawning grounds in some years of the period 1990-99, and averaged only 5.1% of the population (53 of 1,032 scale samples having hatchery patterns). That percentage is expected to decline with the major reduction of coastal hatchery coho smolt releases.

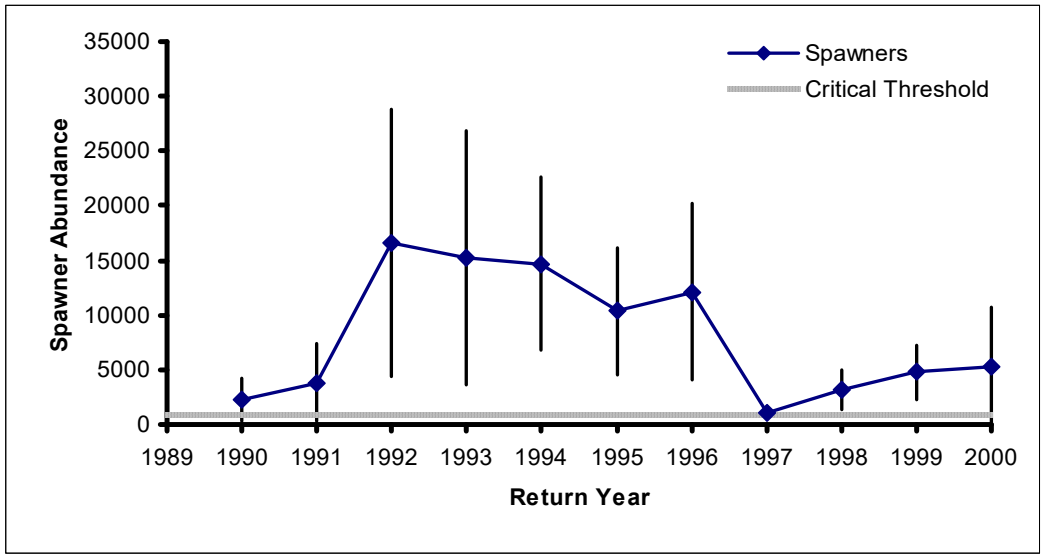

Figure 1. Trend in adult coho salmon abundance relative to the critical population level for the Coos Complex. (Base years 1990-2000, from 2001 HGMP). Error bars are 95% confidence limits.

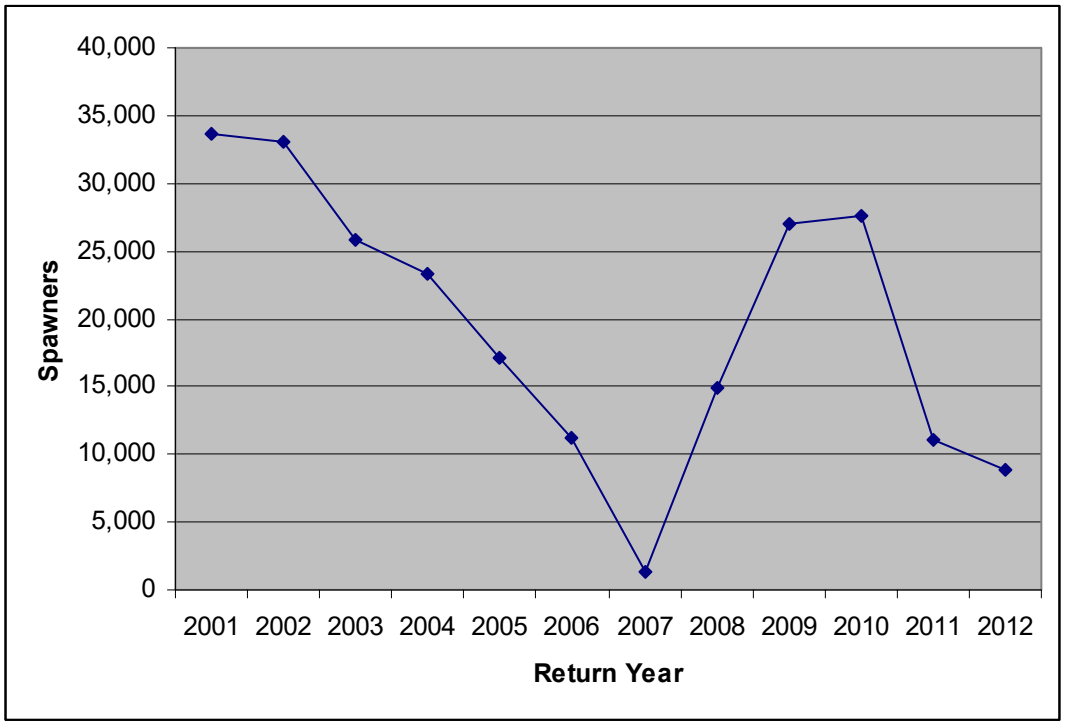

Figure 2. Trend in adult coho salmon abundance (spawners) for the Coos Complex, 2001-2012.

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

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

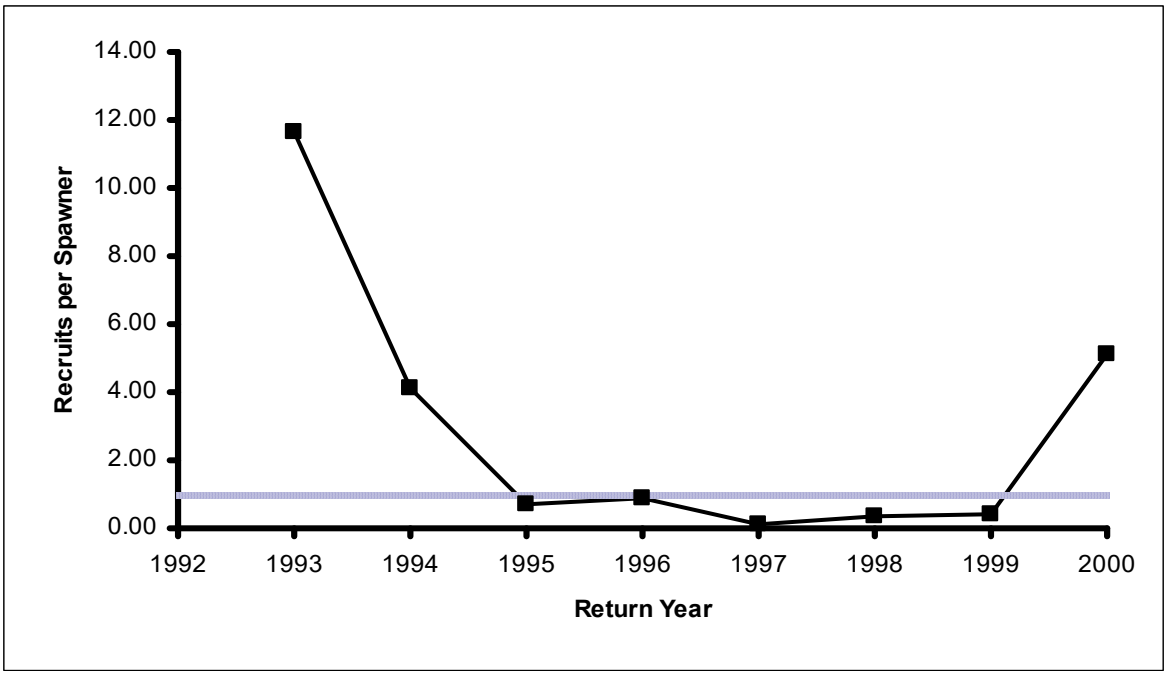

Figure 3. Trend in recruits per spawner for Coos Complex wild coho, 1992-2000.

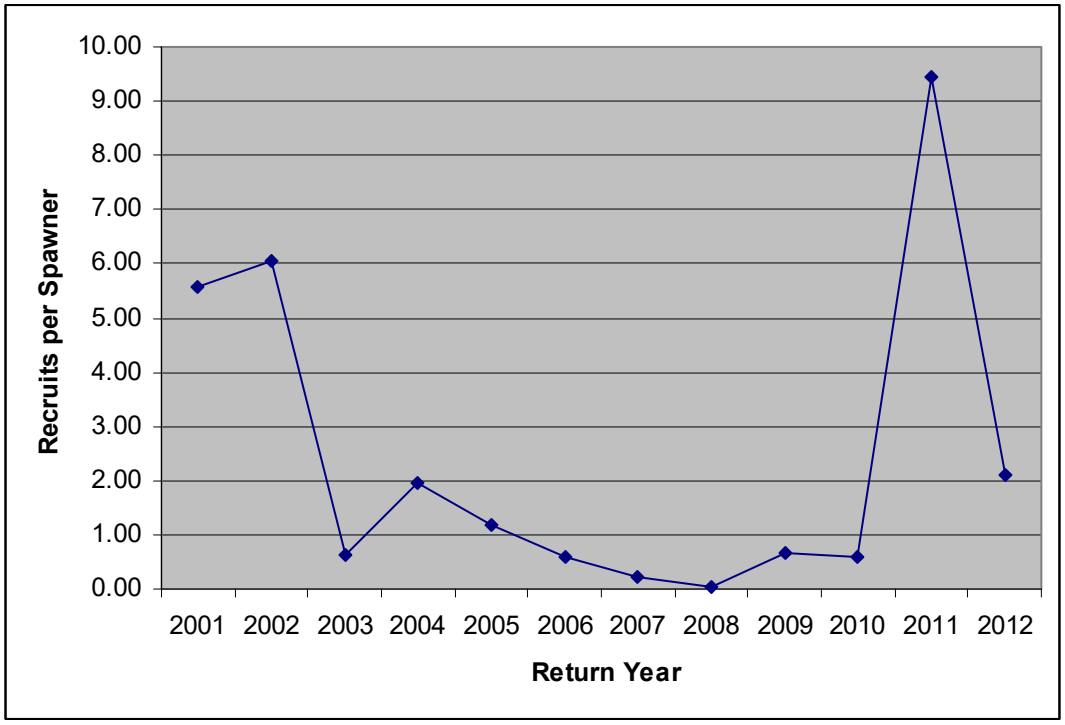

Figure 4. Trend in recruits per spawner for Coos Basin wild coho, 2001-2012.

2.2.3) Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Adult coho are collected by two primary methods, netting and trapping, at a variety of sites within the Coos Basin. Traps are located at Dellwood on the South Coos River (RM10.0), West Fork Millicoma River (RM 2.2), Millicoma Interpretive Center (RM 12.0), Noble Creek (~ one mile above tidegate at the head of Isthmus Slough), and at Morgan Creek (RM 1.0). Netting occurs at the Millicoma Interpretive Center using seines and entanglement nets. Broodstock collection occurs from late October through December.

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

Table 4 below shows the number of wild coho taken for broodstock, and the percentage of wild fish in the total broodstock from 1988-1999, for the past program when the coho smolt program was still occurring. Since discontinuation of the smolt program, the percentage of wild broodstock has been 100%, and broodstock numbers have been on the order of 20 pairs for the UF. With the UF and EI projects implemented for brood year 2012, the collection was approximately 30 pairs.

Table 2.2.3. Number of Wild Coho Taken for Broodstock, under former smolt and fry program, 1988-1999.

Return Year	Males	Females	Jacks	Percent of Broodstock
1988	46	52	6	17
1989	65	75	9	18
1990	37	55	2	11
1991	74	72	2	31
1992	88	68	9	33
1993	31	34	5	18
1994	22	26	0	12
1995	63	70	13	40
1996	41	50	7	44
1997	31	35	2	39
1998	26	21	1	70
1999	24	27	4	36

--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).

At current production goals for the EI program, the annual take levels for listed coho would be approximately 25 adult fish (approx. 10 females' eggs). This broodstock number is based on records of average female fecundity (eggs/female) to meet the 30,000 (EI) egg goals.

Fecundity lower than average may necessitate collection of a few more adult coho to meet project's egg release goal. Migrational delays occur at Dellwood Trap, West Millicoma Trap, Morgan Creek Trap, and Noble Creek Trap, however the length of time fish are delayed is typically no more than 2-3 days, as traps are sorted multiple times per week. Fish are captured, handled, and released above the traps to continue upstream to spawn, if not collected for broodstock.

--Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Options to avoid excess take of listed coho include:
1. Discontinue collection of broodstock as take limits are reached.
2. Close trap facilities and/or open bypass to prevent capture of additional wild coho.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

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

The Oregon Plan for Salmon and Watersheds (Oregon Plan or OPSW) is a prescriptive set of measures for recovering threatened and endangered salmon and steelhead, and meeting federal water quality standards, established by Executive Order of the Governor. The Oregon Plan includes measures linked to the hatchery production of coho salmon in the Coos River Basin including nutrient enrichment, terminal fisheries that regulate harvest impacts on wild coho, and monitoring of wild runs (incl. hatchery strays).

The Oregon Coast Coho Conservation Plan for the State of Oregon was completed in February of 2007. The purpose of the Plan "is to ensure the continued viability of the Oregon Coast Coho ESU and to achieve a desired status that provides substantial ecological and societal benefits."

The Coos River hatchery coho program will operate consistently with the PFMC Harvest Program and with Regional harvest management programs. Allowable harvest impacts to wild coho will be determined based on the harvest matrix in Amendment 13 to the Pacific Coast Salmon Plan (PFMC 1997), updates to that plan, and Fisheries Management and Evaluation Plans (FMEPs) as developed. The "Oregon Coastal Coho, Coastal Rivers Coho Sports Fishery" FMEP (2009) describes conditions under which annual in-basin wild coho fisheries may be conducted in the Coos Basin (and other coastal basins) if criteria are met.

ODFW fish management was guided for about a decade by the Wild Fish Management Policy (WFMP). The Native Fish Conservation Policy (NFCP) replaced the WFMP in 2002, and is

the guiding policy for state management of wild and hatchery coho for protection of genetic resources. Through various avenues including the development of localized broodstocks, acclimation and release strategies for smolts, and other management activities, the NFCP seeks to ensure the conservation and recovery of native fish in Oregon. The NFCP is found in the Oregon Administrative Rules at 635-007-0500.

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

1. Oregon Plan for Salmon and Watersheds
2. Oregon Coast Coho Conservation Plan (Feb. 2007)
3. PFMC Harvest Program.
4. Coos River Basin Plan
5. Hatchery Management Review
6. Fish Health Management Policy, ODFW
7. IHOT
8. STEP Project Agreements with Coos River STEP, South Coast Anglers STEP, and Coquille Tribe.

3.3) Relationship to harvest objectives.

The objectives of this program is not directly harvest-oriented, although unmarked fish returning from these releases would be subject to in-basin wild coho sport fisheries and ocean non-selective harvest, when allowed. In the long-term, commercial fishers who proposed this experiment are hopeful that the egg injection technique can be expanded toward recovering coho populations to a level allowing sustainable fisheries.

Obtaining data on harvest rates for these programs is not likely to occur. Returning adults from these releases will not be differentiated from returning naturally-produced adults, except those collected on spawning surveys in the Catching Creek basin for otolith analysis.

3.4) Relationship to habitat protection and recovery strategies.

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

rebuilding of coho stocks toward an eventual de-listing. The placement of hatchery broodstock carcasses into basin streams is an Oregon Plan measure to enrich stream nutrients for ecological benefits, including increased wild salmonid production.

3.5) Ecological interactions.

Our understanding of the consequences of the interactions between hatchery coho and wild coho salmon is incomplete. This hatchery program of eyed egg injection (EI) is designed to mimic wild populations in spawning, run timing, and genetic considerations to minimize any potential negative effects, using 100% wild broodstock.

Predacious fish that could impact rearing or outmigrating coho juveniles include one native salmonid (coastal cutthroat trout) and numerous marine fish such as lingcod and rockfish species. The effects of predation by cutthroat trout on coho fry and smolts are unknown.

Coho juveniles migrate to the ocean environment primarily as age 1+ smolts. As such, fish released from the EI program (released in a very early life stage) will remain in freshwater for a year past release, assimilating into the population of naturally-rearing juveniles. Movement within the freshwater environment has been demonstrated by research, and is anticipated to occur depending on seasonality, physical stream characteristics, and available resources. The lack of hatchery rearing in these programs is expected to minimize the ecological advantage that might be imparted with rearing to presmolt or smolt stage.

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.

The water sources for incubating eggs at Bandon Hatchery are Ferry and Geiger Creeks. The Ferry Creek system feeds into the Coquille River estuary at river mile 1, near the Port of Bandon. Average summer flows are approximately 1.25 cfs each. Winter flows vary greatly with storm activity, but average about 5 cfs each. Bandon Hatchery has water rights for a total of 3.0 cfs. These water rights are senior to all other active water rights in Ferry and Geiger Creeks. This is all surface water. Intakes are fully screened with perforated aluminum plates with 1/8" x ¾"slots. Located above dams on each tributary, coho are unable to reach the area above the hatchery where the intakes are located, however resident cutthroat are present. The NPDES permit for discharge is General Permit #300J. This is a general permit issued to ODFW. Annual water temperatures range from about 38°F in the winter to a maximum of 61°F in the summer. The 14-year average is 51°F. For adult holding and egg incubating purposes, the overall quality of water is good. Fish production at Bandon Hatchery is limited by water availability in the summer.

The primary water source for Noble Creek STEP facility is Noble Creek, with supplemental

water from springs arising on the property where the facility is located. Noble Creek flows through the raceways and trap of the facility, unimpeded during the period of the year when fish are not held as adults or reared as juveniles (June-Oct.). The creek averages 20 cfs in winter, with summer low flows as low as 1 cfs. Coho salmon are trapped during the period when fall Chinook broodstock are being collected for the Chinook hatchery program (described in Coos Fall Chinook HGMP for ESA coverage), and those coho in excess to broodstock needed for the EI project will be released above the hatchery to proceed to spawning areas in the upper subwatershed.

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

Bandon Hatchery intakes are screened and also occur above impassable dams, minimizing the risk of entrapment of juvenile listed fish. Water diversion for fish culture purposes is non-consumptive, and is returned to Ferry Creek at the fish weir. Settleable solids and suspended solids are monitored and reported upon as per the NPDES permit to insure compliance with pollution abatement.

Water withdrawals at the STEP facilities are also screened to avoid entrainment of listed natural fish, and water use is non-consumptive and returned to the source stream. Water quality is monitored at the STEP facilities to avoid impairment.

In the experimental design of the EI program, eggs will be incubated in a mist or fog incubation system at Noble Creek STEP facility, reducing the potential for disease development or transmission. This system allows for the treatment of incubation water, as well as isolation from water being used to rear/incubate other lots of fish.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Coho for broodstock are collected by the following three different techniques:

Wild coho trapping

a) South Coos River Trap (Dellwood Trap)

The primary main river trap is located at the head of tidewater on the South Fork Coos River at river-mile 10. This trap has been operated since 1987 and has been an important tool in collecting wild coho and Chinook salmon to incorporate into the hatchery program, as well as a monitoring site for Chinook. This trap was originally constructed in 1900 and operated up until 1958 for large egg-takes of Chinook salmon. This trap is composed of a leading weir that guides upstream migrating fish into a concrete and wood trap. The leading weir is three feet wide, three feet tall, and 157 feet in length. The concrete box trap is six feet wide, four feet tall

and 16 feet long. The concrete box opens into a wood trap pen that is five feet tall, ten feet wide, and 20 feet long. A PVC incline weir is on top of the guiding weir.

b) West Fork Millicoma Trap

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

c) Millicoma Interpretive Center

Wild coho are trapped at the Millicoma Interpretive Center, which is located at river-mile 12 on the West Fork Millicoma River. Fish ascend a 60-foot long fishway that begins with a small stream having jump pools made of log weirs and gabions. The last 20 feet of the fishway is a concrete structure, three feet wide and four feet tall. Once through the fishway, the coho move over a finger weir where they are trapped in a concrete pond that is 20 feet wide, 20 feet long, and four feet high.

d) Noble Creek Hatchery

Coho are trapped returning to the Noble Creek STEP Facility, located a short distance above the head end of Isthmus Slough on Coos Bay. The trap is 120 feet long, six feet wide, and five feet tall. Fish enter the trap by swimming over a finger weir. The trap and raceway at this facility are in-stream, pass-through containers. Coho trapped at Noble Creek during fall Chinook trapping are primarily passed above the facility, but can be retained to assist with broodstock collection for the EI and UF programs.

e) Morgan Creek Hatchery

This facility is located on Morgan Creek, a tributary to Daniels Creek, which enters the South Coos River at river mile 2.5. Coho trapped at Morgan Creek during fall Chinook trapping are primarily passed above the facility, but can be retained to assist with broodstock collection for the EI and UF programs.

Netting wild coho.

Coho are netted usually in close proximity to the Millicoma Interpretive Center. Two methods are used to capture coho in netting operations. A 250-foot beach seine is used. The seine is made of two-inch mesh and is eight feet deep. The other nets that are used are entanglement nets which are three inch mesh and are also eight feet deep. These nets are actively moved through the resting pool near the facility. Wild coho may also be captured during netting efforts for fall Chinook or winter steelhead broodstock (overlapping run timing). Most of these coho are released, but could be used to meet broodstock collection goals for the EI project.

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

Broodstock adult fish requiring transport are carried in plastic water storage tanks that have been modified to fit in the back of trucks. These tanks are four feet in diameter and about four feet tall. These tanks hold about 250 gallons of water. A 12-volt aerator circulates the water to keep the fish alive. Tanks are filled with river water from the capture water body.

5.3) Broodstock holding and spawning facilities.

Coho broodstock are held for spawning at three separate locations in the basin. All of the holding ponds are made out of concrete. The pond at Noble Creek is 120 feet long, 14 feet wide, and five feet deep. The pond at the Millicoma Interpretive Center is 60 feet long, ten feet wide, and four feet deep. The holding pond at the Morgan Creek Hatchery is 129 feet long, 20 feet wide and 5 feet deep.

All sorting and handling of the fish is done by hand with no power equipment used at any of these facilities.

5.4) Incubation facilities.

Bandon Hatchery uses vertical Heath type, double stack incubators. These are supplied by two aluminum headboxes. Five gallons of water per minute are normally run through each stack. Water supply headboxes are equipped with alarms that sound when water depth drops. During the period of coho egg incubation, the facility is at an estimated 95% tray capacity (multiple species/stocks).

Two types of incubation systems are used at Noble Creek STEP facility to incubate and thermally mark otoliths in the developing embryos: mist/fog incubators or deep matrix box incubators. Water temperature is adjusted in multiple heating and cooling cycles to induce a "mark" on the otolith. Water heaters and/or chillers are used to accomplish this, depending on ambient water source temperature.

5.5) Rearing facilities.

The coho salmon for this program (EI) are not reared.

5.6) Acclimation/release facilities.

The coho salmon for this program (EI) are not acclimated.
They are placed directly into stream gravels.

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

Adult mortality for these programs has not occurred. The only significant difficulty that can occur at Noble Creek or Morgan Creek is when flooding occurs at these facilities. When floods occur, coho broodstock are able to swim out of the holding ponds and escape upstream. This

does not result in mortality; however, it may mean that fish held for broodstock escape upstream and must be replaced with other trapped/netted fish to meet program goals. Natural spawning occurs upstream of both Noble and Morgan Creek facilities.

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.

Each adult holding facility has back-up aerators that can be used when water flow becomes low. During winter coho holding period, this is not an issue. Dissolved oxygen meters are also available at each station to monitor carrying capacity during questionable water flow periods. Incubation systems have redundant supply systems to prevent or reduce the chance of a water failure. Alarms have also been installed to alert operators of water supply issues.

All equipment that is used in the course of collection, adult holding, and spawning is disinfected with an iodine solution to prevent the transmission of pathogens.

At Bandon Hatchery the incubator headbox system is also very reliable. Critical water level monitor alarms are located at each headbox to insure uninterrupted flows. Green eggs are kept at low density, to avoid suffocation. Historically, there haven't been significant problems associated with diseases that would affect the eggs.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

6.1) Source.

Table 6.1. Initiation of Coos coho broodstock collections at various locations. These collections were primarily for the former smolt program. Wild broodstock for the UF

and EI projects have been collected at some of the same locations on this list.

Began use in Year *	Location	Broodstock Type Hatchery/wild	Method of Operation
1981	Tioga Creek	Wild	Trap
1982	Millicoma/Coos	Wild	Netting
1983	Catching Slough	Hatchery	Trap
1984	Morgan Creek	Wild	Trap
1986	Morgan Creek	Hatchery	Trap
1987	South Coos R.	Wild	Trap
1987	West Millicoma R.	Wild	Trap
1987	Noble Creek	Wild	Trap
1988	Charleston Cr.	Hatchery	Trap
1990	Noble Creek	Hatchery	Trap

* Year the broodstock type began for a given location.

6.2) Supporting information.

6.2.1) History.

For over 30 years, wild broodstock have come from several sources (Table 6.1). Traps combined with netting efforts have allowed us to maintain a substantial genetic infusion from the wild coho population into the hatchery coho population. This infusion is believed to maintain genetic similarities between the two populations, although genetic monitoring has not been conducted. For the former smolt program, the annual hatchery broodstock target was a minimum of 30% wild coho, with the remaining fish composed of returning hatchery adults.

In 1981, we began trapping coho in the Tioga Creek fishway. This was the beginning of the Coos Basin hatchery coho broodstock development. The resulting juveniles from this first year were placed in a farm pond to begin a broodstock development program. The first returns from this program were spawned in 1983. In 1982, collections of coho from the Tioga Creek fishway were supplemented with collections of fish that were netted in the basin. Netting operations usually occurred in tidewater, but sometimes in the early years occurred up in the river as well. A second farm pond was used for broodstock development in 1983. This second broodstock development effort was so successful that the Morgan Creek Hatchery was constructed on that site.

Through the years, wild coho broodstock were collected from several sources. In 1987, the main river traps were constructed on the South Fork Coos River and the West Fork Millicoma. These two additional broodstock sources improved the ability to collect and incorporate wild broodstock into the hatchery program.

Any baised selection of brood fish for particular traits is avoided to the degree possible. Every effort has been made to maintain genetic similarity with wild populations in the basin.

6.2.2) Annual size.

Approximately 25 fish are required for broodstock needs for the EI project. The number of wild fish that are used in the broodstock each year would be small relative to the natural population in the basin as a whole. From 1990 to 2000, the estimated escapement averaged about 8,100 adults (Figure 1). That average has more than doubled to 19,565 for the period 2001 through 2012 (Figure 2).

The broodstock sex ratio target for each generation is one male to one female. The total wild coho broodstock take goal is approximately 10 females and 10 males from the Coos Basin wild population each year.

The Coos River population shows no evidence of extinction risk, and passed multiple criteria for persistence (ODFW 2007). In 1997, the population reached an abundance low of 1,100 fish (Figure 1), however the population has expanded significantly since the first HGMP was developed and submitted to NMFS in 2001.

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

Former program objectives (with the smolt production) described a minimum goal of 30% wild fish to be incorporated into the broodstock annually. Collections did not substantially exceed the goal, however in some years the goal was not met due to river/weather conditions, wild run size, or other factors affecting trapping or netting efficiency.

For the current production of the EI project, the broodstock would be entirely made up of unmarked, wild origin coho. A maximum of 25 adult coho of natural-origin shall be used for broodstock, to meet the eyed egg production/injection goal. Conditions such as those listed above might prevent us from reaching broodstock collection goals, but hatchery coho will not be used to produce eggs for gravel injection.

6.2.4) Genetic or ecological differences.

These programs are not anticipated to create genotypic differences between the hatchery coho stock and local wild coho stocks. Wild x wild crosses will be used to create the egg and fry progeny to be released, and releases into a given reach would only be done for one life cycle length (three years). Parr will be anticipated to distribute in response to localized conditions, and experience mortality similar to naturally-spawned fish. Due to the early life stages at release, no behavioral/physical differences are anticipated either.

6.2.5) Reasons for choosing.

This broodstock was chosen to represent the local wild population in the Coos Basin.

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

Several measures have been put in place to minimize risk to the wild population. Broodstock will be 100% wild fish, the spawning ratio will be one male to one female, and jacks will be included to mimic the natural occurrence. In addition, broodstock collection numbers will be less than 0.2% of the annual average escapement from 2001-2012. Overall wild coho population numbers have been well above the critical threshold population number (see Section 2.2.2).

SECTION 7. BROODSTOCK COLLECTION.

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

Adult coho for broodstock will be collected in the Coos River Basin.

7.2) Collection or sampling design.

Collections will be conducted as randomly as possible, avoiding bias for phenotype such as size or condition factor. Occasionally, bright/immature coho caught during collections may be released because they would be too difficult to hold until they are ready to spawn. For logistics of incubation and otolith marking, collections/spawning will be accomplished in as short a temporal period as possible, to avoid divergent development stages of incubating eggs.

7.3) Identity.

It is believed that, a single population of wild coho is present in the Coos River Basin (see Section 2.2.1, "Coos Complex"). The WFMP status review (Kostow 1995) lists seven sub-populations in the Coos Basin: Isthmus Slough, South Slough, Catching Slough, East Bay (Kentuck and Willanch creeks), Haynes Inlet/North Slough, Millicoma, and South Fork Coos River. Establishment of these subdivisions of the larger Coos Complex was based primarily on entry of spawning/rearing tributaries into salt water. Some natural gene flow is expected to occur between these sub-populations. For the purposes of the EI program, it is appropriate to maintain an operational awareness of the subdivisions in broodstock collection and release. Broodstock from Isthmus Slough and lower S. Fork Coos (Morgan and Dellwood traps) will be prioritized for the EI program.

Identification of returning adult fish from the EI releases will not be recognizable from naturally-spawned fish in ocean and bay fisheries. Otolith marking will facilitate identification of the EI releases once they have returned to Catching Creek subwatershed spawning grounds, Otoliths will be collected from carcasses found on spawning surveys in the EI release area, in order to identify those incubated in the hatchery setting vs. naturally-spawned fish.

7.4) Proposed number to be collected:

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

A total of 25 fish (maximum) are needed to achieve the production goal for the EI program. The target for the EI program is 30,000 eggs or roughly the gametes from 10 females, depending on fecundity.

7.4.2) Broodstock collection levels for the last twelve years, or for most recent years available:

Adult coho salmon returns to the Noble Creek STEP facility are listed below in Table 7.4.2a. Actual numbers of coho spawned in the Coos coho program are shown in Table 7.4.2b, including wild broodstock percentage.

Table 7.4.2a. Adult coho returns at Noble Creek Hatchery, 1988-2012 return years*.**

Return Year	Males	Females	Jacks
1988	23	27	43
1989	38	41	81
1990	17	16	116
1991	288	230	118
1992	189	167	308
1993	643	569	130
1994	541	627	106

1995	112	109	49
1996	374	323	47
1997	58	48	130
1998	143	109	58
1999	119	114	85
2000	144	83	282
2001	359	639	140
2002	612	507	280
2003	681	845	211
2004	146	132	43
*2005	109	121	60
*2006	111	7	5
*2007	32	34	14
*2008	58	39	17
*2009	69	15	3
*2010	146 **		
*2011	22	9	4
*2012	12	11	6

*Did not trap the entire run of coho in Noble Creek since 2005
** In 2010, sex of coho was not recorded just the total number while the trap was operated
*** Returns were a mixture of hatchery and wild from 1988-2006.

Table 7.4.2b. Number of coho spawned in the past and proportion of natural-origin fish in broodstock for the Coos River coho program.

Year	Males	Females	Jacks	Total	% Wild
1988	302	298	12	612	6
1989	415	410	3	828	8
1990	232	471	171	874	12
1991	218	232	20	470	18
1992	267	224	12	503	22
1993	193	194	10	397	35
1994	186	189	14	389	52
1995	200	156	12	368	42

1996	105	98	18	221	39
1997	82	74	18	174	34
1998	33	32	4	69	29
1999	68	70	14	152	39
2000	90	85	20	195	56
2001	79	78	11	168	48
2002	144	128	21	293	58
2003	196	104	22	322	55
2004	102	88	53	243	32
2005	28	19	3	50	100
2006	19	22	4	45	100
2007	3	3	2	8	100
2008	19	22	4	47	100
2009	23	20	4	47	100
2010	25	21	4	50	100
2011	29	21	3	53	100
2012	24	23	2	49	100

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

Since we no longer have a hatchery coho smolt program (finmarked fish), any coho adults and jacks of hatchery origin that return to hatcheries will be killed and placed into streams for nutrient enrichment, or given to food banks if the quality is good for human consumption. Hatchery coho will not be released above traps to spawn with wild coho. Spawning habitat exists above the Noble Creek and Morgan Creek facilities, and wild fish are placed above the traps to continue upstream and utilize this habitat.

7.6) Fish transportation and holding methods.

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

7.7) Describe fish health maintenance and sanitation procedures applied.

All ponds and equipment are cleaned and allowed to air dry prior to each use for a given season. Most equipment is specifically assigned to a given station to prevent the spread of disease from one site to another should a pathogen be present. Broodstock collection equipment is disinfected using an iodaphore that has demonstrated success at eliminating potential disease causing organisms. Mortality of adult coho during holding is a rare occurrence.

7.8) Disposition of carcasses.

Carcasses that are produced by the hatchery spawning process are placed into streams for nutrient enrichment. The only carcasses that are not placed into streams are the rare mortalities among the coho while they are being held for broodstock. Pond mortalities are buried to prevent the spread of pathogens in the event they died of any infections. Nutrient enrichment is

a salmonid population restoration measure under the Oregon Plan.

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

The population of coho in the Coos River Basin is healthy, based on population size alone. A small percentage (less than 1%) of the wild coho population of the Coos would be used for broodstock with this small experimental project. Broodstock collection numbers will be considered for reduction if the annual spawner estimate drops below the critical population level for three consecutive years. Impacts to spawner abundance and subsequent juvenile production as a result of the hatchery program are minimal at current population size.

SECTION 8. MATING

8.1) Selection method.

Wild females are mated with wild males to produce progeny for this EI project. Size, coloration, and body condition are not used as visual criteria for mating, except as these factors relate to maturity. Matings are conducted as randomly as possible. Males and females are checked weekly for optimum ripeness prior to selection for mating.

8.2) Males.

The spawning ratio goal is one male mated to one female. Similar to natural spawning, a small percentage of jacks will be used to contribute male gametes.

8.3) Fertilization.

The spawning protocol calling for one female mated with one male is an attempt to maximize genetic variability within the hatchery population. Gametes from an individual fish are taken into baggies and are kept completely separate from those of other fish. Actual matings occur in a plastic bag to ensure fertilization of multiple females does not occur from a single male. Differential sperm motility is not a concern when using these fertilization techniques. Gametes will not be pooled prior to fertilization.

The plastic bags that are used to hold gametes and to effect fertilization are used only once and then discarded. This technique provides an aseptic environment to handle and fertilize gametes without the threat of horizontal pathogen transmission. When the eggs are placed into a common incubator, the water is treated with an iodaphore that further reduces the potential for horizontal pathogen transmission. During the egg taking operation, the equipment used is treated with an iodaphore to prevent contamination and spread of diseases.

8.4) Cryopreserved gametes.

Cryropreserved gametes are not utilized in this program.

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

Mate selection will be made as randomly as possible, avoiding selection for size, for example. The Coos River coho population is also one of the healthiest in terms of population numbers in Oregon. The average annual escapement estimate has more than doubled between the 1998-2000 periods and the 2001-2012 periods (see section 2.2.2). Genetic drift is a concern in the event that hatchery fish are allowed to spawn in significant numbers with wild fish. With the elimination of coho smolts released in the Coos Basin, this effect has been significantly reduced. The EI project is targeted on a few, specific tributaries with unseeded or underseeded habitat, and the small program release number will minimize the potential for genetic or ecological effects on the overall natural spawning population in the basin.

SECTION 9. INCUBATION AND REARING

9.1) Incubation:

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

Table 9.1.1. Survival rates of green-egg to eyed-egg stage of Coos coho at Bandon Hatchery, 1988-2012.

Year	Eggs Taken	Eyed % Survival
1988	144,957	92.3

1989	625,828	83.0
1990	766,760	85.5
1991	311,774	88.1
1992	195,142	95.4
1993	292,110	90.9
1994	520,928	94.9
1995	444,365	92.6
1996	250,773	84.2
1997	202,866	89.3
1998	163,889	92.6
1999	217,506	92.4
2000	242,143	95.6
2001	357,545	88.7
2002	355,792	84.25
2003	300,352	89.9
2004	268,800	87.9
2005	42,811	91.1
2006	5,317	91.7
2007	23,201	94.0
2008	78,009	92.3
2009	45,623	94.0
2010	58,491	93.8
2011	58,876	96.2
2012	21,189	85.2

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

No gametes from wild parents will be considered to be surplus to the EI program. A predetermined number of adults and jacks are identified prior to the start of the collection season as the collection goal, based on fecundity history. Broodstock collection numbers will be monitored closely to avoid surplus adults collected. Fecundity estimates will be generated in order to monitor adult needs. As the end of broodstock collection is nearing, if fecundity measures show that additional adults were collected, those fish will be released above the facility to ascend and spawn naturally instream.

9.1.3) Loading densities applied during incubation.

At Bandon Hatchery, eggs are loaded into Heath type incubators at a density of approximately 10,000 eggs per tray, or what will usually amount to the gametes of four females. The standard water flow rate is 5 gpm.

At Noble Creek, for the EI program, the capacity of the mist/fog incubators and deep matrix incubators is well beyond the 30,000-egg project size, so incubation capacity is not an issue.

9.1.4) Incubation conditions.

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

At Noble Creek, for the EI program, the owner of the facility's property lives on-site and is available to check water flow, temperatures, and other incubation factors multiple times per day. The incubation system includes a chiller/heater unit that allows for raising and lowering water temperatures to implement an otolith mark.

9.1.5) Ponding.

Not applicable for the EI program. However, a small sample of thermally marked eyed eggs of this EI proect will be incubated, hatched, and reared to produce ~100 fry to verify whether thermal otolith marking was successful. These fish will be sacrificed in order to extract and verify the success in otolith marking.

9.1.6) Fish health maintenance and monitoring.

At Noble Creek, for the EI program dead eggs are picked, but are not formalin treated, due to restrictions on chemical use involving volunteers. Eggs do receive iodine or saltwater flushes to reduce fungus and other diseases.

If eggs are incubated at Bandon Hatchery, they are initially treated with a 1:100 iodine bath for 15 minutes. They are then given a daily 1:700 formalin flush for 15 minutes to prevent fungus growth. During the eyeing stage, eggs are not handled. Eyed eggs are addled at 475 or more temperature units and then run through a Van Gaalen brand egg-picking machine to separate the dead (white) eggs. Additional hand picking may be necessary for blank and/or weak eyed eggs.

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.

Genetic and ecological effects are not anticipated for this small, experimental program.

9.2) <u>Rearing</u>:

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.

Not applicable for this EI program, as eyed eggs will be injected into gravels prior to hatching.

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

Not applicable.

9.2.3) Fish rearing conditions.

Not applicable.

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.

Not applicable.

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

Not applicable.

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*).

Not applicable.

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

Not applicable.

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

Not applicable.

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

Not applicable.

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

Not applicable.

SECTION 10. RELEASE

10.1) Proposed fish release levels.

Table 10.1. Proposed fish release or eyed egg injection levels for Coos coho program for upcoming year, 2014.

Age Class	Maximum Number	Size	Release Date	Location
Eyed Eggs	32,000	Eyed	February	Catching Creek Tributaries

The release dates may vary from year-to-year, dependent upon water temperature, egg/fry development, and initial spawning/fertilization date. The target release is 30,000 eggs; the actual number released may be +/- depending upon fecundity of females.

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

The Coos coho program has been reduced to only "early life stage" releases (unfed fry and eggs injected into spawning gravels). For the 2010 through 2012 brood years, up to 54,000 unfed fry were released into Fourth Creek, above a reservoir/dam that blocked fish passage for several decades. A state-of –the-art fish ladder was installed in 2005. With the 2012 BY, the unfed fry release into Fourth Creek was complete in the spring of 2013. The Coquille Tribe is interested in "jumpstarting" coho recolonization into other tributaries on tribal lands in the lower Coos Bay area in the future.

The egg injection (EI) experiment began with the 2012 brood year in tributaries of the Catching Creek system, which empties into tidewater of Coos Bay, and is proposed to continue under this HGMP.

Proposed locations of egg injection:

Catching Creek and tributaries —Township 26 South; Range12 West; multiple sections in the western half of the township.

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

Table 10.3. Coho fry and egg releases into the Coos Basin. Numbers shown are since discontinuing smolt releases, after 2006.

Brood Year	Number Released	Stage
2007	19,670	Fry
2008	67,962	Fry
2009	32,227	Fry
2010	53,974	Fry
2011	53,235	Fry
2012	18,704	Fry
2012	30,597	Eyed eggs

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

The fry release data (Table 15) are annual totals for the basin, and although release numbers and dates are available for individual sites, they are not presently summarized. These fry releases were typically done in March, upon "button-up" of fry.

Unfed fry are released directly into an unseeded stream reach in a scatter plant, and eyed eggs are injected into suitable spawning gravels of under- or un-seeded streams to simulate a redd. Gravel injection is accomplished using a water jet system designed for placing eggs in stream gravels.

10.5) Fish transportation procedures, if applicable.

Eyed eggs are typically transported in crates covered with wet burlap or cloth to keep eggs cool and moist. Eyed eggs can be transported safely in this manner, and are not particularly fragile.

10.6) Acclimation procedures.

Not applicable to this program.

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

Embryos within the eyed eggs for the EI program are thermally-marked on the otolith. No external mark is visible with this procedure. Otoliths must be extracted from carcasses of spawned-out fish on the spawning grounds and examined.

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

Every effort will be made to avoid producing surplus eyed eggs prior to transportation and liberation. Eyed eggs are carefully inventoried to insure adequate, but not excessive, numbers of fish will be reared. Minor surpluses due to unanticipated higher fecundity or other factors will be released along with the target number, minus the reference sample of fish to be reared for otolith mark verification.

10.9) Fish health certification procedures applied pre-release.

N/A

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

During incubation, backup water supplies can be diverted to the incubation systems in order to

sustain developing eggs. Alarms and redundant water supplies help to safeguard incubating eggs.

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

Risk aversion measures include the use of 100% wild broodstock to produce offspring of similar genetic quality to wild fish, implementation of egg disinfection and other health management procedures, the small size of the release numbers relative to the overall natural production of the Coos Basin, and the release into only a few localized tributaries, geographically. The EI releases are projected into areas that had been demonstrating little to no natural coho seeding prior to release.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

1. Broodstock Use

Standard 1: Use only wild x wild parental crosses to produce eyed eggs for gravel injection.

Indicator (a): Utilize only unmarked adult coho for broodstock. With elimination of the coho hatchery smolt release program, the incidence of stray hatchery coho adults in the basin is extremely low.
Indicator (b): Current/proposed size of the egg injection program is not conducive to exceeding overall basin wide stray rates.

Standard 2: Capture wild coho adults for broodstock in a manner that does not threaten the persistence/rebuilding of the wild population in the Coos Basin.

Indicator (a): Track postseason estimates of wild coho annual escapement in the Coos Basin.
Indicator (b): Verify no more than 25 wild adults were captured and removed for broodstock.

Standard 3: Adult broodstock collection does not significantly alter spatial and temporal distribution of natural coho population.

Indicator (a): Adults will be collected primarily from returns to Noble Creek and Morgan Creek STEP facilities, supplemented with coho collected at remote traps such as Dellwood Trap, West Fork Millicoma Trap, or captured during Chinook salmon broodstock netting

operations.
Indicator (b): Wild adult broodstock collection number is maintained at a low percentage of wild annual escapements so as not to significantly alter overall basin spatial and temporal distribution of naturally-produced coho.

Standard 4: Adult selection, mating, and spawning are consistent with approved methods and procedures.

Indicator (a): Ripe females and males are selected and paired randomly for spawning.
Indicator (b): Fish are spawned at a 1:1 male to female ratio.

2. Facility Operations for Higher Egg Survival and minimize Disease Risks

Standard 5: Follow approved fish health management policy and disinfection guidelines provided by ODFW's Pathology Section to minimize disease impacts to natural populations.

Indicator (a): Verify compliance with approved fish health standards and criteria.

Standard 6: Achieve higher green-egg to eyed-egg survival rates for listed coho in hatchery incubation system.

Indicator (a): Enumerate survival rates from green egg to eyed egg, by maintaining optimal incubation/rearing conditions and practices.

3. Nutrient Enrichment Program

Standard 7: Carcasses of spawned broodstock will be placed in wild coho spawning streams for nutrient enrichment. This is being identified as an Oregon Plan for Salmon and Watershed restoration measure.

Indicator (a): Distribution of carcasses and other products for nutrient enrichment is in compliance with DEQ/ODFW guidelines.

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

As with all state programs, budgets are approved by the Legislature for a two-year period. No commitment of funds can be made past the approved budget period. Funds associated with the monitoring activities of this project come from a variety of sources including license and tag dollars, Federal Sport Fish Restoration funds with matching State dollars, and volunteer contributions. ODFW Restoration and Enhancement grant funds (R&E) have been sought to accomplish the spawning ground surveys. Funds are committed for portions of the monitoring but are subject to change per biennium.

ODFW District staff, STEP volunteers, and the Coos Watershed Association have committed to monitoring the Egg Injection experimental project. Grant funds such as those of the ODFW

Restoration and Enhancement Program may be necessary to accomplish this monitoring. Monitoring activities associated with performance standards may be constrained by staffing and funding levels.

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.

Potential genetic or ecological risks from the proposed monitoring program will be minimized by conducting the EI project for only one life cycle length (3 years for coho). Adult return monitoring from the releases of this EI project will occur for at least three years beyond the last releases, in order to assess survival from the previous releases. Assessment/evaluation of the EI project will be conducted by extracting otoliths from the carcasses of post-mortem spawners without handling or harassing any live fish, and consequently the adversegenetic and ecological effects to listed fish will be negligible due to monitoring and evaluation activities. Carcasses will remain in the system for watershed nutrient enrichment.

SECTION 12. RESEARCH

*Provide the following information for any research programs conducted in **direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish**. If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in **Table 1**.*

Although experimental, no specific research has been planned for this coho eyed-egg injection project. The estimated take levels assoiciated with the activities of this project, including broodstock take are provided in the attachment (Table 1).

12.1) Objective or purpose.

No specific research is planned for this hatchery coho program in the Coos Basin. This egg injection program is an experimental project to evaluate the effectiveness of a hatchery fish

management technique in reestablishing self-sustaining naturally reproducing salmon population. Results of this ODFW/STEP otolith marking/egg injection experiment being conducted for coho in the Coos Basin that will evaluate the effectiveness of incubating eggs in a hatchery environment to eyed stage and then placing the eyed eggs into the gravels of unseeded orunder-seeded habitats as a technique to the recovery of natural salmon population.

12.2) Cooperating and funding agencies. N/A

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

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

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

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

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

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

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

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

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

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities. N/A

SECTION 13. ATTACHMENTS AND CITATIONS

APPENDIX A.

INITIAL PROJECT DESCRIPTION FOR EGG INJECTION PROJECT

Note: This was the initial proposal for the egg injection evaluation (EI), unfed fry releases, and re-initiation of smolt releases in the Coos Basin. The smolt release proposal was later dropped, but the unfed fry releases into Fourth Creek proceeded through the 2013 release, as well as the initial egg injection from the 2012 brood year coho. The otolith marking technique was chosen for marking/evaluation of the EI fish.

Evaluation of the Effectiveness of Coho Unfed Fry/Gravel-Injected Egg Supplementation and Smolt Releases in the Coos Watershed.

Submitted by: Mike Gray and Tim Walters, April 7, 2011.

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Description of the potential impacts that the proposed project is addressing:

The use of unfed coho fry or intra-gravel egg plants for supplementation has met with mixed results, according to a variety of research. To be effective, supplementation programs must address limiting factors in freshwater. Because overwinter habitat is the primary limiting factor in most coastal coho basins, adding fry may not be helpful. In some areas, such as the Coos watershed, past practices have limited some of the available spawning habitat, restricting survival to the unfed fry stage. Adding eggs or fry may help in this situation or in situations where artificial barriers have been removed. This project has three distinct components.

1. Evaluate the effectiveness of coho eyed egg supplementation to jump-start wild coho in portions of the Coos Watershed (Catching Slough) that currently have very little natural production.

2. Past releases of coho smolts in the Coos basin for fishery enhancement have met with mixed results. This study includes reinstating limited coho smolt releases in an area of Coos Bay with low risk to wild coho (Noble Creek, Isthmus Slough) to compare adult returns to the egg and fry experiments.

3. Evaluate the effectiveness of unfed coho fry releases to re-establish coho into a lower Coos Bay tributary where passage was blocked for several decades.

Project Locations:

1. Egg Injection: Coos Watershed, Catching Slough subbasin
2. Smolt Release: Coos Watershed, Noble Creek
3. Unfed Fry Release: Coos Watershed, Coquille Tribal streams near Charleston.

Description of project actions, objectives, measurable benefits, and expected accomplishments:

Action--Egg Injection: Project objectives will be met through a scientifically-rigorous study design aimed at evaluating two to three coho salmon life cycles (6-9 years, duration dependent on whether otolith marking is used). ODFW will seek funding from the ODFW's Restoration and Enhancement Board, or other sources as needed, and work with collaborators and NOAA Fisheries with the goal of beginning the project in Fall 2011. NOAA's support is necessary because Oregon coast coho salmon are listed under the federal ESA. Given the short timeframe and the complexities of the project, it may be Fall 2012 before we can begin in earnest.

Project design and evaluation oversight will primarily be the responsibility of ODFW in conjunction with collaborators. Project monitoring and evaluation will primarily be the responsibility of the Coos Watershed Association or another entity. Implementation will consist of obtaining locally adapted adult coho salmon for broodstock, incubating eggs to the eyed stage, injecting eyed eggs into gravels in a paired stream experiment (treatment/control), and evaluating subsequent adult returns from the egg injections.

Eggs for the study will be obtained from adults collected primarily at the Noble Creek weir, with backup collection at the Morgan Creek weir, by angling, or entanglement netting. Two options exist for the incubation, depending on the level of evaluation feasible:

Option 1—Eggs will be incubated at Noble Creek STEP facility to the eyed stage, then injected into the gravel in one stream, while a nearby stream will remain as a control.

Option 2—Depending on the availability of funds, the eggs will be subjected to temperature fluctuations to mark the otoliths. Eggs will then be injected into spawning gravel in one stream, while a nearby stream will remain as a control.

Evaluating the effectiveness of egg injection will follow two paths, depending on funding for otolith analysis.

1. Baseline evaluation will consist of: (1) comparison of past spawning ground survey data for the control and treatment streams, and (2) spawning ground surveys for one generation before

adults return from the supplementation program (baseline). If otoliths are not marked, approximately 28,000 coho eggs will be injected in one stream for three years (one generation) with an adjacent stream as a control. After one generation, the control and treatment streams will be reversed for an additional three years (one generation). After baseline evaluation, spawning ground surveys will be conducted on each system for 3 generations (9 years).

2. Baseline evaluation will consist of: (1) comparison of past spawning ground survey data for the control and treatment streams, and (2) spawning ground surveys for one generation before adults return from the supplementation program (baseline). If otolith analysis funding is available, the treatment stream will be injected with approximately 28,000 coho eggs for three years (one generation), and the control stream will receive no additional eggs. The total number of eggs is based on the equivalent of ten female coho for broodstock; average fecundity from recent Coos coho collections at approx. 2,800 eggs per female. After baseline evaluation, spawning ground surveys will be conducted on each system for one generation (3 years), with otoliths extracted from all coho carcasses to determine whether the coho were produced naturally, or from egg injection.

The data will be analyzed to address the following objective:

- Determine if egg injection supplementation of coho salmon in Catching Slough, a tributary to the Coos River, can increase adult returns.

Results will help shape management direction regarding implementation of coho salmon egg injection programs in the Coos Watershed.

Action--Smolts: ODFW and project collaborators will seek funding from ODFW R&E or other sources as appropriate to implement the smolt portion of the project. Once funding is secured, sufficient adult broodstock to produce 60,000 to 90,000 smolts (approximately 23 to 34 pairs of coho) could be collected in Fall 2011 or 2012. Implementation will involve obtaining locally adapted adult coho salmon for broodstock. Approval may be necessary from NOAA Fisheries to conduct this study using federal ESA-listed fish. Project design will primarily be the responsibility of ODFW in conjunction with collaborators. Project evaluation and monitoring will be primarily the responsibility of the Coos Watershed Association or another entity.

Adults will be collected primarily at the Noble Creek weir, with backup collection at the Morgan Creek weir, by angling, or entanglement netting. Eggs will be incubated at the Noble Creek STEP facility, and fish will likely be raised at an ODFW Hatchery. All fish will receive an adipose clip. If funds are available, at least 30,000 fish will receive a coded-wire tag.

Evaluating the effectiveness of coho smolt releases will consist of the following:

Utilize coded-wire tag return data to determine specific release contribution to ocean, bay, and river fishery. Conduct angler surveys to evaluate coho hatchery smolt contribution to the bay and river fishery. Determine numbers of marked and unmarked coho returning to Noble Creek. Estimate numbers and proportions of marked and unmarked coho on the spawning grounds utilizing ongoing spawning ground surveys. Compare adult returns from smolt releases with adult returns from the egg and unfed fry portions of the study.

After two generations (6 years), ODFW will assess the effectiveness of the smolt program to determine future direction regarding coho smolt releases in the Coos Basin.

The data will be analyzed to address the following objective:

- Determine whether coho smolt releases contribute substantively to the fishery and adult returns to the facility while avoiding increased stays of hatchery-origin coho on important spawning grounds.

Results will help shape management decisions regarding implementation of hatchery coho salmon smolt programs in the Coos Watershed.

Action—Unfed Fry Plants: ODFW has been working for three years with the Coquille Tribe to establish salmon runs above the Fourth Creek Dam, which was without fish passage for several decades until a fish ladder was installed in 2005. Chinook presmolts have been acclimated and released out of the reservoir since 2008. Beginning in the spring of 2011, approximately 40,000 to 50,000 unfed coho fry will be released into small streams of the Tribal lands between Charleston and Empire above Fourth Creek Reservoir in an attempt to establish a coho run. Other streams on the Coquille Tribal lands will be investigated for suitability of coho fry plants, such as Tarheel, First, or Second creeks. These plants will follow ODFW "jumpstart" protocols, whereby fry are planted for three years in a given stream in order to encourage establishment of a self-sustaining run, after which the plants are discontinued and adult returns evaluated over time.

The data will be analyzed to address the following objectives:

- Determine effectiveness of unfed fry plants to establish a coho salmon run in Fourth Creek and other small lower Coos Bay tributaries.
- Infer whether egg-to-fry recruitment is a potential limiting life stage for coho salmon in small tributaries to Coos Bay.

Results will help shape management direction regarding use of coho salmon unfed fry programs in the lower Coos Watershed, specifically the potential for establishing coho salmon runs on Tribal lands for cultural and economic benefit.

Collaborators and responsibilities:

Egg Injection:

ODFW:

- Seek funding through the next cycle of the Restoration and Enhancement (R&E) Program and/or other sources.
- Project design and approval.
- Training and supervision for brood collection, eyed egg production, egg plants, and (optionally) otolith collection.
- Provide spawning survey histories.
- Collaborate on analysis of results.

Coos STEP groups:

- Seek funding.
- Broodstock Collection.
- Obtain egg injection pump and (optionally) mist incubation system.
- Incubate eggs at Noble Creek STEP facility.

Coos Watershed Association:

- Seek funding.
- Provide habitat inventories and post project monitoring, including spawning ground surveys and post project monitoring.
- Collaborate on analysis of results.

Local High Schools:

- Provide volunteer labor for brood collection, egg production, eyed egg planting, and post project monitoring.
- Otolith reading (optional).

Smolts:

ODFW:

- Seek funding through R&E Program or other sources.
- Project design and approval.
- Training and supervision for brood collection, eyed egg production, fish rearing. Potentially rear fish at Cole Rivers Hatchery or another ODFW facility.
- Mark/tag smolts prior to acclimation.
- Institute angler survey for evaluation of smolt contribution to fishery.
- Incorporate evaluation of proportion of hatchery fish on spawning grounds into ongoing spawning ground surveys.
- Collaborate on analysis of results.

Coos STEP groups:

- Seek funding.
- Broodstock Collection.
- Acclimate smolts before release.

Coos Watershed Association:

- Seek funding.
- Spawning ground surveys and post project monitoring.
- Collaborate on analysis of results.

Local High Schools:

- Provide volunteer labor for brood collection, egg production, and spawning ground surveys.

Unfed Fry Plants:
ODFW:

- Project design and approval.
- Collaboration with Coquille Tribe on identification of release site(s) and design of monitoring/evaluation.
- Collection of broodstock. Incubation of coho eggs to button-up stage at Bandon Hatchery.

Coquille Tribe:

- Assist with broodstock collection.
- Identify release site(s).
- Conduct monitoring of rearing juveniles and adult coho returns.

APPENDIX B.

FISH HEALTH MONITORING

Fish Health Monitoring Plan

Broodstock are not monitored. Only wild broodstock are used, so pathogens in these individuals are in the environment.

Disease Treatment

For the EI project, coho eggs are treated with buffered iodine flush. As eggs are incubating, if fungus develops they are given a salt solution flush lasting about an hour, rather than formalin. Currently, the STEP volunteers at Noble Creek incubating the eggs for the EI project are not authorized for formalin use.

Treatment of eggs at Bandon Hatchery is primarily prophylactic in nature, although formalin flushing may occur when fungus is visible. Currently, only Noble Creek facility is incubating eggs for the EI project.

Appendix Table B1. Five Year Disease History of Coos River Stocks at Morgan Creek, Millicoma, and Noble Cr. Facilities, 2008-2012.

	Stock/Species

Disease/Organism	37 ChF	37 Co	37 StW
IHNV	-	-	-
CAD	-	-	-
Fl. psychrophilum	-	-	+
Fl. columnare	-	-	-
Aeromonas salmonicida	+	+	-
Aeromonas/Pseudomonas	+	+	+
Yersinia ruckeri	+	-	-
R. salmoninarum	-	-	-
Internal mycosis	-	-	-
External mycosis	-	-	-
Ichthyobodo	-	-	-
Gyrodactylus	-	-	-
Ichthyophthirius	-	-	-
Gill Amoeba	-	-	-
Trichodinids	-	-	-

Appendix Table B1. Five Year Disease History of Coos River Stocks at Bandon Hatchery, 2008-2012.

	Stock/Species		
Disease/Organism	37 ChF	37 Co	37 StW
IHNV	-	-	-
CAD	-	-	-
Fl. psychrophilum	+	-	+
Fl. columnare	-	-	-
Aeromonas salmonicida	-	-	-
Aeromonas/Pseudomonas	+	-	-
Yersinia ruckeri	-	-	-
R. salmoninarum	-	-	-
Internal mycosis	-	-	-
External mycosis	+	-	-
Ichthyobodo	-	-	-
Gyrodactylus	-	-	-
Ichthyophthirius	-	-	-
Gill Amoeba	-	-	-
Trichodinids	-	-	-

APPENDIX C.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name and Title of Applicant: Timothy Walters, Umpqua Watershed District Manager

Signature of Applicant: Date:

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

Signature: Date:

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

Listed species affected: Coho Salmon ESU/Population: Oregon Coast ESU Activity: Coho Production

Location of hatchery activity: Coos River Basin Dates of activity: Ongoing Hatchery program operator: Michael Gray

Type of Take	Annual Take of Listed Fish By Life Stage			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a) Migrational delays			Unknown *	
Collect for transport b)				
Capture, handle, and release c) Dellwood Trap; Noble Cr—Morgan Cr.—Millicoma STEP facility traps			100 **	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f) Broodstock			25	
Unintentional lethal take g)				
Other Take (specify) h) Intentional take of fry for otolith extraction to check efficiency in thermally otolith marking.	100 fry			

* migrational delays may occur at Dellwood Weir, however numbers are primarily associated with research/monitoring rather than hatchery programs. While some broodstock are collected at Dellwood, numbers of fish delayed at the weir associated with broodstock collection are small compared to those delayed for research/monitoring.

** capture, handle, and release may occur at Dellwood Weir, however numbers are primarily associated with Chinook monitoring and evaluation, rather than hatchery programs. While some broodstock are collected at Dellwood, numbers of fish captured, handled, and released at the weir associated with broodstock collection are small compared to those captured, handled, and released incidentially. Capture, handle, and release may occur at Noble Creek, Millicoma, and Morgan Creek STEP facility weirs, however wild coho trapped and not used for broodstock are passed above the facilities to spawn naturally in upper Noble or Morgan creeks, or the West Fork Millicoma River.

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.