HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Cole Rivers Hatchery Spring Chinook Salmon Program**
Species or Hatchery Stock:	**Spring Chinook Salmon (Rogue Stock-52)**
Agency/Operator:	**Oregon Department of Fish & Wildlife**
Watershed and Region:	**Rogue Watershed District, West Region**
Date Submitted: First Update Submitted:	**April 8, 2009 August 17, 2016**
Date Last Updated:	**August 17, 2016**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Cole Rivers Hatchery/Rogue River Spring Chinook Salmon Program.

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

Spring Chinook Salmon *Oncorhynchus tshawytscha* (Rogue River Stock-52). ESA Status: Not Listed

1.3) Responsible organization and individuals.

Lead Contact
Name (and title): Scott Patterson, Fish Propagation Program Manager
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On Site Hatchery Contact
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

The United States Army Corps of Engineers (USACE) is involved through the program funding.

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

The funding source is USACE, and the staffing level at Cole Rivers Hatchery is 14 full time and five seasonal employees. The total USACE funded operating costs are $1,323,189 per fiscal year. This program represents ~36% of the total.

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

Cole Rivers Hatchery is located on the Rogue River, 30 miles northeast of Medford, Oregon on Highway 62, about ½ mile downstream of William Jess Dam and Lost Creek Reservoir at river kilometer 253.1. The hatchery site is at an elevation of 1,545 feet above sea level, at latitude 42° 39' 49.1" N and longitude 122° 41' 06.7" W. The Waterbody Code is 1500500000.

1.6) Type of program.

Isolated Harvest Program.

1.7) Purpose (Goal) of program.

The goal of this program is to mitigate for the loss of spring Chinook Salmon spawning and rearing habitat that resulted from the construction of dams in the Rogue River Basin by the United States Army Corps of Engineers (USACE).

1.8) Justification for the program.

The spring Chinook Salmon program comprises part of a packaged mitigation program that is designed to compensate for the loss of anadromous salmonid spawning habitat that resulted from the construction of USACE dams in the Rogue River Basin. The mitigation agreement outlines that the USACE will fund the production of 365,120 pounds of fish while providing ODFW with the flexibility to manage releases to optimize fishery benefits. Currently, ODFW is managing the program so as to annually release about 1,703,250 spring Chinook smolts to provide benefits to the sport fishery in the Rogue River.

By providing fish for harvest, the program supports fisheries that are important economically and culturally for communities of the Rogue Valley. At this time, harvest of naturally produced wild spring Chinook is allowed only on a small portion of the run. Very poor returns in 2006-2008 have resulted in emergency regulation changes and closures in the fishery.

The Rogue River spring Chinook Salmon program minimizes adverse genetic and ecological impacts on listed and other candidate species by implementing specific measures for brood collection techniques, rearing, 100% fin marking, and release strategies.

Brood Collection:

Adult spring Chinook Salmon collection occurs at the Cole Rivers Hatchery collection pond. Upstream migration of spring Chinook Salmon ends at the barrier weir at the hatchery collection pond, and adults are collected from late April through September each year. Migrating fish enter and progress up the ladder until trapped. Both returning hatchery fish and naturally produced swim-ins are collected. Spring Chinook Salmon

brood collection does not result in any handling stress or take of ESA-listed Coho Salmon, because of temporal differences in adult return time between spring Chinook Salmon (mid April - September) and Coho Salmon (late October – mid January).

Rearing and Release Strategies:

The hatchery program for spring Chinook Salmon is a mitigation program intended to replace lost natural production. Approximately 1,703,250 smolts are released between mid-August and mid-March

Mid-August 730,000 @ 13 fish per pound
Mid-September 730,000 @ 9 fish per pound
Mid-October 193,250 @ 6.5 fish per pound
Mid-March 50,000 @ 6.5 fish per pound

The smolts are released primarily into the mainstem at the hatchery at river mile 157. Some releases are trucked and released downstream to minimize impacts on naturally produced spring Chinook Salmon fry. The smolt release strategy maximizes survival rates and minimizes interaction with naturally produced fishes in the Rogue River, as they outmigrate to sea soon after release.

The smolt releases are considered, "volitionally then forced". The water level in the raceway(s) is lowered to a level that matches the level in the release channel at the outfall of the raceways, and one screen is raised up overnight. Any fish remaining in the raceway(s) the next morning are forced out into the release channel, and any fish remaining in the release channel are forced out into the river. Trucked fish are loaded into trucks via a fish pump and released at boat ramps downstream.

The Rogue River Spring Chinook Salmon Conservation Plan (ODFW 2007) included a proposal to replace a portion of the production of Coho Salmon with an increase in the production of spring Chinook Salmon smolts. This action was to be initiated only if: hatchery fish compose less than 20% of the spring Chinook Salmon that spawn in the river immediately below the hatchery (Cole Rivers Hatchery to Rogue Elk County Park); the action is consistent with Coho Salmon recovery planning; and the action is consistent with mitigation goals for the USACE Rogue Basin Project. This production swap has been implemented.

At this time, presmolt releases are implemented at standing waterbodies outside the current distribution of anadromous fish species. Presmolts are released into Applegate Reservoir and Lost Creek Reservoir, Fish Lake and Emigrant Reservoir. These fish contribute to the trout fishery in the reservoirs.

Some fry releases occur as a result of the Classroom Incubator Program implemented through ODFW's Salmon and Trout Enhancement Program (STEP). Eyed eggs are provided to schools to allow students to observe embryo development, and accompanying curricula are available to spur discussions on salmon biology and watershed issues.

Approximately 200 eggs are provided which are placed in aquaria for incubation in each participating classroom. Surviving fry are released into the main-stem of the Rogue River. Additional fry are released into the Middle Fork of the Rogue River upstream of Lost Creek Reservoir for marine nutrients/ecological restoration.

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

BENEFITS **Performance Standards**	**BENEFITS** **Performance Indicators**	**BENEFITS** **Monitoring & Evaluation**
Provide hatchery spring Chinook Salmon for an isolated harvest program (a limited harvest of naturally produced spring Chinook is allowed).	• All smolts will be adipose fin-clipped. • Returning adults contribute to the freshwater fishery	• Annual pre-liberation exam to confirm mark rate. • Punchcard data provide an index of total harvest.
Meet mitigation goals.	• Program will adequately mitigate for the habitat lost due to the construction of William Jess Dam.	• Punchcard data provide an index of total harvest. • Counts of returning spring Chinook Salmon maintained at Cole Rivers Hatchery.
Program fish provide societal benefits.	• Economic benefit to rural communities of Curry, Josephine and Jackson counties.	• Periodic evaluation of the recreational/economic aspects of the fishery will reveal benefits to local communities.
Maintain fish health.	• Follow ODFW Fish Health Management Policy	• Conduct appropriate health checks throughout incubation, rearing, and prior to release.
The spring Chinook Salmon program will meet the criteria provided by the Native Fish Conservation Policy.	• A Conservation Plan provides guidance for this propagation program.	• The program will follow the guidance provided by the Conservation Plan for Rogue Basin steelhead populations.
RISKS **Performance Standards**	**RISKS** **Performance Indicators**	**RISKS** **Monitoring & Evaluation**
Releases of hatchery spring Chinook have minimal impact on listed Coho Salmon that rear primarily in tributaries.	• Currently, program fish are released directly into the mainstem of the Rogue River.	• Releases made when and where scheduled.

Hatchery operations comply with the Fish Hatchery Management Policy and other state and federal guidelines and permits.	• Hatchery operations conform to applicable fish health, sanitation, and operational guidelines. • Hatchery operations conform to DEQ/NPDES guidelines for water quality.	• Fish health is certified prior to release. • Appropriate protocols will be followed for monitoring water quality. • Screens will be checked on a regular basis.
Broodstock collection will have minimal impact on listed Coho Salmon.	• Any brood collection that increases interaction with Coho Salmon will be reviewed with NMFS staff prior to implementation	• Maintain accurate collection data for spring Chinook and Coho Salmon at Cole Rivers Hatchery.

1.11) Expected size of program.

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

The maximum number of adult spring Chinook Salmon to be held for broodstock each year is not expected to exceed 1050 females and 525 males to meet current production goals. There will be times when there is a need to hold greater numbers of fish in order to ensure attainment of age composition goals for spring Chinook Salmon spawners.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs	NA	None
Unfed Fry	Rogue R-4 (STEP); MF Rogue	10,000; 20,000-50,000
Fry	NA	None
Fingerling	Lost Cr, Applegate, Emigrant reservoirs; Fish Lake	250,000-500,000

Life Stage	Release Location	Annual Release Level
Smolt	Rogue R-1- 4	1,703,250*

*includes additional production per Conservation Plan; see Section 1.8.

Note:
Ratio of smolts in each release group may change to best meet fishery goals and make the program as close to the pre-dam life history as possible.

Additional fry or fingerling may be released into waterbodies outside the current range of anadromous fish species.

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

See notes and comments on table 1.12-1 and figure 1.12-1 below for fishery metrics.

- Table 1.12-1 is based on smolt releases of CWT groups (August, September, and October). Data from presmolt releases in BY 1986 and 1987 are not included. The data source is ODF&W Hatchery Management Information System (HMIS).

- Figure 1.12-1 shows the smolt to adult return of combined CWT groups by brood year over time.

- Hatchery return numbers and estimates of total harvest listed in the table are for returns from coded wire tag groups only, from a preliminary cohort analysis provided by Tom Satterthwaite (personal communication, 2008).

- The harvest estimates, per 1,000 lbs of smolts, are based on cohort reconstructions of CWT release groups. Estimates include harvest resulting from ocean and freshwater fisheries.

- Note 1: October releases have maturation probabilities that are more similar to naturally produced spring Chinook that historically spawned above the dam. Earlier release dates increase the proportion of age two and age three fish in the returns.

- Note 2: October CWT releases provide the best surrogate for naturally produced spring Chinook. In years of low smolt-age 2 survival, data from October CWT releases must be pooled with those of September CWT releases to ensure sufficient numbers to estimate survival rates.

Table 1-12-1. Estimated contribution and survival rates of hatchery spring Chinook Salmon smolts released from Cole Rivers Hatchery (brood year 1986-1997).

Brood Year	Smolt Release	#Ad+CWT	Estimate of Total Harvest	Hatchery Return	Minimum Survival Rate (Harvest plus Escapement)	Harvest Per 1000 lbs of smolts Aug.	Harvest Per 1000lbs of smolts Sept.	Harvest Per 1000lbs of smolts Oct.
1986	1,609,054	125,182	1082	324	1.12%	271	87	67
1987	1,627,896	123,935	491	212	0.57%	73	24	60
1988	1,623,008	120,562	454	231	0.57%	51	38	23
1989	1,591,900	118,298	244	284	0.45%	50	42	31
1990	1,726,033	123,697	562	576	0.92%	53	42	NA
1991	1,713,436	92,215	1444	2415	4.18%	305	136	81
1992	1,589,329	88,737	1270	1528	3.15%	220	124	120
1993	1,711,274	93,215	784	1570	2.53%	134	49	49
1994	1,632,444	89,986	131	245	0.42%	17	11	11
1995	1,670,747	91,337	351	1107	1.60%	34	26	40
1996	1,925,814	91,854	117	257	0.41%	23	7	8
1997	1,637,155	93,993	1240	1590	3.01%	149	99	110

Source: Tom Satterthwaite (2008, personnel communication)

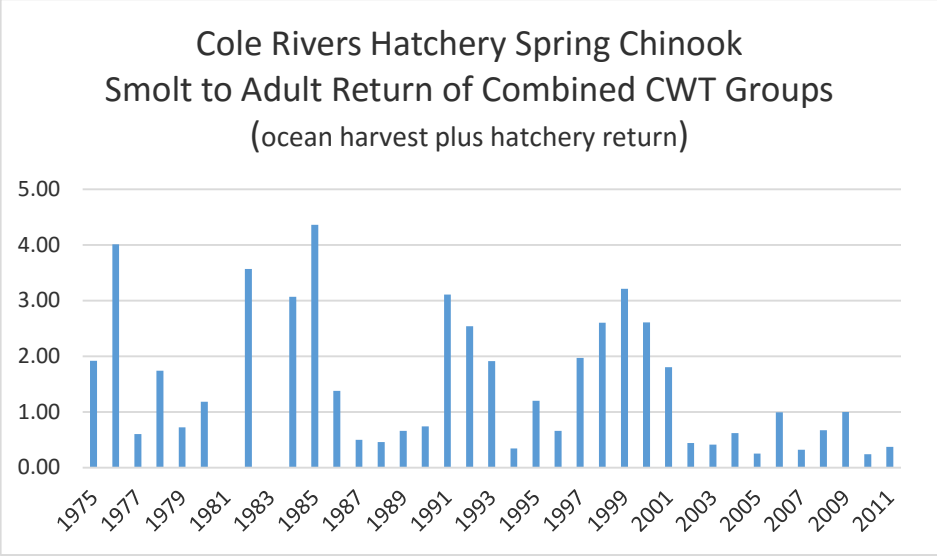

Figure 1.12-1. Cole Rivers Hatchery spring Chinook Salmon smolt to adult return over time.

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

The program started in 1972.

1.14) Expected duration of program.

The program is ongoing with no planned termination date.

1.15) Watersheds targeted by program.

Rogue Section 1	1500200000.
Rogue Section 2	1500300000
Rogue Section 3	1500400000
Rogue Section 4	1500500000

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

1.16.1) Brief Overview of Key Issues.

Issue 1: Release Strategies
Release of program fish into the mainstem between August and March reduces interaction with naturally produced Chinook Salmon, many of which have entered the ocean before the first hatchery smolts are released in the middle of August. Competitive interaction with juvenile coho may occur. However, most coho juveniles are produced in tributary streams of the Rogue River and are thus not susceptible to competition with spring Chinook Salmon smolts which are released primarily into the mainstem.

Issue 2: Straying
Spring Chinook Salmon are almost exclusively a mainstem spawner in the section of the Rogue River above Gold Ray Dam. Big Butte Creek is the only tributary that supports a self-sustaining population of spring Chinook Salmon . Stray rates are generally acceptable, but some hatchery fish spawn naturally every year. Chinook Salmon spawn timing precedes the spawning of Coho Salmon, so impacts on Coho spawning or Coho redds are unlikely, but the progeny of hatchery fish may compete for resources with juvenile Coho, especially in Big Butte Creek.

1.16.2) Potential alternatives to current program.

Alternative 1: Terminate Rogue spring Chinook Salmon hatchery program.

Pros: The termination of the program will eliminate any possible risk to listed natural Coho Salmon due to competition/interaction with hatchery spring Chinook. This alternative would ensure no interaction with listed juvenile Coho in either the mainstream or Big Butte Creek.

Cons: This alternative will totally eliminate the culturally and economically important fishery supported by the hatchery spring Chinook program. The discontinuation of the program would violate the mitigation agreement that was a key part of final public approval of Rogue River Basin Project dams in the Rogue watershed, which may cause

significant public concern.

Alternative 2: Reduce the number of hatchery spring Chinook smolts released into the Rogue River.

Pros: It would reduce the potential risk to listed Coho Salmon due to competition/interaction with hatchery spring Chinook. This alternative would reduce potential interaction with juvenile Coho in both the mainstem and in Big Butte Creek.

Cons: This alternative would reduce the culturally and economically important fishery provided by the hatchery spring Chinook program. The reduction could violate the mitigation agreement that was a key part of final public approval of Rogue River Basin Project dams in the Rogue watershed.

Alternative 3: Increase the number of hatchery spring Chinook Salmon smolts released into the Rogue River.

Pros: The alternative will provide additional hatchery spring Chinook Salmon for the recreational fishery and increase the likelihood that the hatchery program will meet mitigation obligations.

Cons: This alternative may increase risk to listed Coho Salmon due to interaction with hatchery spring Chinook Salmon. The competitive interaction with coho could be for food or rearing habitat.

1.16.3) Potential Reforms and Investments.

Reform/Investment 1: Investigate off-site releases to improve contribution to the fishery, minimize impacts to other species, and continue to minimize the number of hatchery adults that stray and spawn in the wild. Offsite acclimation and releases in the estuary may be implemented as well.

Reform/Investment 2: Continue to investigate and implement methods to improve contribution to the fishery and reduce stray rates in the area near the hatchery. This may include monitoring projects conducted by ODFW personnel and/or volunteers in the Salmon Trout Enhancement Program.

Reform/Investment 3: Implement additional changes to increase program performance consistent with ODFW's Native Fish Conservation Policy.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS.

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

The HGMP for this program was submitted to NMFS on 4/8/2009 for ESA permit or take authorization. This is an updated version of the previously submitted HGMP.

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

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

The NMFS-listed Southern Oregon Northern California Coast (SONCC) Coho Salmon populations may be affected by this propagation program.

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

No direct take of ESA-listed populations of SONCC Coho Salmon will occur due to this program.

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

The ESA-listed populations of SONCC Coho Salmon may be incidentally affected by the

program during program operation. In the Rogue Basin, SONCC Coho populations include the Illinois River, Middle Rogue River (including Applegate River), and Upper Rogue River (upstream from and including Evans Creek).

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

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

The Final Recovery Plan for the Southern Oregon/Northern California Coast Evolutionarily Significant Unit of Coho Salmon (NOAA Fisheries, 2014) lists recovery goals by population. ODFW has expressed concerned about the analysis behind the recovery goals, and has recommended the use of alternate criteria for effective population size.

The Recovery Plan identifies the upper Rogue coho population is identified as a Core, Functionally Independent Population with a Moderate Extinction Risk and an ESU viability recovery goal of 13,800. Key limiting stresses are identified as 'Altered Hydrologic Function' and 'Impaired Water Quality'.

The Middle Rogue/Applegate coho population is identified as a Non-Core, Functionally Independent Population with a High Extinction Risk and an ESU viability recovery goal of 2,400. Key limiting stresses are identified as 'Lack of Floodplain and Channel Structure' and 'Altered Hydrologic Function'.

The Illinois Coho Salmon population is identified as a Core, Functionally Independent Population with a High Extinction Risk and an ESU viability recovery goal of 11,800. Key limiting stresses are identified as 'Altered Hydrologic Function' and 'Degraded Riparian Forest Conditions'.

ODFW does not routinely monitor Coho Salmon escapement to individual population areas but total escapement of the aggregate populations is estimated at Huntley Park (RM 8). Estimates of run size of Coho Salmon to the Rogue River Basin for 2000-2014 are presented in Table 2-1 (Sounhein et al. 2015). Estimates of wild fish are based on the observation of fin-marks at the Huntley Park seining site (Jacobs et al. 2002). The estimated escapement of wild Coho Salmon to the Rogue River has ranged from 394 to 24,231 and has averaged 7,369 since 2000.

Table 2.2.2-1. Estimated escapement of naturally produced wild Coho Salmon in the Rogue River, 2000 - 2014. Mark-recapture estimate derived through capture at the Huntley Park seine site (~ River Mile 8).

Return Year	Adult Wild Coho Salmon
2000	10,895
2001	11,654
2002	8,385

2003	6,534
2004	24,231
2005	9,715
2006	3,750
2007	5,103
2008	394
2009	2,566
2010	3,671
2011	4,545
2012	5,474
2013	11,210
2014	2,409

Upper Rogue Population Data--The counting station at Gold Ray Dam was operated between 1942 and 2010. Located at rivermile 126, the station provided a count of most (but not all) Coho Salmon in the upper Rogue population as identified by the National Marine Fisheries Service. Below is a graph of the Coho Salmon count at Gold Ray over time.

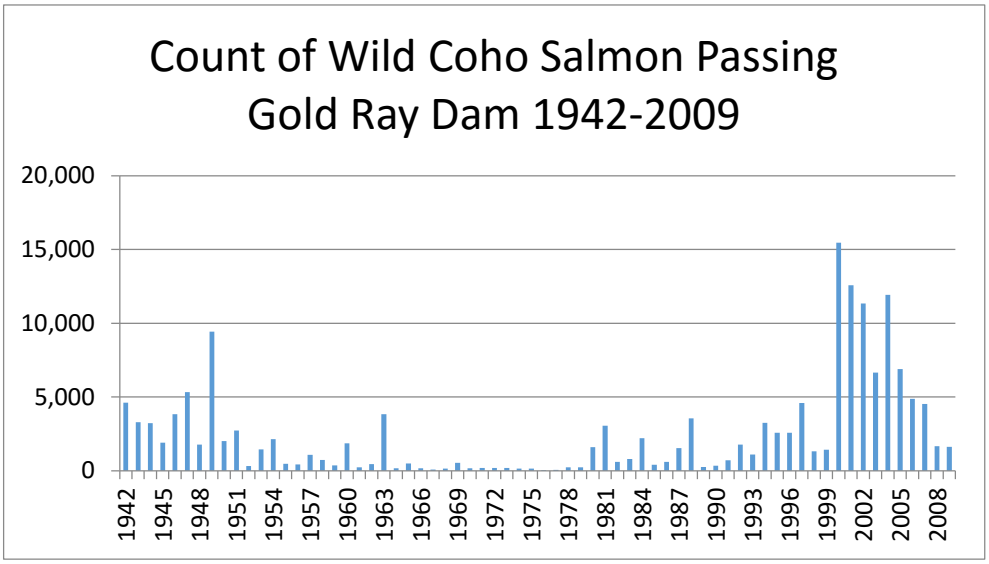

Figure 2.2.2-1. Count of wild Coho Salmon passing Gold Ray Dam over time

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

Parent-progeny ratios for naturally produced Coho Salmon in the Rogue River Basin can be evaluated based on freshwater returns for the 1993 and later brood years. Earlier years can also be evaluated, but any evaluation would need to account for the marked changes

in the ocean fishery impacts. Mortality impacts in the ocean fisheries were estimated to range between 0.07 and 0.15 during the 1994-2005 fishery years (PFMC 2006). In contrast, ocean fishery impacts in earlier years the impacts ranged between 0.27 and 0.87 (PFMC 2006).

The following figure shows recruits per returning adult of Rogue River coho for the brood years 1993-2004. This figure of recruits per spawner has shown no discernable pattern over the 12 year period. Survival has shown dramatic inter-annual variation, ranging from less than one to greater than six recruits per brood year. Spawners failed to replace themselves five times during this period. Productivity rates were highest for the 1998 and 1999 brood years when brood productivity rates averaged about six recruits per returning adult. These estimates were derived from data presented in the previous table.

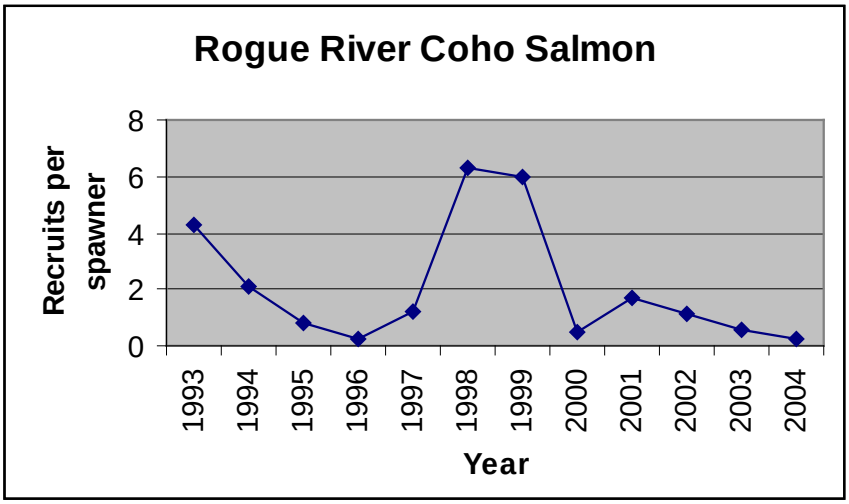

Figure 2.2.2-2. Recruits per spawner of Rogue River Coho Salmon (1993-2004).

Hatchery Coho Salmon produced at Cole Rivers Hatchery have included coded wire tag groups throughout the history of the program. Below is a graph of smolt to adult recruitment over time for Cole Rivers Coho. These data include only ocean harvest and hatchery returns. Poor returns in recent years hint at poor ocean conditions for Coho Salmon.

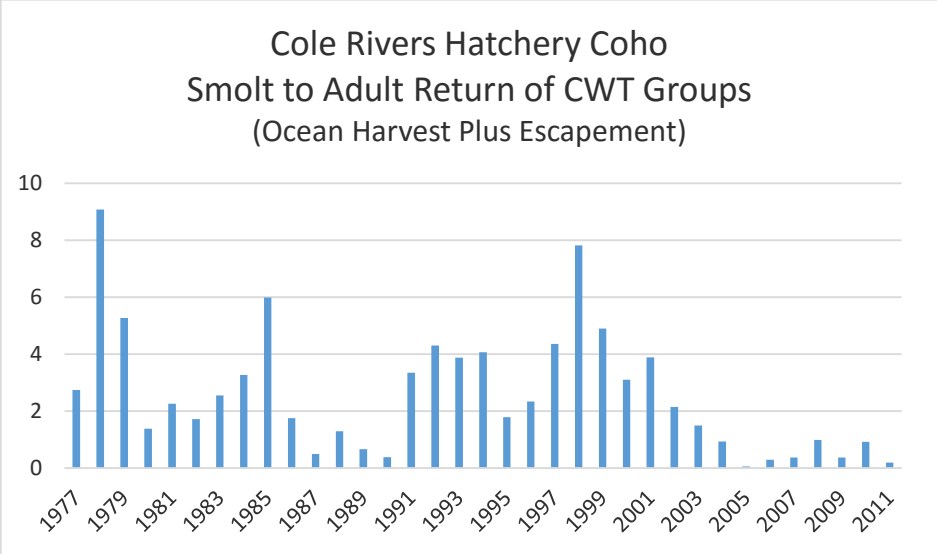

Figure 2.2.2-3. Smolt to adult survival/return for Cole Rivers Coho Salmon over time.

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

A. Estimates of freshwater returns of naturally produced Coho Salmon to the Rogue watershed were presented above (Table 2.2-1). The figure below shows the number of adult returns of Rogue River Coho for the years 1980-2015.

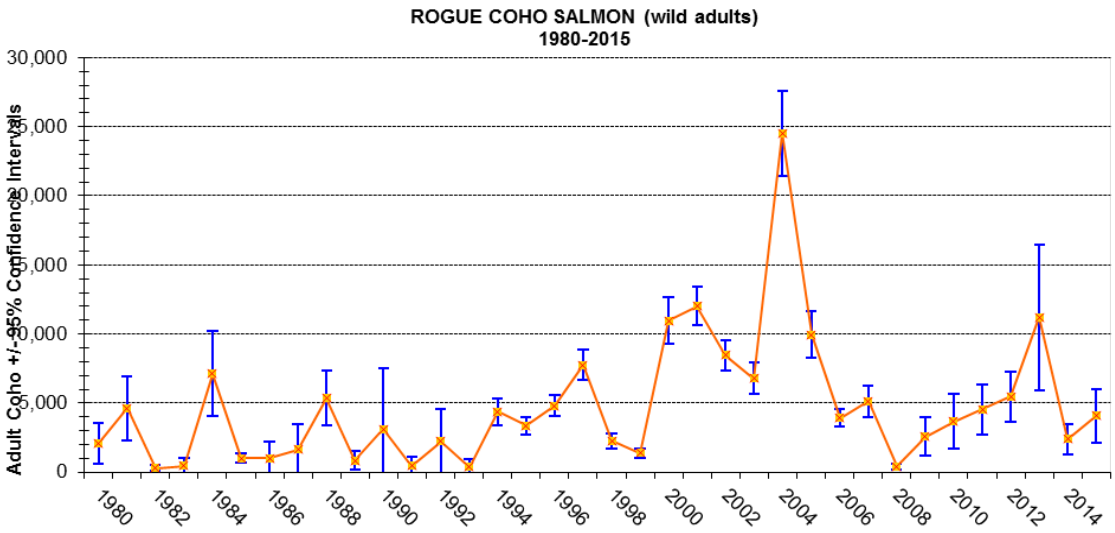

Figure 2.2.2-4 Number of Coho Salmon adult returns for the years 1980-2015.

Adult Distribution

The distribution of adult coho spawners among annual random sites in the Rogue River Basin is shown in Figure 2.2.2-4. Spawner densities are adjusted to compensate for differences in spawner abundance among the four return years. This figure illustrates the interannual consistency (or variability) of spawner distribution among these sites (Jacobs et al. 2002).

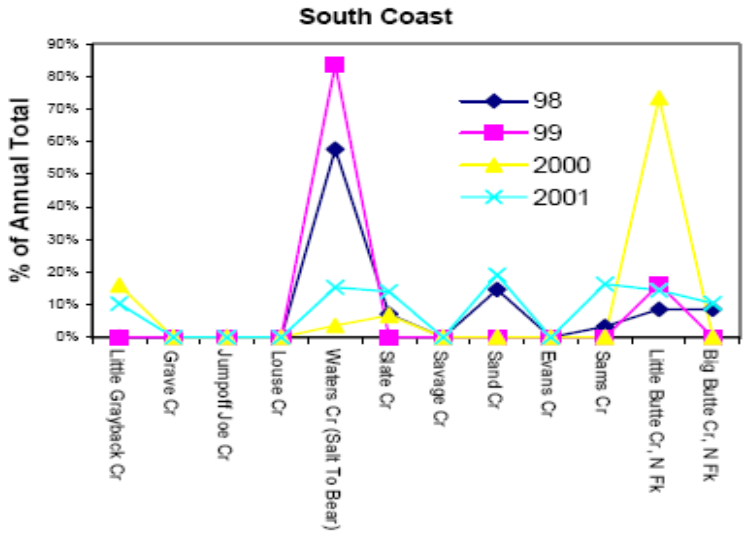

Figure 2.2.2-5 Distribution of adult Coho Salmon spawners among annual random sites in the Rogue River Basin, 1998-2001. Data are plotted as the proportion of annual total abundance among all sites that each individual site comprises. Only sites having valid Area Under the Curve (AUC) estimates in each of the four years are used.

Juvenile Abundance:

In the summer of 1998 the Western Oregon Rearing Project began a program to monitor juvenile coho salmon in Oregon coastal streams. The project was designed to monitor trends in abundance of juvenile salmonids rearing in five coastal monitoring areas, including the South Coast Monitoring Area (Jepsen and Rodgers, 2004).

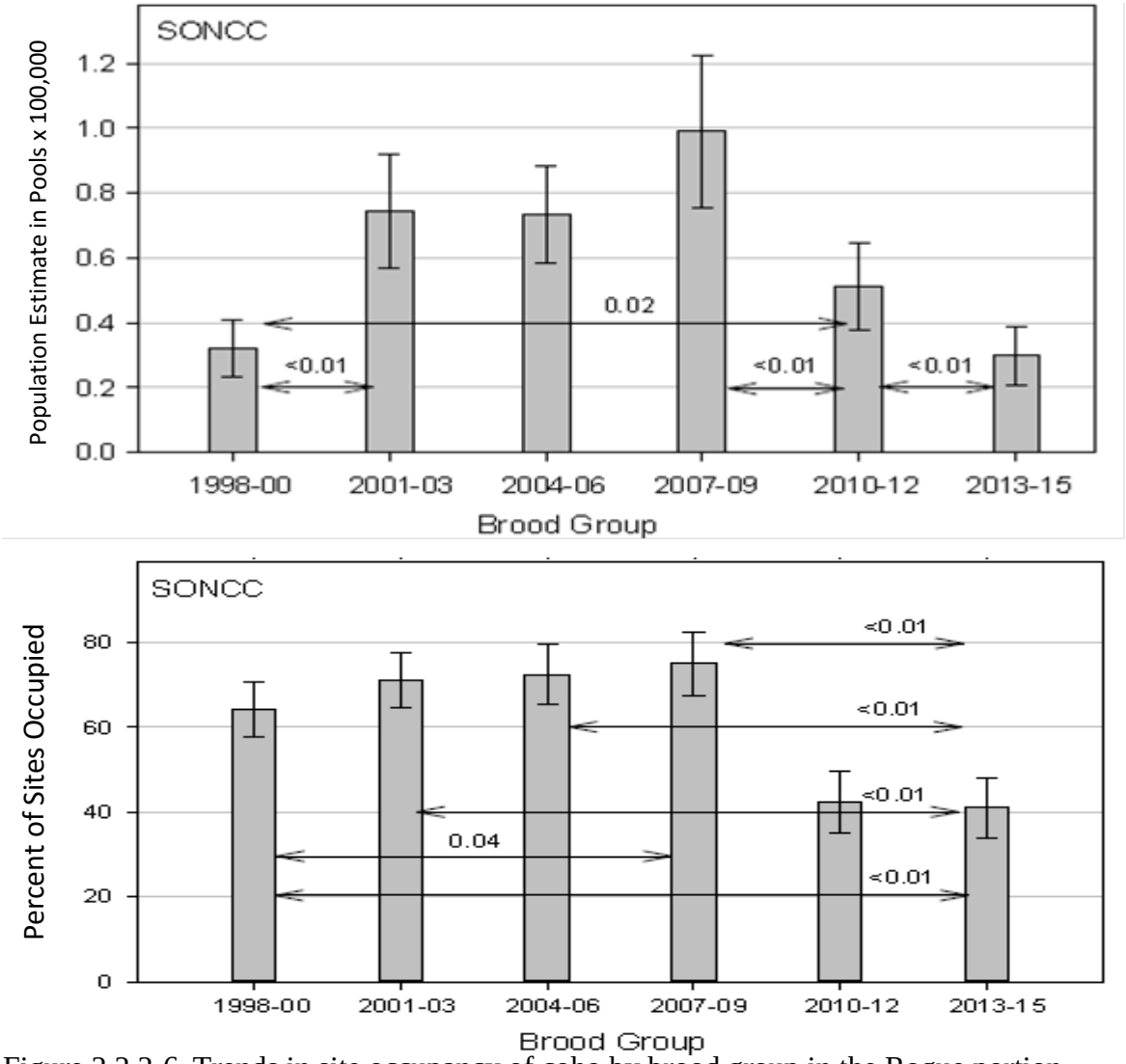

Figure 2.2.2-6. Trends in site occupancy of coho by brood group in the Rogue portion of the Southern Oregon Northern California Coast Coho ESU. Gray bars show the percent occupied (with 95% CI) for the brood group, *p* values for comparisons among brood groups are given above each vertical arrow where there is a significant difference.

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

Carcass surveys were reinitiated (2004) to provide data in support of the Rogue spring Chinook Salmon conservation plan. Determination of spawner composition will be facilitated by the mass marking of hatchery spring Chinook smolts releases with a 100% adipose fin-clip, which was initiated with the 1998 brood year.

During 2006-2015 hatchery fish annually composed an average of 9% of the natural spawners (range 2-22%). The proportion of hatchery origin fish on the spawning grounds meets the desired status criterion in the conservation plan of less than or equal to 15% as a 10 year moving average. Conservation status, as described in the conservation plan, is triggered when spawner composition exceeds 25% as a two year moving average. The proportion of hatchery origin fish on the spawning grounds averaged 4% over the last two years (range 2-6%).

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

--Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the take may occur,

Brood Collection:
Spring Chinook Salmon adult collection occurs at the Cole Rivers Hatchery collection pond. Migrating fish enter and progress up the ladder until trapped. Both returning hatchery fish and naturally produced swim-ins are collected. Upstream migration of spring Chinook Salmon ends at the barrier weir at the hatchery collection pond, and spring Chinook adults are collected from March through September each year. Spring Chinook brood collection does not result in any handling stress or take of ESA-listed Coho Salmon, because of temporal differences in adult return time between spring Chinook and coho, and because listed adult coho entering the trap are used as brood for a coho propagation program which has been described in a separate HGMP.

Rearing and Release Strategies:
The hatchery program for spring Chinook Salmon is a mitigation program intended to replace lost natural production. Approximately 1,703,250 smolts are released between August and March.

Mid-August 730,000 @ 13 fish per pound
Mid-September 730,000 @ 9 fish per pound
Mid-October 193,250 @ 6.5 fish per pound
Mid-March 50,000 @ 6.5 fish per pound

To minimize adverse ecological impacts, the smolts are released volitionally primarily into the mainstem from the hatchery at river mile 157, which outmigrate quickly towards the sea soon after release. Some smolts are trucked and released downstream to minimize impacts on naturally produced spring Chinook Salmon fry. The smolt age at release, release strategy, and location maximizes survival rates and minimizes interaction with naturally produced fishes in the Rogue River. Further, Coho Salmon spawning occurs almost exclusively in tributary streams, with fry emergence occurring in early April. The mainstem release of spring Chinook will have minimal adverse impact because juvenile coho will be living primarily in tributary streams.

At this time, presmolt releases are implemented at standing waterbodies outside the current distribution of anadromous fish species. Presmolts are released into Applegate, Emigrant and Lost Creek reservoirs as well as Fish Lake, contributing to the trout fishery in the reservoirs. These presmolt releases into standing waterbodies will have no adverse impacts on listed fish.

Some fry releases occur as a result of the Classroom Incubator Program implemented through ODFW's Salmon Trout Enhancement Program (STEP). Eyed eggs are provided to schools to allow children to observe embryo development, and accompanying curricula are available to spur discussions on salmon biology and watershed issues. Approximately 200 eggs are provided placed in aquaria in each participating classroom. Surviving fry are released into the mainstem and their impacts on listed fish shall be insignificant because of the small release numbers. Additional fry are released into the Middle Fork of the Rogue River upstream of Lost Creek Reservoir for marine nutrients/ecological restoration.

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

The spring Chinook brood collection in the past did not cause any handling stress or take of listed Coho Salmon at Cole Rivers Hatchery, because the period of adult collection for Rogue spring Chinook does not overlap adult coho entry into Cole Rivers. This would be the case even if additional collection methods were to be implemented.

--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).

No juvenile or adult coho will be captured, handled or lethally taken during spring Chinook broodstock collection. See attached Table 1 (page 48) for further details of take levels, which usually occurs during Rogue coho broodstock collection activities.

-Indicate contingency plans for addressing situations where the take levels within a

given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

No adult coho are taken as part of the spring Chinook program. Take of coho associated with the coho propagation program at Cole Rivers Hatchery will follow the guidelines described in the Coho Salmon HGMP.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe the 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.

Oregon Plan for Salmon and Watersheds: This is a prescriptive set of measures for recovering salmon and steelhead populations and habitats, 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 Rogue River Basin including nutrient enrichment and monitoring hatchery and wild runs. While many of the particular measures in the OPSW make reference to a particular species, the measures are broadly applicable to all salmonids.

ODFW Native Fish Conservation Policy: The Oregon Fish and Wildlife Commission adopted the policy in 2003 to ensure the conservation and recovery of native fish in Oregon, and manage hatchery based fisheries consistent with conservation of naturally produced native species. Conservation plans will provide guidance for hatchery programs for species within the associated Species Management Units.

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

ODFW Rogue Spring Chinook Salmon Conservation Plan: The Oregon Fish and Wildlife Commission adopted the Rogue Spring Chinook Salmon Conservation Plan in July 2007, and the current hatchery program on Rogue River spring Chinook Salmon is consistent with the plan.

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

(1) USACE/ODFW Cooperative Agreement
(2) ODFW Fish Health Management Policy
(3) ODFW/DEQ MOA: fish carcass distribution in Oregon streams
(4) NPDES permit for Cole Rivers Hatchery operation, to maintain Oregon water quality criteria for hatchery effluents

3.3) Relationship to harvest objectives.

Spring Chinook Salmon smolts are released primarily into the Rogue River at river mile 157. Some fish are trucked and released downstream. Adult hatchery-origin spring Chinook Salmon returning to the Rogue River are intended to be caught in ocean and freshwater fisheries, as the program was designed to provide a fishery to mitigate for lost habitat and fish production.

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

Beginning in 2008, the fishery for spring Chinook Salmon on the Rogue River is primarily a selective fishery on hatchery produced fish. Only a limited harvest opportunity on naturally produced spring Chinook is allowed in the basin. Contribution to the fishery of hatchery spring Chinook Salmon on the Rogue is listed in Table 1.12-1.

In 1994, the direct economic value of the spring Chinook Salmon fishery in the Rogue watershed was nearly $2.5 million. These totals resulted from an estimate of 26,603 local resident and 4,953 non-resident spring Chinook fishing trips tallied in an economic study that was conducted from 1992 to 1994 by the Rogue Valley Council of Governments (Olson et al. 1994). The study included interviews of 1,200 anglers who participated in Rogue River fisheries.

3.4) Relationship to habitat protection and recovery strategies.

The climate of the Rogue watershed is more extreme than most of the western Oregon, with much hotter and drier summers. Rogue spring Chinook Salmon evolved to migrate upstream during snowmelt-driven spring flows, hold in the river above Gold Ray Dam, and spawn in the mainstem and Big Butte Creek.

Being primarily a main-stem river spawner, the Rogue River spring Chinook Salmon has been greatly affected by the construction and operation of William Jess Dam. ODFW continues to work with the USACE to reduce impacts to naturally produced spring Chinook Salmon and to help the Corps achieve the objective of fishery benefits that make up a primary authorized use of the Dam.

General land use activities are not considered to be major factors affecting natural production of Rogue River spring Chinook Salmon. Factors that affect the overall productivity of the watershed and Rogue fish stocks include impacts to spawning habitat, rearing habitat, access to habitat, ocean conditions, predation, water flows, water quality, and climatic conditions. The Oregon Plan for Salmon and Watersheds lays out measures to be followed by all state agencies including: habitat protection, restoration, harvest, and hatchery refinement measures by Oregon Department of Fish and Wildlife; forest practices revisions by Oregon Department of Forestry; water quality protection by Department of Environment Quality; irrigation diversion monitoring by Water Resources Division; and Senate Bill 1010 implementation by Department of Agriculture, all of which are designed to protect and improve salmonid habitat. Protection of riparian

habitat is the responsibility of city and county governments through Oregon's land use system.

The Rogue River spring Chinook Salmon hatchery program is consistent with these habitat protection and recovery strategies, and provides hatchery fish for harvest while most naturally produced wild fish must be released unharmed in the fishery.

3.5) Ecological interactions.

(1) Species that could negatively impact program.
Mammalian predators including otters, harbor seals, sea lions and raccoons may adversely affect the program. Avian predators including the great blue heron, green herons, kingfishers, mergansers, cormorants, osprey, and gulls may negatively impact the program.

(2) Species that could be negatively impacted by program.
The listed natural Coho Salmon within the basin could be negatively impacted by the program, but the impact is expected to be minimal due to the life history compatibility of the two populations, and spatial and temporal differences in habitat utilization.

(3) Species that could positively impact program.
Any fish (Coho and Chinook Salmon as well as steelhead) that dies (or is recycled for nutrient enrichment) in the basin may positively impact the program.

(4) Species that could be positively impacted by the program.
Aquatic species (salmonids, other fish, mammals, birds, etc.) that depend directly or indirectly on salmonids for food and nutrient supply could be positively impacted by the program. Hatchery production has potential for significant influence on predator-prey relationships and community ecology during periods of low natural productivity**.**

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

The Rogue River is the main source water for Cole Rivers Hatchery. Ambient water is gravity fed to the hatchery from an impoundment formed by a diversion dam. The intake structure is screened with a #4 mesh having 0.178 inch square holes. The supply system may provide up to 300 cfs. Ambient temperatures range from 41.2 ^{o}F to 56.7 ^{o}F.

The hatchery's warm water supply is piped from the surface of Lost Creek Reservoir. This warmer water is gravity fed from a floating intake on the powerhouse intake tower, and energy is dissipated in a pool to lower the pressure before it enters the hatchery. The warm water supply system can provide up to 60 cfs, and annual temperatures range from 42.8 ^{o}F to 72.8 ^{o}F. When the warm water temperatures rise above 57 ^{o}F, ambient water is blended to acquire a maximum of 57 ^{o}F.

Incubation water is pumped from the ambient supply line and is ultraviolet sterilized. Incubation water is all single pass. The facility has the ability to filter ~~some~~ all of the water through sand and drum filters. Also, it has boilers and chillers to manipulate growth rates of the developing embryos. The water quality is generally very good, and production at Cole Rivers has not been hampered by available water or its temperatures. The NPDES permit number for effluent discharge is #300J, and is under a general permit issued to ODF&W. The water right for Cole Rivers Hatchery is for 224 cfs, and the permit number is (S 44910). The facility is in compliance with the water rights, water withdrawals and annual water uses reporting to Oregon Department of Water Resource.

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

There are no listed fish above the water intake structures, and therefore these structures are exempt from NOAA Fisheries screening criteria, and downstream barriers prevent anadromous fish from reaching the water intake structures. The water diversion for fish culture is non-consumptive and is returned to the Rogue River below the hatchery. All cleaning wastewater effluent is pumped to a 150' X 100' X 6' asphalt lined pollution abatement settling basin. The water quality of hatchery effluent is monitored and reported quarterly to DEQ as per requirements of the NPDES 300-J permit.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock collection facilities consist of 1-20' X 60 X 6' concrete pond with a finger weir trapping device, and a mechanical crowding device.

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

Cole Rivers Hatchery has three liberation units assigned to it. One of the units is an insulated 250 gallon pickup driven slip tank with aeration, and oxygen supplementation. The other is a flatbed truck mounted, insulated 1,000 gallon tank, with aeration, oxygen supplementation, and cab mounted dissolved oxygen monitors. The third is an insulated, chassis mounted, 1,600 gallon tank, with aeration, oxygen supplementation, recirculation, and cab mounted dissolved oxygen sensors.

5.3) Broodstock holding and spawning facilities.

There are 6 – 20' X 100' X 5' broodstock holding ponds, of which the Rogue spring Chinook occupy two. Spawning facilities consist of an indoor room with mechanical lifts, sorting tables, spawning tables, and fresh water supplied horse troughs for fish recovery. Fish are anesthetized using electroshock and are mechanically lifted using a self-draining brail to lift the fish up to table height.

5.4) Incubation facilities.

At Cole Rivers the total incubation capacity consists of 66 stacks of Marisource incubators. Each stack consists of 15 usable trays totaling 990. Approximately 898 trays are used for the Rogue spring Chinook Salmon egg incubation.

5.5) Rearing facilities.

Cole Rivers has 16- 14'X 3'X 3' "Canadian" style fiberglass troughs; 26- 25' X 4' concrete circular ponds; and 87 – 100' X 20' X 5.5' concrete raceways. The Rogue spring Chinook program requires seven raceways until they are marked, and 32 raceways from marking through release.

5.6) Acclimation/release facilities.

All of the smolt size fish produced of this stock are either: released volitionally on site through both the upstream and downstream release channels located at the tailrace end of the raceways; or are trucked and released downstream to minimize impact to naturally produced spring Chinook Salmon fry. No acclimation facilities are used for this program at this time, but are being considered for implementation in the future to improve contribution to the fishery. The unfed fry are stocked by hand, and fingerlings are stocked directly into the various water bodies using one of the trucks described in section 5.2.

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

In the 1999 brood year an incubation pump failure and corresponding alarm system failure resulted in the loss of 1,405,052 spring Chinook Salmon alevins in the incubators just prior to ponding. A redundant pump has been installed and alarm checks have been revised as a result.

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.

Even though no listed fish are at issue with this section, Cole Rivers Hatchery employs many risk aversion measures to protect its' program fish and the habitat. These include: full time staffing with trained personnel assigned to be on-call; back-up generator systems that power essential equipment; alarm systems for water levels and intruders; daily alarm system checks; monthly fish health check-ups and pre-release fish health certification by Fish Health Services staff; and disinfection protocols to prevent the spread of diseases.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

The broodstock originated from wild fish entering the collection pond at Cole Rivers Hatchery.

6.2) Supporting information.

6.2.1) History.

Spring Chinook Salmon production at Cole Rivers Hatchery began in 1972. With the exception of age at maturity, hatchery fish currently exhibit life history characteristics similar to those exhibited by naturally produced spring Chinook Salmon before the construction and operation of William Jess Dam and Lost Creek Reservoir. The life history of naturally produced fish has changed to a later migration and spawn timing post Dam construction (ODFW, 2007). Hatchery fish likely to mature at younger ages due to broodstock selection practices and accelerated growth rates of juveniles during hatchery residence.

6.2.2) Annual size.

The goal is to use as many wild fish as possible from naturally produced adults returning to the Cole Rivers Hatchery trap. In 2007 broodstock practices were revised to ensure that hatchery spring Chinook Salmon would exhibit, as much as possible, the life history of the wild population that historically spawned upstream of the dam. Additional changes such as adding back a yearling release are being made to best match that pre-dam life history.

Collection goals call for the 20% of brood fish to be collected in late April and May, 40% in June, 30% in July, and 10% in August and early September. Currently, 1,050 females and 525 males are collected as the brood collection goal. Assuming an average fecundity of 3,000 eggs per female, at least 800 females will be spawned to achieve an egg take of a minimum 2,400,000 green eggs.

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

Determination of the percentage of wild fish used in egg takes has not been possible until the 2004 brood year, when 100% of the hatchery fish returning were from marked smolts. For brood years 2004-2008, a range of 4-17% females, and 15-45% males spawned were from wild fish. The goal is to use as many wild fish as possible from naturally produced adults returning to the Cole Rivers Hatchery trap. Additional collection methods could be implemented in the future if needed.

6.2.4) Genetic or ecological differences.

As stated previously, the life history of naturally-produced spring Chinook Salmon has changed post-Dam construction more than the life history of hatchery-produced spring Chinook Salmon, because of the effects of reservoir operation on the ecology of the upper river, especially warmer water temperatures during egg incubation. Recent genetic assessments using microsatellite DNA markers did not find any genetic differences between naturally produced and hatchery produced spring Chinook Salmon for the Rogue River Basin. There has been a trend toward earlier spawning at the hatchery since the 1970s, which is being corrected as part of revisions enacted in 2007.

6.2.5) Reasons for choosing.

Spring Chinook Salmon stock-52 is native to the Rogue River basin, remains well-adapted to the basin, and will have minimal impacts on naturally produced spring Chinook Salmon in the basin if they interbreed.

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.

Even though no listed fish (Coho Salmon) are expected to be impacted by the selection of spring Chinook Salmon broodstock, our risk aversion measures to minimize its impacts on naturally produced spring Chinook include utilizing wild fish in the broodstock selection and corresponding egg takes, and implementing elements of run timing and spawning timing into the spawn, which shall minimize the genetic impacts if they interbreed in the wild.

SECTION 7. BROODSTOCK COLLECTION

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

All fish retained for broodstock will be from maturing adults.

7.2) Collection or sampling design.

The adult fish are collected at the Cole Rivers Hatchery trap which is a finger weir design, and the collection pond is open year round. Adult spring Chinook Salmon are collected from late April through September each year. Upstream migration of spring Chinook ends at the barrier weir at the hatchery collection pond. Additional collection methods could be implemented in the future if needed.

7.3) Identity.

Wild fish are identified by the presence of all fins and are generally described as "unmarked". Adults returning from hatchery origins are identified by scanning the fish for specific missing, or clipped fins. Virtually 100% of the hatchery released smolts are finclipped.

7.4) Proposed number to be collected:

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

The program goal is to collect 1,050 females and 525 males and ~5% jacks for broodstock. There will be times when there is a need to hold greater numbers of fish in order to ensure attainment of age composition goals for spring Chinook Salmon spawners. A 2:1 female to male spawning ratio is used.

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

	Adults				
Year	**Females**	**Males**	**Jacks**	**Sub-jacks**	**Juveniles**
1992	796	513	28	76	0
1993	1144	570	34	30	0
1994	1284	571	26	19	0
1995	1382	635	32	41	0
1996	1357	703	102	68	0
1997	1207	603	32	12	0

Year	Adults			Sub-jacks	Juveniles
	Females	Males	Jacks		
1998	870	431	43	8	0
1999	816	372	34	9	0
2000	1460	1055	61	78	0
2001	1221	653	56	64	0
2002	3885	2012	75	43	0
2003	1312	751	74	53	0
2004	1437	943	70	51	0
2005	1546	1027	79	37	0
2006	1394	721	108	53	0
2007	1135	651	56	25	0

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

Surplus hatchery origin fish are marked (opercle punch) and recycled downstream back into the fishery until late-July (4,000 fish maximum, currently) as long as stray rates are below criteria in the conservation plan. Additional hatchery fish surplus to brood needs are sold to the highest bidder using a sealed bidding process.

7.6) Fish transportation and holding methods.

Fish transported are usually on the truck less than 2 hours, and are loaded onto a liberation unit using a powered brail and chute. Fish held for broodstock are usually treated with hydrogen peroxide to control fungus, and are injected with antibiotics to control bacterial infections. Mortality is picked daily, frozen, and later discarded in a sanitary landfill or processed for rendering. Any unusual losses would be promptly reported to ODF&W Fish Health Services for treatment recommendations.

7.7) Describe fish health maintenance and sanitation procedures applied.

Footbaths containing 100 ppm iodophor are utilized at the door of the adult area, and at the door into the incubation area to prevent the spread of disease. Latex surgical gloves when used are disposed of before leaving the adult area, and all rubberized outerwear is disinfected with 100 ppm iodophor before leaving. Routine sampling of at least 60 adult fish for the detection of virus is performed each year. All equipment used during spawning is disinfected with either iodophor, or chlorine on a routine basis.

7.8) Disposition of carcasses.

Currently most carcasses are being used for nutrient enrichment as part of a Salmon and Trout Enhancement Program (STEP) project. Other uses include use as fertilizer by a local company. Other fish that are killed and spawned are frozen and disposed of in a sanitary landfill. Daily pre-spawning mortality is frozen in totes and later disposed of in a sanitary landfill.

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

No adverse genetic or ecological effects are expected, anticipated, or have been observed as a result of this spring Chinook Salmon broodstock collection program, because of the temporal differences in adult return time between spring Chinook and listed natural Coho Salmon.

SECTION 8. MATING

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

8.1) Selection method.

Brood are retained throughout the run on a 1:2 male to female ratio, keeping a specified number of fish per week to achieve the goal for that particular period. For example if we need 630 females and 315 males from the beginning of the run until July 1st, and there are 10 weeks in that period, we would keep 63 females and 32 males per week. Wild fish are given preference for brood collection, and hatchery fish are used to backfill as needed. All egg groups are labeled and transferred to the incubator trays which are also labeled appropriately.

8.2) Males.

Males and jacks are used one time only.

8.3) Fertilization.

Females are spawned individually in a bucket, and males are spawned individually in a "dixie" cup. Eggs from two females are fertilized using the milt from one male only. The fertilized eggs from two females are left to stand for 2-3 minutes and are then pooled into one bucket in preparation for incubation.

8.4) Cryopreserved gametes.

No cyropreserved gametes are used in this program.

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

The mating scheme described for spring Chinook Salmon in the hatchery environment should pose no risk to listed Coho Salmon. The use of wild fish in the mating pool reduces the threat of genetic drift, and the large spawning pool with 1:2 male/female spawning ratio reduces the threat of gene resource bottlenecking in the hatchery produced spring Chinook Salmon population.

SECTION 9. INCUBATION AND REARING -

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

9.1) Incubation:

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

Table 9.1.1-1. Data of egg take and survival rates (1992-2007).

Brood Year	Eggs Spawned	% Survival To Eyed	# Eggs Shipped	# Excess Culled	% Survival To Swim Up	# Fry Ponded
1992	2,201,000	85.1%	0	0	80.6%	1,773,000
1993	2,566,000	89.3%	0	437,750	87.7%	2,250,000
1994	2,321,000	90.4%	1,000	0	86.4%	2,005,000
1995	2,365,000	93.6%	1,000	0	91.1%	2,153,000
1996	3,062,000	93.3%	3,000	506,478	85.5%	2,110,000

1997	3,390,000	94.2%	4,000	635,943	89.5%	2,395,000
1998	2,089,000	91.3%	15,000	0	83.7%	1,734,000
1999	2,094,000	90.7%	13,000	0	21.4%*	436,000
2000	2,619,000	88.5%	13,000	0	75.3%	1,959,000
2001	3,326,000	94.3%	9,000	426,598	88.1%	2,494,000
2002	2,952,000	92.0%	9,000	0	81.7%	2,404,000
2003	3,033,000	90.0%	9,000	0	84.6%	2,557,000
2004	2,337,000	83.2%	8,000	0	80.0%	1,870,000
2005	2,105,000	89.7%	7,000	0	85.4%	1,798,000
2006	2,460,000	87.1%	8,000	0	81.3%	2,000,000
2007	2,468,000	91.6%	7,000	0	85.7%	2,115,000

* High fry losses due to mechanical failure as described in Sec. 5.7

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

Surplus eggs and/or fry are often destroyed when in excess of program needs. Often fecundity rates and survival exceed our estimates and surplus eggs and alevins are randomly culled from the population with preference to wild progeny, parental run timing, and spawning timing. Eggs and fry are disposed of by freezing in totes and disposed of in a sanitary landfill.

9.1.3) Loading densities applied during incubation.

Average fecundity is 3,000 eggs per female and eggs are trayed down at the rate of two females per tray, for an average rate of 6,000 total eggs per tray. Flow rates are set at five GPM, checked daily and maintained throughout the incubation period. When eye up occurs at about 500-550 temperature units the eggs are shocked, picked, enumerated and re-incubated at the rate of 4,500 per tray. Hatching occurs between 850–900 temperature units, and button up occurs between 1,800-1,900 temperature units.

9.1.4) Incubation conditions.

Flows are set at five GPM and monitored daily. Temperatures can be manipulated, and usually are, using boilers and chillers, to achieve temperatures anywhere from 40-55 ^{o}F. Temperatures are manipulated to bring groups together for common ponding dates. The first take of spring Chinook is incubated on chilled or ambient temperature, while subsequent takes are heated. Once all egg takes are uniformly developed, all eggs are heated to achieve swim up in early January. Temperatures are monitored daily. Dissolved oxygen levels are not routinely monitored, and are only taken if deemed necessary. Incubation water is generally UV sterilized, filtered, and aerated prior to exposure to the eggs.

9.1.5) Ponding.

Ponding occurs at an estimated 99% button up usually between 1,800-1,900 temperature

units. Fry are ponded in raceways at 950 fish per pound, and the ponding process is forced. Ponding occurs in early January.

9.1.6) Fish health maintenance and monitoring.

All eggs are water hardened in a bath solution of 100 ppm PPV buffered iodophor for 15 minutes when first trayed down. Fish Health Services staff examine the visceral tissues and ovarian fluids to detect pathogens. Fertilized, healthy eggs are treated on weekdays with a 1:600 formalin solution to control fungal infections. Dead or diseased eggs are removed during the shocking process using a mechanical picker, or salt bath, and hand tools. Dead and diseased fry are removed one day after ponding using hand tools, and the dead material is frozen in totes and disposed of in a local landfill. All equipment and tools used during incubation are cleaned and sterilized between uses using either iodophor or bleach solutions.

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.

The spring Chinook Salmon in the Rogue Basin is not an ESA-listed population. However, to minimize the genetic and ecological effects to wild spring Chinook, eggs are incubated in sub-groups based on arrival time, spawn time, and wild or hatchery parentage. At the eyed stage, egg groups within each subgroup are mixed to randomize any later reductions that could create any bias. Catastrophic losses are minimized due to alarm systems and 24 hour surveillance.

9.2) Rearing:

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

Table 9.2.1-1. Survival rates from fry to fingerling, and fingerling to smolt stages of spring Chinook Salmon at Cole Rivers Hatchery.

Brood Year	# Ponded	% Survival to Fingerling	% Survival to Smolt	# Smolt Released
1992	1,683,918	99.7%	96.3%	1,310,134
1993	1,738,061	98.9%	98.5%	1,711,274
1994	1,683,342	97.5%	97.0%	1,632,444
1995	1,957,934	98.9%	98.7%	1,670,747
1996	2,127,451	99.5%	99.3%	1,672,186
1997	2,162,259	98.9%	98.8%	1,637,155
1998	1,864,365	91.4%	90.4%	1,633,666
1999	556,885	98.0%	97.9%	544,904
2000	2,019,811	94.3%	94.0%	1,898,340
2001	2,511,936	95.6%	95.1%	1,972,233

2002	2,433,824	89.4%	89.0%	1,957,760
2003	2,402,396	97.6%	97.5%	1,944.499
2004	1,758,839	96.5%	96.1%	1,620,999
2005	1,853,373	97.4%	99.6%	1,798,096
2006	1,895,301	95.1%	90.1%	1,624,377

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

Fry are ponded into seven raceways at the rate of 300 pounds of fry per raceway. This is equivalent to 0.375 pounds per cubic foot of space and 0.45 pounds per GPM flow using warm water. As temperatures increase ambient water is blended with the warm water to keep temperatures below 57^{o}F.

Flows are increased as fish grow and when the size of fish approaches 2500 pounds per raceway marking and tagging begins and they are distributed into 32 raceways on ambient water. The final density goal is not expected to exceed 1.0 pounds per cubic foot of space, and 6.0 pounds per GPM of flow. For the 2003 brood released in 2004, the highest density of all of the raceways at release was 0.875 pounds per cubic foot of space, and 5.25 pounds per GPM.

9.2.3) Fish rearing conditions.

Various water sources, and fish facilities are described in sections 4.1, 5.3, and 5.5. Water temperatures are recorded daily from the various sources. Dissolved oxygen levels are taken at times of crisis or as needed as densities approach limits. Ponds are screened to prevent the escape of fish. Fry are ponded using the warm water supply, and as warm water temperatures approach 57^{o}F ambient water is blended to achieve a maximum of 57^{o}F. Flows are gradually increased as fish grow until a maximum of 1,333 GPM is achieved. Avian predator mesh covers the raceways. Any debris and wastes are broomed from the raceway bottom weekly.

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.

Regular monthly lengths and condition factors are not collected. See tables 9.2.4-1 and 9.2.4-2 for monthly weights, in fish per pound, for brood years 1999-2006.

Table 9.2.4-1. Fish growth expressed in number of fish per pound (BY 1999-2002)

MONTH	BY 99	BY 00	BY 01	BY 02	AVG (99-02)
JAN	900	830	983	934	911.8
FEB	398	729	581	499	551.8
MAR	200	281	270	210	240.3
APR	78.8	79.4	109	82.3	87.4
MAY	52.3	31.1	47	44.2	43.7

JUN	19	21.3	29.1	23.9	23.3
JUL	12.5	14.7	14.4	15.4	14.3
AUG	9.2	10.2	9.4	10.2	9.8
SEPT	5.7	6.2	6.1	6.3	6.1
Final	5.6	5.7	5.6	6.0	5.7

Table 9.2.4-2. Fish growth expressed in number of fish per pound (BY 2003-2006)

MONTH	BY 03	BY 04	BY 05	BY 06	AVG (03-06)
JAN	771	897	950	869	871.8
FEB	485	460	641	629	553.8
MAR	197	231	319	314	265.3
APR	123	114	169	103	127.3
MAY	73.8	54	82	64	68.5
JUNE	31.6	35	38	34	34.7
JUL	18.2	17	20	18	18.3
AUG	11.6	9	12	12	11.2
SEPT	6.4	6	10	9	7.9
Final	5.3	6	6.6	7	6.2

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

Table below is a predicted schedule for monthly growth for a population of 1,622,000 fish from ponding to smolt release.

Table 9.2.5-1. Predicted monthly growth of spring Chinook Salmon fry from ponding to smolt stage.

DATE	TEMP F	LENGTH	#/LB	% BOD WT	LB FED/D	FOOD CONV
01/31	40.8	1.57	703	1.895	49.1	1.2
02/28	44.2	1.84	434	2.223	93.4	1.2
03/31	49.2	2.26	233	2.545	199	1.2
04/30	55.5	2.82	120	2.790	424	1.2
05/31	49.1	3.52	62	2.641	774	1.2
06/30	50.4	4.31	33.7	2.313	1251	1.2
07/31	54.1	5.25	18.6	2.284	2234	1.2
08/31	56.1	6.33	10.7	2.063	3522	1.2
09/30	44.9	7.18	7.3	0.997	2435	1.2
Final	44.5	7.47	6.5	0908	2548	1.2

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*).

See tables above under sections 9.2.4 and 9.2.5 for further information. The starting diet is BCS #0-2, then #2 with Aquamycin added to control Bacterial Kidney Disease, then BCF 1.0 through 3.0.

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

Fish health and behavior are monitored daily. Any mortality is picked, discarded and recorded. As mentioned above, Aquamycin is fed for 28 days to control Bacterial Kidney disease. Any unusually high losses are reported to ODF&W Fish Health Services for investigation. Fish Health Services performs monthly site visits for routine sampling and pre-liberation checkups. Infections /diseases of either a parasitic or bacterial origin are treated as prescribed by Fish Health Services. Just prior to release a 60 fish sample is collected for Fish Health Services to perform ELISA tests to monitor Bacterial Kidney Disease levels. Empty raceways are pressure washed and sun dried in preparation for incoming groups of fish. All equipment used in the raceways is disinfected with iodophor or bleach solutions prior to their use.

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

No gill ATPase or other quantitative analysis is performed. Degree of smoltification is determined by fish behavior, age of fish, fish size, time of year, scale loss, coloration, and body elongation characteristics, etc.

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

No natural rearing method is applied except that the rearing occurs in natural waters of the Rogue River.

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.

The spring Chinook Salmon population which is under propagation is not a listed population. However, all raceways are securely screened to prevent the escape of fish prematurely. Fish rearing practices are programmed in a way that all fish achieve full smolt size at the desired time of year to optimize outmigration.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	0	NA	NA	NA
Unfed Fry	10,000; 20,000 - 50,000	950	1/1	Rogue River R4; MF Rogue
Fry	0	0	NA	NA
Fingerling	250,000-500,000	50	6/1	Lost Creek, Applegate Emigrant reservoirs and Fish Lake
Smolts	730,000; 730,000; & 193,250; 50,000*	13.0, 9.0, & 6.5	8/15, 9/15, 10/15	Rogue River R 1- 4

*Conservation Plan includes proposal to increase production; see Section 1.8.

Note:
Ratio of smolts in each release group may change to best meet fishery goals and make the program as close to the pre-dam life history as possible.

Additional fry or fingerling may be released into waterbodies outside the current range of

anadromous fish species.

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

Stream, river, or watercourse:
Rogue River 1500500000
Lost Cr Lk 1571200000
Applegate Lk. 1571300000

Release point:
Rogue River 42 39’ 49.1” N, 122 41’ 06.7” W
Lost Cr Lk 42 40’ 43.8” N, 122 40’ 17.2” W
Applegate Lk. 42 01’ 34.5” N, 123 08’ 56.5” W

Major watershed: Rogue River
Basin or Region: Rogue River Basin

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

Table 10.3-1. Cole Rivers Hatchery spring Chinook Salmon release data of the past (1993-2015).

Release Year	Unfed Fry	Avg size	Fry	Avg size	Fingerling*	Avg size	Smolt	Avg size
1993	0	NA	0	NA	279,195	17.5	1,310,134	10.40
1994	0	NA	0	NA	0	NA	1,711,274	9.41
1995	96	950	0	NA	0	NA	1,632,444	9.56
1996	523	950	0	NA	260,714	49.7	1,670,747	9.54
1997	2,160	950	0	NA	347,654	34.5	1,672,186	9.90
1998	2,129	950	0	NA	497,720	52.6	1,637,155	9.84
1999	5,537	950	0	NA	0	NA	1,633,666	9.48
2000	7,164	950	0	NA	0	NA	544,904	8.60
2001	6,716	950	0	NA	0	NA	1,898,340	9.76
2002	4,705	950	0	NA	416,522	57.1	1,972,233	10.10
2003	5,958	950	0	NA	206,111	65.0	1,957,760	10.03
2004	6,591	950	0	NA	396,058	36.7	1,944,499	9.39
2005	6,736**	950	0	NA	59,426	32.8	1,620,999	9.02
2006	4,912**	950	0	NA	0	NA	1,798,096	11.00
2007	6,552**	950	0	NA	153,094	65.0	1,624,377	11.51
2008	5,243	950	0	NA	200,849	86.1	1,639,279	11.95

2009	3,534	950	433,880	1000	372,025	51.2	1,627,078	10.08
2010	6,615	950	0	NA	117,714	51.2	1,636,010	10.17
2011	4,213	950	0	NA	414,602	67.0	1,796,354	11.65
2012	3,959	950	0	NA	295,375	73.8	1,741,338	10.35
2013	2,008	950	0	NA	0	NA	1,520,465	9.30
2014	2,642	950	0	NA	375,200	66.0	1,660,659	9.42
2015	20,266	950	0	NA	304,239	87.0	1,727,878	9.74
Average	3,985	950	18,864	1000	204,196	55.8	1,651,212	10.01

*Fingerling releases were excess to program released to Applegate, Emigrant and Lost Creek reservoirs and Fish lake to provide angling opportunities.
**Chuck Fustish (personal communication, 2008)
Data source: ODFW Hatchery Management System (HMS) database.

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

Table 10.4-1. Actual dates of fish release, life stage and method of release (Brood years 1999-2014).

BROOD YEAR	RELEASE DATE(S)	LIFE STAGE	RELEASE TYPE
1999	11/21/99-1/10/00	Fry	Forced
1999	8/13-16, 9/15, 10/13/00	Smolt	Volitional/Forced
2000	11/28/00-3/20/01	Fry	Forced
2000	8/14-17, 9/10-13, &10/15/01	Smolt	Volitional/Forced
2001	11/19/01-2/20/02	Fry	Forced
2001	6/5, & 6/28/01	Fingerling	Forced
2001	8/13-15, 9/17-20, 10/11/02	Smolt	Volitional/Forced
2002	12/11/02-4/18/03	Fry	Forced
2002	6/24/03	Fingerling	Forced
2002	8/12-14, 9/15-18, 10/15/03	Smolt	Volitional/Forced
2003	11/26/03-3/10/04	Fry	Forced

2003	8/4-8/6/04	Fingerling	Forced
2003	8/9-8/12, 9/13-15, 10/14/04	Smolt	Volitional/Forced
2004	7/6, 8/26	Fingerling	Forced
2004	8/15-8/17,9/11-9/14, 10/10,11	Smolt	Volitional/Forced
2005	8/14-8/17, 9/11-9/14, 10/16- 10/19	Smolt	Volitional/Forced
2006	6/7/2007	Fingerling	Forced
2006	8/13-8/16,9/10-9/13, 10/15-10/16	Smolt	Volitional/Forced
2007	6/25, 7/8	Fingerling	Forced
2007	8/18-8/21, 9/16-9/19, 9/26, 10/14-10/15	Smolt	Volitional/Forced
2008	1/29-1/30	Fry	Forced
2008	6/30-7/2	Fingerling	Forced
2008	8/17-8/20, 9/15-9/18, 10/13-10/14	Smolt	Volitional/Forced
2009	11/25-2/18	Fry	Forced
2009	6/3, 6/25	Fingerling	Forced
2009	8/8-8/10, 9/13-9/15, 10/11-10/12	Smolt	Volitional/Forced
2010	12/10-2/15	Fry	Forced
2010	5/31-6/2	Fingerling	Forced
2010	8/15-8/17, 9/12-9/15, 10/17-10/18	Smolt	Volitional/Forced
2011	11/30-1/20	Fry	Forced
2011	5/21-5/22, 5/31, 6/22	Fingerling	Forced
2011	8/20-8/23, 9/17-9/19, 10/15-10/16	Smolt	Volitional/Forced
2012	12/15-1/17	Fry	Forced
2012	8/12-8/14, 9/17-9/19, 10/15	Smolt	Volitional/Forced
2013	12/9-1/29	Fry	Forced
2013	6/10-6/12	Fingerling	Forced

2013	8/12-8/14, 9/15-9/19, 10/13-10/14, 3/10	Smolt	Volitional/Forced
2014	12/5-1/8	Fry	Forced
2014	5/20/2015	Fingerling	Forced
2014	8/17-8/20, 9/14-9/17, 10/12-10/13	Smolt	Volitional/Forced

Source: ODFW HMS database

Fry are released by hand from the various classroom incubators operated at local schools. Students use plastic buckets and transfer the fry to the river and release by hand. Additional fry are released in the Middle Fork Rogue for marine nutrients and ecological restoration. Fingerlings are released forcibly from a tank truck into standing water bodies. The dates usually coincide with the completion marking and distribution of fish into the final rearing ponds.

The timing of smolt releases has been chosen to be mid-August – mid-March to maximize outmigration rates and minimize interaction with naturally produced spring chinook. Each release begins when the water level in the raceway(s) is lowered down to a level that matches the level in the release channel at the outfall of the raceways, pulling one screen up, and leaving up overnight. Any fish remaining in the raceway(s) the next morning are forced out into the release channel, and any fish remaining in the release channel are forced out into the river. Some releases are trucked downstream and released.

10.5) Fish transportation procedures, if applicable.

Fingerlings that are stocked by truck are loaded using a fish pump, and hand loaded as necessary using crowders and dipnets. There is no temperature control devices on any of the trucks used in this program. Oxygen supplementation is provided by a bottled source, and dispersed through ceramic diffusers at a rate of 2-4 liters per minute. Levels are monitored with a meter inside the cab. Additional oxygen supplementation is provided by powered aerators and water pump recirculation. Oxygen levels are maintained using these three methods to be above at least 10 ppm throughout loading and transport. Fish are generally in the truck tank less than two hours, and densities do not exceed 1.0 lb fish/gallon of total tank volume.

10.6) Acclimation procedures.

There are no acclimation devices or procedures utilized in this program at this time. This has been described in Section 1.16 as a potential investment for the program, and will be implemented if needed to improve contribution to the fishery.

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

Fingerling and smolt releases are virtually 100% marked with an adipose clip. Double index tagging of smolts with a coded wire tag but no finclip ended with the 2006 brood year.

Table 10.7-1. Marks applied to smolts by percentage of smolt releases (BY 1997 – 2006)

Brood Year	Release Year	Unmarked	Ad Only	Ad+CWT	CWT only
1997	1998	92.7%	0%	7.3%	0%
1998	1999	0%	89.7%	10.3%	0%
1999	2000	0%	66.6%	23.0%	10.4%
2000	2001	0%	90.7%	6.3%	3%
2001	2002	0%	91.5%	5.8%	2.7%
2002	2003	0%	91.4%	5.8%	2.8%
2003	2004	0%	92.2%	5.0%	2.8%
2004	2005	0%	89.3%	7.4%	3.3%
2005	2006	0%	90.4%	6.6%	3.0%
2006	2007	0%	94.1%	5.9%	0%

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

Disposition of excess fish happens in June when fingerling are released. Excess fish above the programmed fingerling and smolt needs are usually allocated to reservoirs, where the programmed fingerlings are already being stocked (depending on the available habitat).

10.9) Fish health certification procedures applied pre-release.

ODF&W Fish Health Services' pathologists perform a pre-release examination within 30 days of the scheduled release of all fish of this stock. Any infected or diseased raceways are treated as necessary and prescribed, allowed to withdraw from the therapy as recommended, rechecked, and released if cleared to do so. Any raceways deemed unfit for release shall be destroyed, or stocked in water bodies where the infection would not cause any harm. The decision to not stock smolt fish as scheduled would be a joint decision between the hatchery manager, ODF&W Fish Health Services, ODF&W Fish Division, ODF&W SW Region and Rogue Watershed staff, and consultation with appropriate NOAA Fisheries staff if needed.

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

Early releases of unfed fry will not occur. Emergency releases of fingerling in standing water bodies can occur at the discretion of the hatchery manager any time prior to their scheduled release time as long as they are certified disease free, are within 20% of scheduled release numbers, and are stocked only in scheduled water bodies. Emergency smolt releases can occur, at the discretion of the hatchery manager, within 60 days of their scheduled release, as long as the fish have been properly marked, are within 20% of scheduled release numbers, are stocked in scheduled water bodies, and are certified disease free. Emergency release of smolts earlier than 60 days prior to their scheduled release would be a joint management decision between the ODF&W Rogue Watershed staff, ODF&W Southwest Region staff, ODF&W Fish Division staff, the Cole Rivers Hatchery manager and consultation with appropriate NOAA Fisheries staff if needed.

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.

Smolt releases of Cole Rivers Hatchery spring Chinook Salmon are programmed to be at smolt size during the peak outmigration period in late summer fall and early spring of the year. Release of program fish at full smolt stage will enhance the speed of outmigration, and the likelihood of residualization shall be low, and thus will reduce the interaction with listed Coho Salmon in the watershed.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how "Performance Indicators" listed in Section 1.10 will be monitored. Results of "Performance Indicator" monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet "Performance Standards".

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.

Indicator--All smolts will be adipose clipped.

- Annual preliberation exam to confirm mark rate.

Indicator--Returning adults contribute to the freshwater fishery.

- Punchcard data will provide an index of total harvest.

Indicator--Program will provide an annual harvest that at a minimum equals the harvest provided by lost production of at least 13,020 adults.

- Punchcard data will provide an index of total harvest.

Indicator--Economic benefit to rural communities of Curry, Josephine and Jackson counties.

- Periodic evaluation of the economic benefits provided by the hatchery program and associated sport fishery.

Indicator--Release groups will meet ODFW fish health standards.

- Conduct appropriate health checks throughout incubation, rearing, and prior to release.

Indicator--A Conservation Plan will be developed for the appropriate Species Management Unit (SMU).

- Procedures for assessing stock status and risks have been developed in the Rogue River Spring Chinook Salmon Conservation Plan

Indicator--Broodstock collection reflects the run timing and age classes represented in the natural population prior to construction of William Jess Dam.

- Data on adult return timing and spawning maintained by hatchery staff

Indicator--Hatchery operations conform to applicable fish health, sanitation, and operational guidelines.
Indicator--Hatchery operations conform to DEQ/NPDES guidelines for water quality.
Indicator--Facility intakes are screened appropriately.

- Fish health is certified prior to release.
- Appropriate protocols will be followed for monitoring water quality.
- Screens will be checked on a regular basis.

Indicator--The program does not increase interaction with coho salmon. Handling of adult coho at Cole Rivers will follow the procedures outlined in the HGMP for Rogue Coho Salmon.
Indicator--Any brood collection that increases interaction with Coho Salmon will be reviewed with NMFS staff prior to implementation

- Maintain accurate collection data for spring Chinook and Coho Salmon at Cole Rivers.

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

Most actions are conducted as part of existing district, hatchery, and fish health program workload. Additional funding and assistance will be needed for future creel surveys, economic evaluation.

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.

No effect on listed species is expected from monitoring and evaluation activities planned in support of the Rogue spring Chinook Salmon program:

- Annual preliberation exam to confirm mark rate.
- Punchcard data will provide estimates of total harvest.
- Periodic evaluation of the economic benefits.
- Conduct appropriate health checks throughout incubation, rearing, and prior to release.
- Procedures for assessing stock status and risks will be developed.
- Data on adult return timing and spawning maintained by hatchery staff.
- Length frequency and size at release data will be maintained by hatchery staff.
- Releases made when and where scheduled.
- Fish health is certified prior to release.
- Appropriate protocols will be followed for monitoring water quality.
- Screens will be checked on a regular basis.
- Maintain accurate collection data for spring Chinook and Coho Salmon at Cole

Rivers Hatchery.

SECTION 12. RESEARCH

12.1) Objective or purpose

No research program is planned under the Rogue River spring Chinook Salmon hatchery program at this time. Projects to improve performance of the program may be implemented in the future by ODFW and/or volunteers in the Salmon and Trout Enhancement Program (STEP).

12.2-12.12) Not applicable to the Rogue River spring Chinook Salmon hatchery program.

SECTION 13. ATTACHMENTS AND CITATIONS

Citations:

Everest, F.H. 1973. Ecology and Management of Summer Steelhead in the Rogue River. Fishery Research Report Number 7, Oregon State Game Commision Final Report.

Jacobs S., J. Firman, G. Susac, D. Stewart and J. Weybright 2002. Status of Oregon coastal stock of anadromous salmonids, 2000-2001 and 2001-2002; Monitoring Program Report Number OPSW-ODFW-2002-3, Oregon Department of Fish and Wildlife, Salem, Oregon.

Jepsen, D.B. and Rodgers, J.D. 2004. Abundance Monitoring of Juvenile Salmonids in Oregon Coastal Streams, 2002-2003. Monitoring Program Report Number OPSW-ODFW-2003-1, Oregon Department of Fish and Wildlife, Salem, Oregon.

ODFW. 2005. Oregon Native Fish Status Report 2005 Public Draft. Oregon Department of Fish and Wildlife, Salem, Oregon.

ODFW, 2007. Rogue Spring Chinook Salmon Conservation Plan. Oregon Department of Fish and Wildlife, Salem, Oregon.

Olsen, D., J.Richards, C. Carter, R. Jones, and R. Baxter, 1994. Rogue River Sport Fisheries Economic Valuation Study, Rogue Valley Council of Governments.

Vogt, J. 2004. Upper Rogue Smolt Trapping project, 2004. Oregon Department of Fish and Wildlife, Central Point, Oregon.

Personal Communications

Chuck Fustish. Discussion of hatchbox fry releases, January 5, 2008. Oregon Department of Fish and Wildlife, Salem Oregon.

John Leppink. Email message with ODFW punchcard harvest estimates, February 28, 2008. Oregon Department of Fish and Wildlife, Salem Oregon.

Mark Lewis. Email message with Rogue coho summary table, January 29, 2007. Oregon Department of Fish and Wildlife, Corvallis Oregon.

Mike Evenson. Email message on corrected table of Elk Creek Trap data, March 26, 2008. Biologist, Rogue FishBio Services, Inc.

Rene Pellisier. Email message on Gold Ray coho data, August 11, 2008. Gold Ray fish counter, Oregon Department of Fish and Wildlife, Central Point Oregon.

Tom Satterthwaite. Email message on preliminary cohort analsyis associated with spring chinook production at Cole Rivers Hatchery, December 26, 2008. Fishery Biologist, Oregon

Department of Fish and Widlife, Grants Pass Oregon.

SECTION 14. CERTIFICATION LANGUAGE, SIGNATURE OF RESPONSIBLE PARTY.

"I hereby certify that the information provided 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: Russell Stauff, Rogue Watershed District Manager, West Region, ODFW

Signature of Applicant: _____ Date:_____

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

Signature: _____ Date: _____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Coho Salmon ESU/Population: SONCC/Rogue Basin				
Activity: Propagation of spring Chinook Salmon (stock-52)				
Location of hatchery activity: Cole Rivers Hatchery, Rogue River Basin				
Dates of activity: April 15 - Oct 15 Hatchery program operator: ODFW				
	Annual Take of Listed Fish By Life Stage (*Number of Fish*)			
Type of Take	Egg/Fry	Juvenile/ Smolt	Adult	Carcass
Observe or harass a)	0	0	0	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	0	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	0	0	0	0
Other Take (specify) h)	0	0	0	0

Note: No take of listed Coho Salmon is expected during Rogue River spring Chinook Salmon propagation program.

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

Instructions:

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

Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as "fishery enhancement".

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: depensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as "supplementation".
Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR).*

Natural origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery, natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance, and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see “Population”).

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

(generally from Washington Department of Fish and Wildlife, November, 1999).

	SPECIES/AGE CLASS	SIZE CRITERIA Number of fish/pound	SIZE CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Fingerling	>20 to 150	3 to <23
X	Chinook Fry	>150 to 900	0.5 to <3
X	Chinook Unfed Fry	>900	<0.5
X	Coho Yearling 1/	<20	>=23
X	Coho Fingerling	>20 to 200	2.3 to <23
X	Coho Fry	>200 to 900	0.5 to <2.3
X	Coho Unfed Fry	>900	<0.5
X	Chum Fed Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 800	0.6 to <23
X	Sockeye Fall Releases	<150	>2.9
X	Sockeye Fry	> 800 to 1500	0.3 to <0.6
X	Sockeye Unfed Fry	>1500	<0.3
X	Pink Fed Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fingerling	>20 to 150	3 to <23
X	Steelhead Fry	>150	<3
X	Cutthroat Trout Yearling	<=20	>=23
X	Cutthroat Trout Fingerling	>20 to 150	3 to <23
X	Cutthroat Trout Fry	>150	<3
X	Trout Legals	<=10	>=45
X	Trout Fry	>10	<45

1/ Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.
2/ Sockeye yearlings defined as meeting size criteria and 1 year old.