HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Umpqua River Spring Chinook Salmon Program**
Species or Hatchery Stock:	**Spring Chinook Salmon *Oncorhynchus tshawytscha* (Stock-55)**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**Umpqua Watershed District, West Region**
Date Submitted: **First Update Submitted:**	**January 27, 2006** **August 23, 2016**
Date Last Updated:	**August 23, 2016**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Rock Creek Hatchery, Umpqua River Spring Chinook Program (stock-55)

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

Spring Chinook Salmon *Oncorhynchus tshawytscha* (stock-55). Spring Chinook Salmon in the Umpqua Watershed are currently not ESA listed population.

1.3) Responsible organization and individuals.

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Hatchery Contact:

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

- Umpqua Fishermen's Association—provides assistance with spawning of adult fish.

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

Funding for this program is 50% State General Funds and 50% Federal Funds. Rock Creek Hatchery has a staff of 5 permanent full-time employees and seasonal employees that vary

based on the need for property guards and fin clippers. Table 1.1 shows the budget for the spring chinook program at Rock Creek Hatchery for the past five years.

Table 1.4-1. **Annual Program Budget and percentage of budget spent on spring Chinook Salmon program.**

Year	Total Budget	(Species) Budget	Percent of Total
1999	$343,507	CHS	41%
2000	$372,504	CHS	44%
2001	$372,504	CHS	44%
2002	$396,996	CHS	52%
2003	$352,000	CHS	57%

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

Current Facilities

- *Winchester Dam trap site*—Located at RM 7 on the North Umpqua River, a tributary to the mainstem Umpqua River, Oregon. Winchester Dam is used to count the number of Chinook Salmon migrating into the North Umpqua and is used as a capture facility for broodstock. Watershed Code—1600200000.

- *Rock Creek Fish Hatchery*—Located at RM 36 on Rock Creek, a tributary to the North Umpqua River. The hatchery is located on 26.5 acres of land 23 miles East of Roseburg, Douglas County, Oregon with a legal description of latitude 43º 20' 07" and longituded 123º 00' 05". Spring Chinook Salmon swim into the hatchery volitionally and can be captured for broodstock, used for food bank programs or used for nutrient enrichment programs. Chinook Salmon are reared at Rock Creek Hatchery thus acclimated to Rock Creek. They are released volitionally from the hatchery's rearing ponds into Rock Creek. Watershed Code---1600202000.

Spawning, Egg Incubation and Rearing

Spring Chinook Salmon broodstock are spawned at Rock Creek Hatchery and Rock Creek Hatchery is used for incubation and rearing.

Release Sites

Hatchery spring Chinook Salmon smolts are released volitionally from Rock Creek Hatchery's rearing ponds into Rock Creek during October and February.

1.5) Type of Program.

The Umpqua spring Chinook Salmon program is an integrated harvest program.

1.7) Purpose (Goal) of program.

As an integrated harvest program, this program provides significant numbers of adult spring Chinook Salmon for the Umpqua River main-stem and North Umpqua River recreational fisheries, plus commercial and sport fisheries in the ocean. To accomplish harvest and escapement goals, the ODFW has a goal of 4,000 to 7,000 spring Chinook Salmon adults annually passing the Winchester Dam. To reach this adult return goal, the program annually releases approximately 342,000 smolts. This integrated program also aims to produce fish that are genetically similar to naturally-produced fish by incorporating natural fish into broodstock each year.

1.8 Justification for the program.

This program was adopted through a public basin planning process (North Umpqua Basin Plan 1986). It has minimal impact on ESA-listed natural Coho Salmon, while providing adult returns of hatchery spring Chinook for a popular and intensive commercial and recreational fishery. Program fish not harvested are allowed to spawn naturally with naturally producing Chinook Salmon. Based on ODFW freshwater creel surveys and Winchester Dam returns, adult spring Chinook Salmon migrate to the Umpqua basin from late February through August. This migration of spring Chinook is prior to arrival and spawning of listed natural Coho Salmon in the basin in October through January. This temporal difference reduces the potentials for negative impacts to adult Coho Salmon from spring Chinook Salmon angling activities and broodstock collection. In addition, tackle used in the spring Chinook recreational fishery is generally too large to catch emigrating Coho Salmon juveniles. Also, all hatchery-produced Chinook Salmon are mass-marked which will be easy to identify during harvest and detect their presence in the natural spawning grounds.

1.8) List of program "Performance Standards", 1.10) List of program "Performance Indicators" 1.10.1) Performance Indicators—Benefits

BENEFITS Performance Standards	BENEFITS Performance Indicators	BENEFITS Monitoring & Evaluation
Provide hatchery spring Chinook Salmon to augment recreational and commercial harvest.	• Release approximately 342,000 spring Chinook Salmon smolts annually. • Expected 4,000 to 7,000 adult Chinook Salmon returns and cross Winchester Dam annually. • Program fish are harvested in the ocean and freshwater fishery.	• All releases are properly documented. • Annual Winchester Dam counts are used to monitor Chinook Salmon abundance and population trends. • Harvest rates of program fish are estimated in ocean and freshwater fisheries.
Program Chinook Salmon are	• All juveniles released will be marked.	• Verify with mark efficiency checks that

identifiable.		proper marking quality goals are being met. • Quantify the number of marked fish released and observed in the fishery to evaluate survival rates, escapement, and contribution to the fishery.
Healthy, full-term smolts of spring Chinook Salmon are released.	• Smolt release groups will meet ODFW health standards. • Use volitional release methods.	• Conduct appropriate disease checks throughout rearing and prior to release. • Document size and indicators of smoltification prior to release.
Collection of spring Chinook Salmon broodstock does not impact listed natural Coho Salmon.	• Temporal differences between adult spring Chinook and Coho Salmon return run times are maintained. • No Coho Salmon are trapped during spring Chinook Salmon brood collections.	• Monitor the passage of all fish species and fish at Winchester Dam to ensure no Coho are present during the April - June spring Chinook broodstock collection period. • If an adult Coho is documented in the Winchester Dam trap during April - June, it is allowed free-passage.
Adults from program releases return to Rock Creek Hatchery in sufficient numbers to meet in-hatchery needs.	• Returning program fish can be used to help meet broodstock needs. • Returning program fish can be used to meet other ecological or societal benefits.	• Document the number of hatchery fish used for spawning. • Document the number of returning hatchery fish used for stream enrichment, food bank, or other programs.
RISKS **Performance Standards**	**RISKS** **Performance Indicators**	**RISKS** **Monitoring & Evaluation**
Life history characteristics of program fish will not diverge significantly from wild spring Chinook Salmon.	• Releases of program smolts mimic the emigration of naturally produced Chinook Salmon. • Smolts are acclimated to Rock Creek Hatchery.	• Appropriate downstream monitoring techniques will be periodically used monitor juvenile migration, size, and smoltification. • Smolts will be reared for

	• Run timing of adult program fish does not differ from run timing of naturally produced fish. • Behavioral and morphological characteristics of program fish are similar to naturally produced Chinook Salmon. • Broodstock collection and spawning is random and reflects the natural timing and age classes represented in the Chinook Salmon population. • Wild origin Spring Chinook Salmon will be incorporated into the broodstock in an effort to maintain genetic diversity within the hatchery-produced population, and minimize genetic difference between hatchery- and natural-origin Chinook Salmon.	at least 1 month on Rock Creek/North Umpqua water for smoltification and size of fish will be noted before the volitional release. • If funding and technology become available, sample returning natural and hatchery broodstock for genetic characteristics and/or environmental factors such as chemical concentrations and toxicology issues. May also sample hatchery juveniles or eggs. Samples (tissue, scale, organ, etc.) would be determined by the best science available used for the evaluation. • Counts at Winchester Dam will be used to verify run times of program and naturally produced Chinook Salmon. • Size and sex of Chinook Salmon passing Winchester Dam will be used to document morphological characteristics of program and natural Chinook. • A program to periodically sample hatchery juveniles and returning adults for phenotypic and genotypic characteristics to measure similarities/differences to naturally produced Chinook Salmon will be developed.
Releases of program juveniles have a minimum impact on native wild Coho Salmon juveniles.	• Based on developmental characteristics, program fish will be released in October and February, prior to the March - June	• Appropriate downstream monitoring will be periodically conducted for program fish and Natural Coho Salmon in the basin.

	emigration of Coho Salmon juveniles.	
Adult hatchery Chinook Salmon will meet the criteria provided by the Native Fish Conservation Policy for hatchery fish management.	• Based on the Conservation Plan and Hatchery Management Policy, an appropriate Hatchery Management Plan will be developed.	• Periodically conduct spring Chinook spawning ground surveys to document the number of hatchery and naturally produced Chinook. • Develop a program to use methods such as radio-telemetry to document the distribution of program and natural Chinook in the basin when financially feasible. • Continue to document ESA listed Coho Salmon adult run timing and spawning habitat use to document the temporal and spatial separation of spring Chinook and Coho Salmon.
Harvest of program Chinook Salmon has a minimal impact on native listed Coho Salmon.	• A temporal difference in run timing reduces potential impacts to returning adults. • Hook sizes used for harvesting Chinook are generally too large to cause incidental capture or mortality of juvenile Coho Salmon.	• Use Winchester Dam fish counts to document the run times of returning spring Chinook and Coho Salmon. • Conduct periodical creel surveys to document incidental catch of Coho during the spring Chinook Salmon season. • Review the angling regulations to ensure seasons and tackle limitations reduce potential impacts to Coho.
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 NPDES guidelines for water quality. • Hatchery intake operations	• Fish health is regularly monitored to avoid the introduction of new pathogens or significant levels of existing pathogens. Fish health is certified prior to release. • Appropriate reports will be filed to document regular

	are appropriately screened and maintain adequate instream flows to avoid impacts to fish.	sanitation and maintenance activities. • Appropriate protocols will be followed to monitor water quality standards for fish health and facility effluent. • Monitor the daily stream flows between the facility intakes and outflow so flows can be appropriately adjusted for fish passage and water temperature.

1.11) Expected size of program.

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

To achieve the release goal of approximately 342,000 smolts, 155-195 pairs of North Umpqua River spring Chinook Salmon will be collected annually for brood. In recent years, 5-20% of the broodstock collected were naturally-produced fish.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs	N/A	
Unfed Fry	N/A	
Fry	N/A	
Fingerling	N/A	
Yearling	Rock Creek Hatchery	342,000

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

- Creel surveys of spring Chinook Salmon recreational fishery conducted on the North Umpqua during 1998-2000 above Winchester Dam estimated a sport harvest of approximately 20% and a spawning escapement of 80%. Minimal spawning is thought to occur below Winchester Dam.
- The upper reaches of the South Umpqua River also support a population of a few hundred naturally-produced spring Chinook Salmon (per information generated through the South Umpqua spring Chinook Resting Pool Inventory Project).
- Adult hatchery-origin spring Chinook Salmon production has ranged from 1,762 to

17,435 with an average return of 5,386. These numbers are from the ODFW Winchester Dam counting station. The total counts since 1992 were made using a video camera. The adult production/return target is 4,000 - 7,000 fish crossing the Winchester Dam.

Table 1.12-1. Estimated Umpqua Hatchery Spring Chinook Salmon Smolt-To-Adult Escapement Rate to North Umpqua River

Smolt Year	Hatchery Smolt Releases*	Estimated Hatchery Adult Escapement	Hatchery Smolt To Adult Escapement Rate (%)**
1988	327,000	3010	N/A
1989	309,847	1791	N/A
1990	327,941	1620	N/A
1991	297,777	1410	0.43
1992	302,188	1978	0.64
1993	303,090	1699	0.52
1994	298,846	2020	0.68
1995	308,470	2867	0.93
1996	247,660	1786	0.59
1997	403,412	2007	0.66
1998	399,938	2338	0.78
1999	424,492	3642	1.47
2000	412,377	7366	1.83
2001	400,000	11,647	2.91
2002	410,432	13,948	3.29
2003	418,051	9810	2.38
Averages	340,217	4309	1.08

*Smolt releases are grouped by brood year.
**Estimates obtained by dividing adult hatchery returns to Winchester dam by the number of hatchery smolts released three years earlier. ODFW scale analysis estimates 75% of hatchery adult Umpqua River spring Chinook Salmon return at age four.

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

The Umpqua River spring Chinook Salmon program began in 1950 and has been ongoing to this date.

1.14) Expected duration of program.

The Umpqua spring Chinook Salmon program is ongoing and expected to will continue.

1.15) Watersheds targeted by program.

The Umpqua River spring Chinook Salmon program is targeted at the North Umpqua River

and mainstem Umpqua River basins.

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.

Current key issues with the spring Chinook Salmon program in respect to listed natural Coho Salmon are the impacts of hatchery Chinook Salmon smolts on naturally produced Coho juveniles, the incidental take of adult coho during spring Chinook Salmon broodstock collection and competitive interactions for food and space between hatchery-produced juveniles/smolts and naturally-produced Coho Salmon juveniles within the basin. Given the temporal differences between Coho and Chinook Salmon juvenile out-migration and adult return times, the potential impacts during emigration and adult collection are minimal.

Management of hatchery- and naturally-produced Chinook Salmon on the spawning grounds will follow the guidelines set by the Native Fish Conservation Policy and subsequent Conservation and Hatchery Management Plans. In recent years up to 100% of the spring Chinook used for broodstock have been naturally produced fish to minimize genetic differences between hatchery and natural fish. Most program fish return to Rock Creek. Spatially, some Coho Salmon use Rock Creek for spawning, but this impacts less than 13 miles of the 173 miles of Coho Salmon spawning habitat available in the North Umpqua basin.

1.16.2) Potential Alternatives to the Current Program.

The alternatives are drafts only and not necessarily endorsed by the implementing agency.

Alternative 1. Eliminate Spring Chinook Salmon Hatchery Program.

Pros: Eliminating the spring Chinook Salmon hatchery program would eliminate any potential risks to native wild Coho due to interactions between the two species. It would also eliminate the need to collect naturally produced Chinook Salmon for brood. Based on funding levels and other program objectives, the elimination of the spring Chinook Salmon program could allow other hatchery programs at Rock Creek to expand due to the increased availability of rearing space.

Cons: If the hatchery program was eliminated, the goals of the ODFW North Umpqua Fish Management Plan (1986) would no longer be met. The elimination of the program would also reduce the current ocean and freshwater fishery. The spring Chinook Salmon run consists of 50-60% hatchery returns. By eliminating more than half of the returns we estimate the mainstem Umpqua River fishery would be reduced by approximately 60% and the North Umpqua fishery would be reduce up to 70% (destination of Rock Creek Hatchery fish). This would reduce economic revenue to Douglas County communities which rely on anglers' dollars. Communities which would be negatively impacted include Reedsport, Scottsburg, Elkton, Roseburg, and Glide. Eliminating the hatchery Chinook Salmon program would direct all of the freshwater harvest pressure to the naturally produced spring

Chinook Salmon population. This could lead to a decline in the natural population, a more restrictive fishery or closure of the freshwater spring Chinook Salmon fishery.

This basic alternative could also be modified to reduce the smolt allocation. The same pros and cons would apply, although the impacts would vary by the degree that the program was reduced. Since hatchery Chinook Salmon already have a minimal impact on native wild Coho Salmon, the greatest negative impact in reducing the smolt allocation would be to the ocean and freshwater fishery, the economic benefit of the program to various communities, and the increase in harvest pressure on naturally produced Chinook Salmon.

Alternative 2. Increase the production of Umpqua Spring Chinook Salmon and create a downstream acclimation site.

Pros: Prior to 1999, the smolt releases did not meet the goal of 4,000-7,000 adult hatchery spring Chinook Salmon returns (1986 ODFW North Umpqua Fish Management Plan). Smolt allocations were increased in 1998 and the resulting hatchery-adult returns have reached and surpassed the current adult return goals. Increasing smolt allocations above the current level and creating a downstream acclimation site would increase freshwater fishering opportunities and create another popular angling area. Increased hatchery adults would provide additional sport and commercial harvest, and would provide freshwater anglers increased opportunities to catch spring Chinook Salmon.

Cons: An increase in smolt allocations would result in a need for additional adult broodstock collection and holding capacity. Increasing the number of wild fish used for broodstock could impact the number of wild fish spawning naturally. Due to potentially lethal water temperatures during the summer, the downstream acclimation site should also include a trap to remove potential surplus fish. Spring Chinook Salmon holding downstream could stray into areas currently used for spawning by fall Chinook, or with the small wild spring Chinook Salmon population in the South Umpqua.

Alternative 3. Release all smolts at downstream acclimation sites, protect all naturally produced spring Chinook Salmon and remove all hatchery spring Chinook Salmon at Winchester Dam.

This alternative would create a naturally produced spring Chinook Salmon sanctuary above Winchester Dam. To implement this alternative, off site acclimation sites in the mainstem Umpqua River below Winchester Dam, below the spawning areas of naturally produced spring Chinook Salmon, would have to be constructed. A catch and release fishery on unmarked spring Chinook in both the mainstem and North Umpqua Rivers would have to be established to protect naturally produced chinook. All spring Chinook Salmon passing Winchester Dam would have to be sorted to remove hatchery spring Chinook. Additional sorting and removal could occur at the Rock Creek Hatchery fish ladder.

Pros: Down stream acclimation and removal of hatchery fish would decrease the number of hatchery spring Chinook that enter the North Umpqua River. A catch and release fishery on unmarked spring Chinook Salmon would increase the number of naturally produced Chinook on the spawning grounds. Downstream acclimation sites would provide an additional fishing opportunity for mainstem Umpqua River anglers since the returning adults would stay in the mainstem fishery an extended period of time. Rearing ponds presently

used for spring Chinook Salmon smolts at Rock Creek Hatchery would be available for other district programs. Interactions between naturally produced Coho Salmon and hatchery Chinook Salmon in the North Umpqua River would be reduced.

Cons: For the cost, construction and personnel necessary to build and operate downstream acclimation sites, this alternative does not provide a significant reduction in impacts to native wild Coho Salmon compared to the current program. The additional handling of hatchery and naturally produced fish at Winchester Dam and Rock Creek Hatchery would likely cause handling mortality to some natural Chinook. Unless acclimation sites could trap surplus adults, warm summer water temperatures could be lethal to Chinook Salmon holding downstream. Spring Chinook holding downstream could potentially stray into streams currently used for spawning by fall Chinook. A catch and release fishery on unmarked spring Chinook Salmon would be overly restrictive compared to current regulations. This alternative would also fail to meet the goals established by the North Umpqua Management Plan (1986).

1.16.3) Potential reforms and investments.

Reform/Investment for Alternative 1: To allow closure of the spring Chinook Salmon hatchery program the Coastal Multi-Species Conservation and Management Plan and the North Umpqua Management Plan would need to be revised to reflect this closure. There would be a negative economic impact to the communities of Reedsport, Scottsburg, Elkton, Roseburg, and Glide through the closure of this program. These communities would likely request another hatchery program to replace the spring chinook program. The cost is unknown.

Reform/Investment for Alternative 2: Since rearing space at Rock Creek Hatchery is limited, the additional smolts would require a reduction in another district program, construction of additional rearing ponds at Rock Creek Hatchery or rearing the smolts at the acclimation site. A suitable downstream acclimation site would have to be identified, purchased and constructed. Obtaining water or a water right for the acclimation facility could be a long and costly procedure, especially if the site was also used for rearing during the summer. Additional personnel would be necessary to operate the acclimation site. Total costs for this alternative would be high, but cannot be estimated until more precise acclimation site and water rights information is known.

Reform/Investment for Alternative 3: The current Coastal Multi-Species Conservation and Management Plan and the North Umpqua Management Plan would need to be rewritten and approved to accommodate this alternative. Current fishing regulations would have to be changed to create a catch and release fishery. Suitable downstream acclimation sites would have to be identified, purchased, constructed, plumbed with water and staffed. This would have the same difficulties as previously discussed. This could be potentially multiplied by the need for more than one acclimation site. In addition, the fish trap at Winchester Dam and Rock Creek Hatchery would have to be staffed from March through August to allow sorting and removal of hatchery fish. Total cost is unknown.

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

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

Rock Creek Hatchery has been operating under an incidental take permit (number 1017) for Umpqua Cutthroat Trout, which were classified as endangered under the Federal Endangered Species Act in 1995. Cutthroat Trout were removed from the federal ESA list in April 2000 and subsequently the Oregon Department of Fish and Wildlife withdrew its application for the incidental take permit.

This program also operates under FERC license 7161 issued to Douglas County for operation of the Galesville Dam project (1984 – 2034). Rock Creek Hatchery also has permit NWP-2002-132/5; NMFS No. 2011/03901 for the operation and annual June cleaning of their intake pipe. This permit allows the excavation of 100 cubic yards of gravel and sand to clear the fish hatchery intake. The project is located at North Umpqua River Mile 35.7 approximately 150 feet upstream of the confluence with Rock Creek. Work is performed from the adjacent shoreline bar with an excavator. As per National Marine Fisheries Service requirements, aggregate is returned to the river system by spreading materials over the adjacent gravel bar. For additional requirements, see permit NWP-2002-132/5.

The HGMP for the Umpqua River spring Chinook Salmon program was submitted to NMFS on 01/27/2006 for approval and ESA coverage. This is an updated version of the previously submitted HGMP.

Water right permits for the hatchery include: S 5890, S 8896, S 12003 and S 17680 for water from Rock Creek, and S 41447 for North Umpqua water.

The hatchery is operated under the NPDES general permit 300-J to comply with the federal Clean Water Act.

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

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

The ESA listed Oregon Coast Coho Salmon ESU may be affected by this hatchery program, particularly the Coho Salmon populations within the Umpqua River Basin. The following are a brief description of the habitat and the affected population(s):

Umpqua Population Stratum

The OCCCP (2007) uses the population delineations identified by the Oregon Coast Workgroup of NOAA's Oregon-Northern California Technical Recovery Team (TRT). The TRT identified a geographic stratum of Coho Salmoin populations in the Umpqua River Basin that includes the following populations: Lower Umpqua, Middle Umpqua, North Umpqua and South Umpqua. There are estimated 1,489 miles of spawning habitat available to Coho Salmon inhabiting this population complex.

Coho Salmon Life History

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

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

Table 2.2.1. Observations of coho salmon sex ratios at adult traps.

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

The smolts undergo rapid growth in the ocean, reaching about 40-50 cm by fall. Little is known of the ocean migrations of Coho Salmon from Oregon coastal streams; however, it appears migrations are mostly limited to coastal waters. Initial ocean migration appears to be to the north of their natal stream (Fisher and Pearcy 1985; Hartt and Dell 1986). After the first summer in the ocean, a small proportion of males attain sexual maturity and returns to spawn as jacks. Migration patterns during the fall and winter are unknown. Those fish remaining at sea grow little during winter but feed voraciously during the next spring and summer, growing to about 60-80 cm in length. During this second summer in the ocean, certain percentage of maturing adults are caught in ocean troll and sport fisheries, usually to the south of their natal stream (Lewis 2000). The survivors return to their home streams or neighboring streams where they spawn and die to complete the life cycle.

Habitat Use and Freshwater Distribution

Spawning and rearing of juvenile Coho Salmon generally take place in small, low gradient (generally <3%) tributary streams, although rearing may also take place in lakes where available. Coho Salmon require clean gravel for spawning and cool water temperatures for rearing. Fifty-three to 58°F is preferred, with 68°F being the maximum (Reiser and Bjornn 1979). Fry emerge from February to early June (Moring and Lantz 1975) and occupy

backwater pools and the stream margins (Mundie 1969; Lister and Genoe 1970; Nickelson et al. 1992a). In summer, Coho Salmon fry prefer pools in small streams, whereas during winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex cover (Nickelson et al. 1992a, 1992b). Complexity, primarily in the form of large and small wood, is an important element of productive Coho Salmon streams (Nickelson et al. 1992b; Rodgers et al. 1993). Little is known about residence time or habitat use of estuaries during seaward migration. It is usually assumed that Coho Salmon spend only a short time in the estuary before entering the ocean. However, recent research is finding that rearing in the upper ends of tidal reaches can be extensive.

The distribution of Coho Salmon within a basin is primarily determined by two factors: marine survival, and the distribution of freshwater habitat of different levels of quality. When marine survival has been very poor, Coho will be found in only the highest quality habitats. Coast-wide, high quality environments comprise about 22% of available habitat (Nickelson 1998). When marine survival increases, as could occur with a changing climate regime, Coho Salmon will redistribute into freshwater habitats of lower quality. Thus Coho Salmon population dynamics function with a classic "source-sink" relationship among stream reaches.

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

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

According to the OCCCP (2007) the overall Umpqua stratum passed the viability analysis. The North Umpqua as an individual population failed due to the hatchery influence. The North Umpqua program has subsequently been discontinued and Coho Salmon numbers have increased. Gray et al. (2011) noted that to reach current full seeding in the Umpqua basin, 29,400 spawners would be necessary. As illustrated in Figure 2.2.2a, the Umpqua has generally met or surpassed the number of spawners necessary for fully seeding the basin and has averaged 42,656 returning adults during the last 12 years.

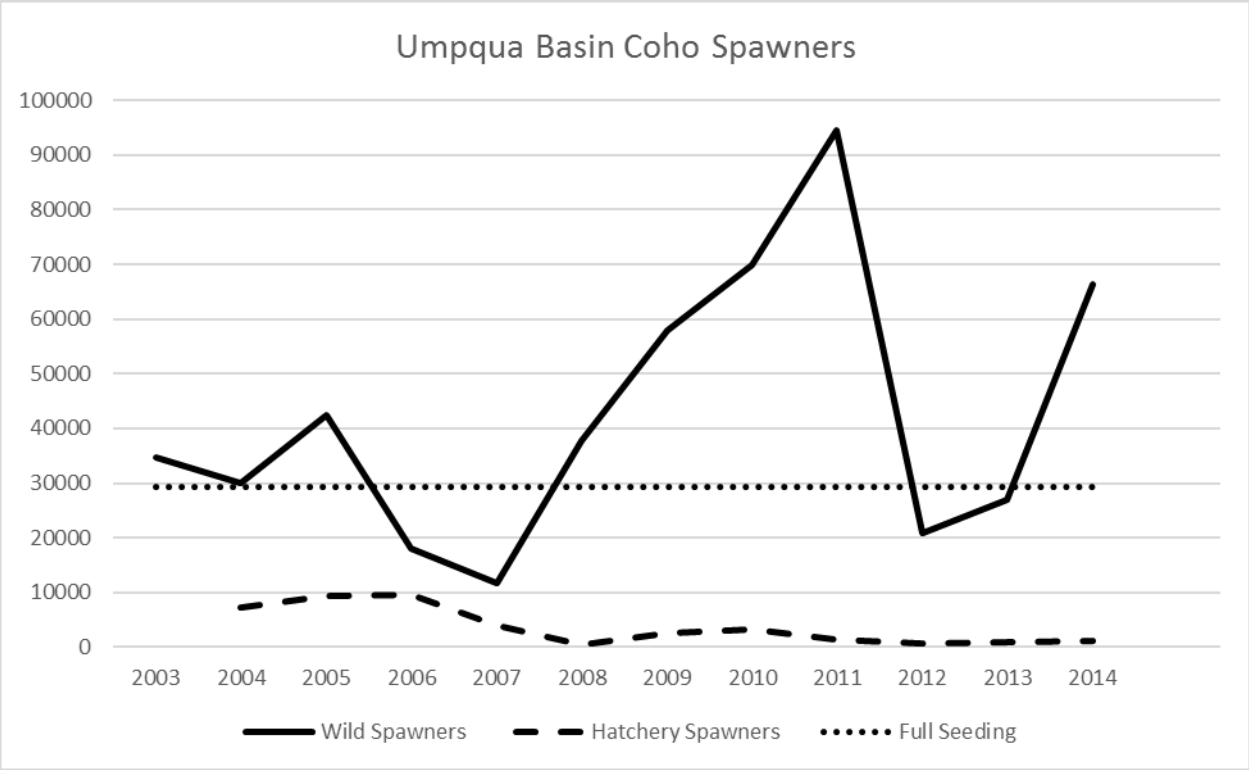

Figure 2.2.2a. The abundance of listed natural Coho Salmon spawners in the Umpqua Basin (2003-2014) showing a marginal line for full seeding levels.

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

Figure 2.2.2b illustrates the number of recruits per spawner in the South Umpqua basin. This data is available from the Salmon and Steelhead Recovery Tracker link on the ODFW website. The South Umpqua is presently averaging about 2.1 recruits per spawner. Data for the North Umpqua is not presented since the newest data does not include 2008 to the present. Data from 2008 onward reflects the current status of the North Umpqua basin since the hatchery program was discontinued.

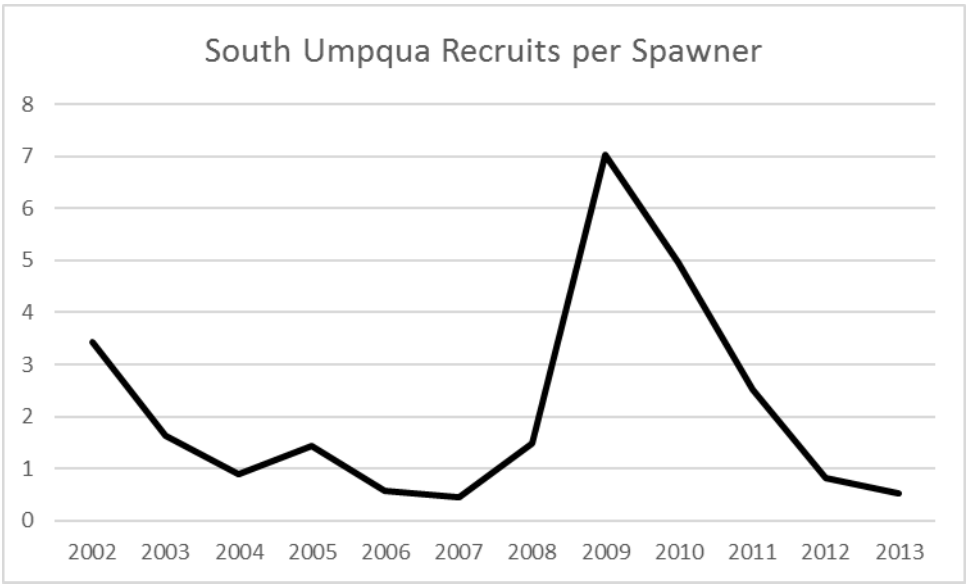

Figure 2.2.2b. Number of recruits per spawner of Coho Salmon for the South Umpqua basin, 2002-2013.

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

The Umpqua River has generally met or surpassed the number of spawners necessary for fully seeding the basin and has averaged 42,656 returning adults during the last 12 years (see Figure 2.2.2a).

-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.

The number of spawning adults in the South Umpqua has increased in recent years and from 2003 to 2014 averaged 15,295wild coho and 662 hatchery Coho Salmon (Figure 2.2.2c). According to OASIS spawning ground data (M. Lewis pers.com and http://odfw.forestry.oregonstate.edu/spawn/reports.htm) hatchery influence has ranged from 0% to 13% of the population and has averaged 4.6% since 2004. This is well within the goals of the NFCP (2003), OCCCP (2007) and HMP (2003) plans. Since the hatchery program for this basin fulfills a specific mitigation goal of releasing 60,000 smolts, this stray rate should continue to remain low and meet the department's program goals for stray rates. Per NEQ seeding levels noted by Gray et al. (2011), the South Umpqua population has also met or exceeded reaching 75% of the seeding needs of the basin in most years (Figure 2.2.2c). Persistence estimates in 2007 (ODFW Salmon and Steelhead Recovery Tracker) show a high probability of all of the Umpqua's populations persisting into the future. The Lower Umpqua had an average probability of 0.993, Mid Umpqua 0.992, North Umpqua 0.976, and South Umpqua 0.997. Again, these data for the North reflect the time period prior to the hatchery program being discontinued.

The proportion of hatchery-origin spring Chinook Salmon spawners (pHOS) in the North Umpqua, above Rock Creek, has been 11.5% on average over the past 12 years. This information is based on carcass counts in the upper North Umpqua.

The proportion of hatchery-origin spring Chinook Salmon spawners (pHOS) in Rock Creek, above the acclimation site, from 2004-2015 equaled 96.20% on average. This information is based on snorkel counts that are completed every fall. This number is expected to decrease into the future as modifications to the fish ladder have been made in recent history and it is now possible to remove hatchery origin fish prior to them making it onto the spawning grounds.

The stray rate for the South Umpqua above Tiller, OR from 2010-2014 (most recent) has averaged 2.4%. This data is based on snorkel counts that are completed in resting pools during the summer. It is assumed that these percentages translate into pHOS values due to the fact these fish spawn near where they hold throughout the summer.

Due to the fact these spring Chinook Salmon do not spawn during the same time period as Coho Salmon it is not expected that competition for suitable spawning habitat is taking place between these two species. Progeny of spring Chinook Salmon may compete with Coho Salmon juveniles for rearing space and food.

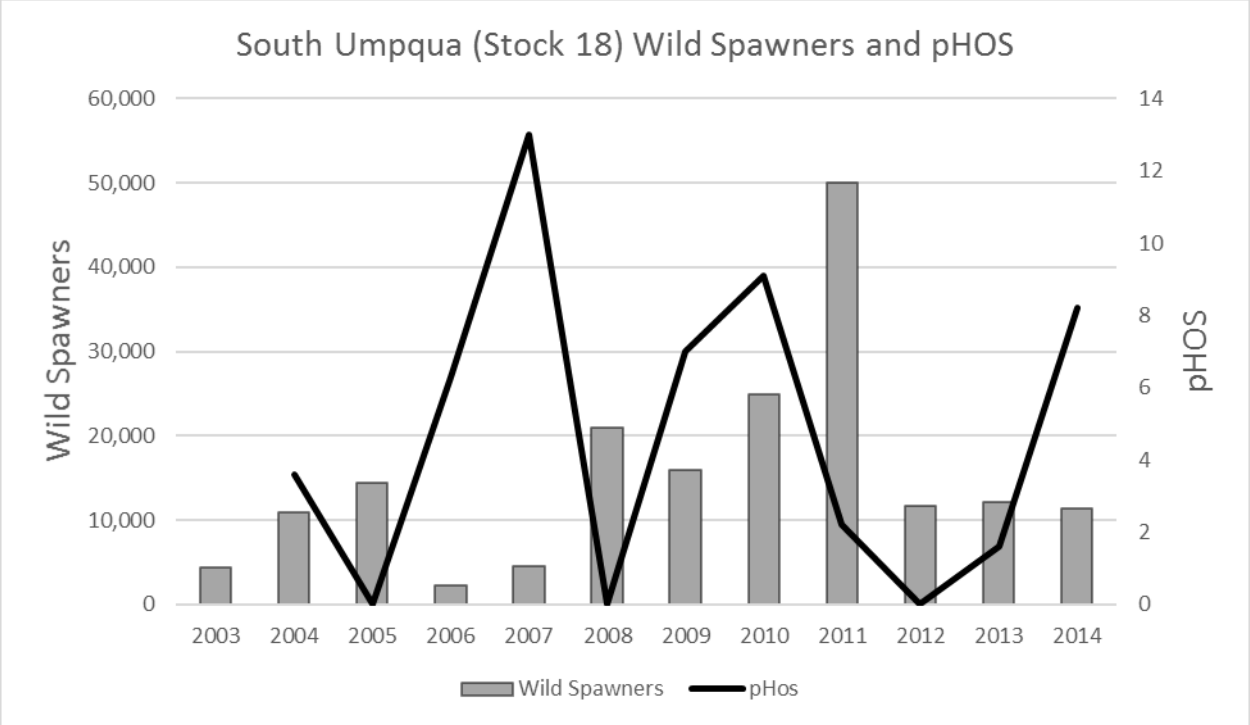

Figure 2.2.2c. The number of wild and hatchery Coho Salmon in the South Umpqua basin compared to NEQ seeding levels.

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

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

Winchester Dam

Winchester Dam is the primary collection site for the spring Chinook Salmon brood stock. Upstream migrating fish pass over Winchester Dam via a fish ladder in which a fish counting station is located. The dam may cause some brief delays in fish passage while salmon find the entrances to the fish ladder. The count station does not impede fish passage unless the fishway is blocked, at which time salmon are shunted into a fish capture holding facility. Fish may be held in the holding facility for a maximum of 48 hours until loaded by net and hydraulic lift onto a hatchery liberation truck for transport to Rock Creek hatchery for broodstock. Mortality rarely occurs in the holding facility and is less than 1% on a yearly basis. Wild adult Coho Salmon are not present in the North Umpqua during the April to August when spring Chinook Salmon broodstock collection occurs. Winchester Dam or the fishway does not appear to impede emigrating Coho Salmon smolts based upon years of trapping experience.

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

No wild Coho Salmon have been handled, injured, or killed during brood stock collection during the last ten years at Winchester Dam during spring Chinook Salmon trapping.

- Provide projected take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by type of take resulting from the hatchery program (e.g. Capture, handling, injury, or lethal take).

Wild adult Coho Salmon are not present in the North Umpqua River during the April to July which is the broodstock collection period for spring Chinook Salmon, therefore, no adult Coho Salmon are expected to be taken during this period. Winchester Dam or the fishway does not impede emigrating listed natural Coho Salmon smolts. Spring Chinook smolts are released volitionally from Rock Creek Hatchery in October and February, and move rapidly downstream to tidewater. Predation of juvenile Coho Salmon by hatchery spring Chinook Salmon smolts is unlikely due to the spatial separation of rearing Coho fry/juveniles and emigrating hatchery spring Chinook Smolts smolts.

See Table 2.2.3-1 for an estimated take levels of ESA listed Coho Salmon that may occur due to this program.

Table 2.2.3-1. Estimated listed salmonid take levels of by hatchery activity.

Listed or wild species affected: Coastal Coho ESU/Population: Coast Coho **Activity: Spring Chinook Salmon brood collection.**				
Location of hatchery activity: Winchester Dam Dates of activity: April to August **Hatchery program operator: Greg Huchko**				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	50-100	50	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	25	0
Capture, handle, tag/mark/tissue sample, & 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 h) specify	0	0	0	0

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migration 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, moralities 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.

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

The ODFW will continue to monitor the Winchester Dam counting station for the presence of listed natural adult Coho Salmon during the spring Chinook broodstock collection period. No take of adult Coho Salmon during this April to August period is anticipated. ODFW will pass over Winchester Dam any adult Coho Salmon encountered in the fishway during program broodstock collection efforts. Emigrating juvenile Coho are not handled at Winchester Dam, and pass downstream unimpeded. No take of juvenile or adult Coho Salmon is anticipated; if problems do occur, ODFW will modify spring Chinook Salmon broodstock collection procedures to reduce or eliminate incidental mortality of any listed natural Coho Salmon.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

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

Until May 2000, the North Umpqua River spring Chinook Salmon program was operated under a section 10 incidental take permit application for the hatchery programs in the Umpqua Basin for take of Umpqua River Cutthroat Trout. ODFW requested that this permit be withdrawn as a result of the delisting of the Umpqua Cutthroat Trout in April 2000. The Spring Chinook HGMP was initially submitted to NMFS (NOAA Fisheries) in March 2003. This program is currently operating under ODFW's Coastal Multi-Species Conservation and Management Plan (CMP) 2014, the Native Fish Conservation Policy and the Fish Hatchery Management Policy which were adopted by the ODFW in 2010.

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

1) Section 10 incidental permit number 1017 (withdrawn May 2000)
2) FERC permit number 7161 (Galesville Dam Project)
3) North Umpqua Settlement Agreement, June 2001
4) PacificCorp/OFWC Memorandum of Understanding, Waiver of Fish Passage March 2001
5) FERC License 1927 and OWRD
6) US Army Corps of Engineers permit number 2000-00552
7) ESA Section 7 consultation, biological opinion in cooperation with Roseburg and Coos BLM districts, Umpqua National Forest, Interagency fish population monitoring program, approved NMFS April 10, 1997
8) US Army Corps of Engineers- General Authorization permit number for improving fish habitat in Western Oregon
9) NPDES permit 300J for Rock Creek hatchery operations and DEQ Memorandum of Agreement regarding fish carcass distribution in Oregon streams.
10) ODFW Native Fish Conservation Policy, 2003
11) ODFW North Umpqua Management Plan, 1986
12) ODFW Fish Hatchery Management Policy, 2010
13) Oregon Plan for Salmon and Watersheds, 1997
14) ODFW Coastlal Multi-Sspecies Conservation and management Plan, 2014

3.3) Relationship to harvest objectives.

Harvest objectives for Umpqua spring Chinook Salmon have been approved by NOAA Fisheries under the section 7 consultation for the PFMC salmon management plan. Smolts raised in the hatchery program are 100% marked for identification in ocean and Umpqua basin fisheries. The current freshwater harvest estimate is meeting North Umpqua Management Plan objectives. Harvest benefits include a popular commercial and recreational fishery, the ocean and freshwater harvest of adult hatchery spring Chinook Salmon, and economic benefits to various communities such as Reedsport, Scottsburg, Elkton, Roseburg, and Glide.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Harvest rates for program fish are estimated at 20% in the ocean fishery (CWT data) and 25% in the freshwater fishery (creel data). Table 3.3.1-1 shows punchcard estimates of freshwater harvest of hatchery fish from 1985-1997. A creel program was conducted for Umpqua basin fisheries from 1998-2000. Angler access in the vicinity of the Rock Creek hatchery is excellent. A Douglas County park and an USDA Forest Service park span the mile of river including and immediately below the mouth of Rock Creek. This stretch of river includes several large, deep, holding pools where hatchery spring Chinook Salmon are intensely harvested during the recreational fishery.

Table 3.3.1-1. Hatchery Spring Chinook Salmon Harvest Data for the North Umpqua River Program.

Year	**Ocean Harvest	*Harvest Above Winchester Dam	*Harvest Below Winchester Dam	Total Inriver Harvest	Freshwater Harvest Rate (%)
1985	6505	430	508	938	14.3
1986	687	484	376	860	15.2
1987	694	618	498	1,116	14.4
1988	641	371	497	868	20.1
1989	1,166	370	332	702	27.3
1990	920	261	286	547	23.7
1991	80	174	563	737	31.7
1992	1,468	183	391	574	20.0
1993	1,128	332	712	1,044	36.9
1994	828	164	279	443	15.8
1995	287	413	1,131	1,544	32.7
1996	N/A	276	895	1,171	37.4
1997	N/A	226	480	706	23.6
1998	N/A	438	552	990	28.5
1999	N/A	694	589	1,283	25.0
2000	N/A	1,349	1232	2,581	24.7

*Punch card data from 1985-1997, creel data from 1998-2000

**Coded wire tag data, total ocean harvest by release year, not included in harvest rate.

3.4) Relationship to habitat protection and recovery strategies.

Wild Coho Salmon population in the Umpqua basin have declined over the past decades for a number of reasons including poor ocean conditions which negatively effect smolt survival, predation, lack of screening at irrigation diversions and pumps, degradation of sufficient suitable habitat (spawning gravel and large woody debris), and unfavorable natural conditions.

Habitat conditions appear to be improving in the Umpqua Basin as well as the ocean, which are benefiting survival of coho salmon. The mainstem North Umpqua River currently has very good salmonid habitat. Local watershed councils, in conjunction with federal and state agencies, are implementing numerous habitat improvement projects throughout the basin, including fencing riparian habitats, placing large woody debris in the streams, decommissioning roads, replacing culverts and improving fish passage. The Department of Fish and Wildlife has an active screening program, which has screened 45 irrigation pumps in the Umpqua Basin. Wider buffer strips to protect riparian areas and streams have also been established by the U.S. Forest Service, BLM, Northwest Forest Plan and the Oregon Forest Practices Act. Ocean conditions have also improved during 2001-2004 which has improved smolt survival and increased adult growth.

3.5) Ecological interactions.

(a) Species that could negatively impact program.

Predatory fish that could impact outmigrating Chinook Salmon smolts include two native fishes (Northern Pikeminnow and coastal Cutthroat Trout) and two non-native fishes (Smallmouth Bass and Striped Bass). Effects of predation by Pikeminnow and Cutthroat Trout on the wild Chinook Salmon populations are unknown. Stomach analysis of Smallmouth Bass over a four-year period verified Smallmouth Bass eat salmonid smolts but suggested the overall impacts on wild populations are insignificant in the Umpqua basin. Studies conducted in San Francisco Bay also documented salmonid predation by Striped Bass due to migration patterns and timing that coincide with spawning Striped Bass when they tend to reduce or cease feeding. Little is known regarding competitive interactions of hatchery spring Chinook and wild coho Salmon during the estuary and ocean phases of their life history. Predation by aquatic mammals like otters, seals, sea lions etc. could negatively impact the program. Also, birds like blue herons, Caspian terns, cormorants, and gulls etc. may impact the program.

(b) Species that could be negatively impacted by program.

Little is known about the interactions between hatchery spring Chinook Salmon and wild Coho Salmon. However, competition for food and space by Chinook may negatively impact the listed Coho Salmon and candidate steelhead in the estuary; but spatial and temporal differences between listed and hatchery smolts would suggest that interactions are minimal. Chinook and Coho Salmon have co-existed in the basin and the spring Chinook Salmon hatchery program is designed to mimic naturally produced spring Chinook Salmon populations in spawning, run timing, and genetic background to minimize any negative effects on Coho. Hatchery smolts are reared and volitionally released at Rock Creek Hatchery to encourage returning program adults to return to Rock Creek. Upon their return to Rock Creek Hatchery, some hatchery spring Chinook are removed for broodstock. The

remaining hatchery Chinook are managed according to the Native Fish Conservation Policy and the goals of an integrated harvest program and are allowed to spawn with naturally produced chinook. Rock Creek is the primary area of hatchery influence for this species, thus spatial overlap with wild Coho is minimized. Due to Coho spawning after spring Chinook and the Coho's tendency to use smaller tributaries and gravel, the temporal and spatial differences reduces the interaction between these two species during spawning even in areas with hatchery Chinook. Also, steelhead smolts are more aggressive than Chinook smolts, and therefore, impacts on steelhead by Chinook would be minimal.

(c) Species that could positively impact program.

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

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

The freshwater and marine species that depend directly or indirectly on salmonids for their food and nutrient supply could be positively impacted by the program. These include larger salmonids, other fish species, aquatic mammals, birds etc. Thus the hatchery production has the potential for playing a role in the predator-prey relationships and community ecology during the 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 water right for Rock Creek Hatchery is 16 cfs from Rock Creek during the months of October through June, and 22 cfs from the North Umpqua during June through October. Rock Creek's temperatures are too high in the summer for fish health, which necessitates the need for the cooler North Umpqua water supply. The facility complies with the water rights, water intake flows, 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.

Both intake structures are equipped with NMFS specification mesh screening, the Rock Creek intake is equipped with 0.0689 inch stainless steel wedge wire and the North Umpqua intake is screened with 5/64 inch perforated aluminum panels. Sixty percent of the waste discharged from the facility raceways is abated in a large 100' x 80' pond before dismissal to Rock Creek. Hatchery effluents are monitored and data are reported quarterly to DEQ as per NPDES permit 300J requirements.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock adults are collected at two locations:

- Winchester Dam ladder and trap facility on the North Umpqua in Winchester at RM 7. The trap facility is equipped with a hydraulic door which is manually opened and closed and leads into a concrete 10'x15' covered holding area. The fish are lifted to the transportation tank by means of a 200-gallon gondola type tank.
- Rock Creek Hatchery ladder and trap facility on Rock Creek, tributary to the North Umpqua at RM 36. Fish are trapped in the collection pen after swimming over a finger weir located in the upper end of the ladder ascending from Rock Creek. The collection pen is a 20'x30' raceway of concrete and wood. Fish can also be contained in the sorting facility on the 2012 Rock Creek fish ladder. Per funding and staff, surplus hatchery fish can be used per HMP disposition guidelines.

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

- Transportation/liberation trucks are 3 sizes: one 3,000-gallon stainless steel tractor-trailer with liquid oxygen and agitators; one 2,300-gallon stainless steel tanker with liquid oxygen and one 1,000-gallon steel tanker with refrigeration and oxygen**.**
- Insulated portable fiberglass tank with diffused oxygen and spray aeration. Holds 250 gallons of water.
- Push-in aluminum tank with spray aeration. Holds 200 gallons of water.
- Insulated aluminum portable tank with oxygen and spray diffusers. Holds 350 gallons of water.

5.3) Broodstock holding and spawning facilities.

Rock Creek Hatchery is the other facility used to hold and spawn spring Chinook Salmon. The wooden pens are 12' x 30'. Water depth is adjustable from 1.5' to 4' deep and normally kept at a 4' depth. Water is supplied from Rock Creek or the North Umpqua. Flow is adjustable, but normally is set at 1.5 cfs or approximately 10 pounds fish per gallon per minute. All adult salmonids are held in this collection/holding pond until spawned or released into the North Umpqua or Rock Creek. Spawning occurs in an adjacent hatch house building inside the shop area which is converted during times of spawning.

5.4) Incubation facilities.

Eggs are incubated at Rock Creek Hatchery in 20 vertical stack incubators. The water is taken from the Rock Creek and filtered through 20 micron mesh and passed through UV sterilization. The water supply is the same as the rest of the hatchery. Discharge water from incubation is returned back to Rock Creek except for during times of treatment. Treated incubation water is diverted to the abatement pond before entering Rock Creek.

5.5) Rearing facilities.

There are 20 rearing containers at Rock Creek Hatchery: two 30x80 concrete; six 20x80 concrete; six 145x20 concrete; one 20x80 concrete with a center wall; and six 16' Canadian

troughs. All of the structures are single pass containers with adjustable flows in all containers. All containers carry a maximum 5' depth except for the Canadian troughs which carry a 2' depth.

5.6) Acclimation/release facilities.

Rock Creek Hatchery is the only rearing and acclimation site to volitionally release spring Chinook Salmon smolts.

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

Disease outbreaks pose the greatest operational difficulty. Spring Chinook Salmon suffer from bacterial kidney disease (BKD), furunculosis, columnaris, Ichthyophthirius multifiliis (ich), and amoebic gill disease (AGD). AGD and ich are successfully treated with formalin. BKD is treated with aquamycin and erythromycin. Frunculosis and columnaris are treated with oxytetracycline. A large November storm occurred in 1996 resulting in the collapse of the Rock Creek intake and emergency release of 240,000 premature smolts (two months early) into Rock Creek during the peak of the torrent. The gradual degradation of the 60 year old Rock Creek intake prompted building a new intake in 1998 to include NMFS specification screening.

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.

Rock Creek Hatchery is equipped with a state of the art 245kw emergency generator which has the capacity to run the North Umpqua pump station and hatchery facility concurrently. The facility is staffed 24 hours, 365 days a year. All rearing and incubation containers are secured with low level water alarms connected to 5 personnel residences via Motorola radio and a facility grounds audio siren in case of water emergencies. The hatch house is equipped with an intruder security system connected to the same radio and siren. Both intakes are equipped with NMFS criteria screening. All fish are routinely examined on a monthly and as-needed basis by an assigned ODFW fish pathologist located at Oregon State University. Brood fish are also thoroughly checked for viral pathogens at the spawning stage.

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.

North Umpqua River spring Chinook Salmon are the only source of broodstock. Since this is an integrated harvest program, the hatchery program meets the Fish Hatchery Management Policy standards and follows ODFW guidelines.

6.2) Supporting information.

6.2.1) History.

The first returns of hatchery spring Chinook Salmon to the Umpqua River occurred in 1952, and have continued to the present day. The primary source of broodstock for the spring Chinook program is naturally produced North Umpqua River adults. Hatchery spring Chinook Salmon returning to Rock Creek hatchery are incorporated into the brood per the guidelines established by the Fish Hatchery Management Policy.

6.2.2) Annual size

Between 155 and 195 pairs of spring Chinook Salmon are used for this program. This number of broodstock represents less than 4% of the total Chinook Salmon passing Winchester Dam and less than 12% of the naturally produced Chinook passing Winchester Dam annually since 2000.

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

Natural origin spring Chinook have been incorporated into the broadstock of this program in varying numbers historically from about 5% to 20%.

Proposed levels of wild broodstock will be consistent with the Coastal Multi-Species Conservation and Management Plan and the Fish Hatchery Management Policy which both call for “clear and measurable goals to be set for each program that will allow for the evaluation of the effectiveness of each program in achieving those goals”. Our current goal for wild broodstock is 25%-30% but we will use adaptive management based on the best available science and adjust this number if appropriate.

6.2.3) Genetic or ecological differences.

While conducting surveys, trapping and spawning ground counts, ODFW staff has not detected genetic, phenotypic, or ecological differences between hatchery and natural Umpqua River spring Chinook Salmon.

6.2.4) Reasons for choosing.

This program will meet standards set in the Fish Hacthery Management Policy. Utilizing approximately 25-30 percent wild-origin broodstock maintains genetic diversity while having minimal impact on wild populations. Brood fish will be selected randomly

throughout the run, not by any phenotypic traits or characteristics.

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

The North Umpqua River spring Chinook Salmon is the broodstock used for this program. We will maintain the natural profile of fish that have co-existed over time to ensure no adverse genetic or ecological impacts occur to native wild coho salmon. Spring Chinook Salmon brood collection period is outside the Coho Salmon migration time and area.

SECTION 7. BROODSTOCK COLLECTION

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

A total of 155 - 195 pairs of spring Chinook are collected at Winchester dam and Rock Creek Hatchery traps to produce approximately 342,000 smolts for release. All adults captured for broodstock represent the life history model of the basin's population. The entire window of spawn timing is incorporated into the hatchery progeny to carry forth the acquired diversity of that brood year.

7.2) Collection or sampling design.

- Lower North Umpqua Winchester dam trap facility – the holding area is operated manually by personnel. Spring Chinook Salmon broodstock are collected April through July to mimic the natural run timing.
- Jacks are incorporated into the broodstock at the approximate same ratio as the season's returning run.
- Rock Creek Hatchery Fish Ladder Trap is used to augment any insufficient numbers from the Winchester Dam trap.

7.3) Identity.

All hatchery fish released from Rock Creek Hatchery are marked with an adipose clip and easily identifiable at time of collection from naturally produced nonclipped Chinook Salmon.

7.4) Proposed number to be collected:

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

About 155 to 195 pairs of the North Umpqua spring Chinook Salmon are collected annually with a sex ratio of 1:1.

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

Table 7.4.2-1. North Umpqua River Spring Chinook Salmon Broodstock Collections Levels (1988-2004).

Brood Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1988	375	352	10	1,437,412	371,879
1989	311	189	2	1,165,555	359,836
1990	274	197	27	976,506	327,941
1991	187	166	20	609,979	376,898
1992	180	189	24	610,100	387,013
1993	135	139	3	492,079	303,090
1994	112	97	21	388,500	298,846
1995	116	114	0	423,200	308,470
1996	101	97	12	315,917	247,660
1997	137	128	19	488,751	403,412
1998	146	129	10	503,817	399,938
1999	196	118	11	683,696	424,492
2000	152	118	6	596,399	412,377
2001	202	138	2	693,177	400,062
2002	220	160	0	652,000	410,432
2003	199	172	4	578,194	418,061
2004	255	189	11	456,836	NA

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

As per the Coastal Multi-Species Conservation and Management Plan efforts will be made to reduce hatchery-origin spring Chinook that swim above Rock Creek Hatchery. The newly modified ladder above the hatchery has the ability to open and close the fish ladder which allows trapping of returning fish. If an excess of hatchery fish are collected during the brood collection period they are either used in stream enrichment, donated to a food bank program, or sold through competive bid process.

7.6) Fish transportation and holding methods.

Adults transported from traps are enroute for less than 1 hour before reaching Rock Creek

Hatchery. With the 2,300-gallon fish liberation truck no more than 100 fish are hauled at one time. Generally, loading capacity is at least one gallon of water per pound of fish. Oxygen levels are maintained at 9-11 ppm. A synthetic slime (Polyaqua) is incorporated into the transport tank water to aid fish in recovery from handling stress. In addition, MS222 anesthetic is also occasionally used to reduce transportation stress. Water temperature ranges from 45°F to 58° F.

7.7) Describe fish health maintenance and sanitation procedures applied.

To prevent fungal infection, fish are treated with 167 ppm formalin for 1 hour upon receipt at the facility. The fish then undergo 3 treatments weekly until spawning. Any outbreaks of frunculosis are monitored and antibiotic (oxytetracycline) injections are applied if situation warrants. Spawned adults are sampled and tested for viral and bacterial infection by ODFW's pathology unit. Tanks are disinfected with chlorine, then thouroughly rinsed. All pieces of equipment are disinfected with iodophor.

7.8) Disposition of carcasses.

Carcasses are placed into the mid to upper reaches of Rock Creek and East Fork Rock Creek for nutrient enrichment following DEQ permit rules.

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

The risk of genetic effects will be minimized by compliance with the goals in the CMP. Health risks will be minimized by monitoring flows and properly maintaining the Winchester Dam ladder and trap. Overall, due to temporal differences in run timing between spring Chinook and Coho Salmon, no risk is expected on the listed wild Coho during broodstock collection (Table 1 in section 2.2.3). If a wild Coho were encountered in the ladder or trap during broodstock collection, it would be passed over the dam with minimal handling. Emigrating Coho Salmon juveniles are not handled at Winchester Dam and pass unimpeded downstream.

SECTION 8. MATING

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

8.1) Selection method.

Broodstock are randomly chosen proportionally to mirror natural run model during migration and randomly chosen at ripeness during spawning episodes through entire spawn timing window.

8.2) Males.

Males are used one time only. The collection goal of 1:1 male to female is easily obtainable. Jacks are incorporated at random proportional to their existence in the run for that year.

8.3) Fertilization.

Eggs are fertilized on a 5 male x 5 female matrix. Ovarian and tissue samples are drawn on 60 fish to monitor the presence of any pathogens. The donor or parent fish are examined by an ODFW fish pathologist to examine overall health. Eggs are water hardened in 100 ppm iodine for 30 minutes.

8.4) Cryopreserved gametes.

N/A

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.

A randomly picked mating scheme representing the entire adult migration time is used to incorporate as much diversity as the population maintains. About 80% of the broodstock are captured before June 1st and are termed as early arriving. The remaining 20% are collected post June 1 and are considered late arriving Chinook Salmon. All Chinook Salmon, representing all of the collections, are pooled together, and are checked weekly beginning in late August, early September for ripeness. All females ripe in a given week are spawned. An equal number of ripe males are also used to maintain a 1 : 1 ratio. A 5 x 5 matrix mating process is performed to further randomize the mating process. The entire window of spawn timing is incorporated into the hatchery progeny to carry forth the acquired genetic diversity of that brood year. By mimicking the naturally produced fish which have co-existed over time risks will be minimized.

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. Survival rates of Umpqua River spring Chinook Salmon at different life stages at Rock Creek Hatchery, 1988-2004.

Brood Year	Egg Survival %	Fry Survival %	Juvenile Survival %	Pre-Smolts Released	North Umpqua Smolts released	Smolt goal
1988	95.1	96.7	97.5	43,882*	327,997	312,500
1989	87.1	96.4	97.5	49,989*	309,847	312,500
1990	86.5	96.9	98.4	0	327,941	312,500
1991	92.1	97.2	98.1	79,121**	297,777	312,500
1992	94.0		97.6	84,825**	302,188	312,500
1993	95.1	97.5	98.3	0	303,090	290,000
1994	93.8	97.7	98.5	0	298,846	290,000
1995	93.7	98.2	98.1	0	308,470	290,000
1996	81.8	97.6	97.6	0	247,660	370,000
1997	89.4	89.4	96.5	0	403,412	412,000
1998	85.1	96.9	98.4	0	399,938	412,000
1999	74.9	95.1	95.4	0	424,492	412,000
2000	79.6	96.4	98.8	0	412,377	412,000
2001	88.2	96.8	91.8	0	400,361	412,000
2002	89.4	98.8	95.5	0	410,432	412,000
2003	83.0	96.9	96.7	0	418,061	412,000
2004	92.2	96.6	NA	0	NA	342,000

* North Umpqua releases (discontinued 1990)
** South Umpqua releases (discontinued 1992)

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

The smolt production program receives first priority and requires a large number of eggs. Surplus eggs are kept until it is determined that egg loss is normal for the year and until pathology diagnosis of the adults is complete. All eggs taken from infected parents are

buried. If any surplus remains, the eggs are raised up to the unfed fry stage and released in local reservoirs such as Galesville where downstream passage is sufficiently blocked to prevent any interaction with the listed species or any anadromous populations.

9.1.3) Loading densities applied during incubation.

Rock Creek

- Trays are Marisource replica to Heath
- Green egg size @ 75 per ounce.
- Eyed egg size @ 55 per ounce.
- Tray density for green @ 200 ounces per tray.
- Tray density for hatch @ 80 ounces per tray.
- Incubator flows set @ 5 gallons per minute for egg and fry incubation.

9.1.4) Incubation conditions.

At Rock Creek Hatchery incubation temperatures monitored and recorded @ 8:00 am and 4:00 pm daily. The water temperatures range from 32°F to 58° F. Water used in hatch house is filtered through 20 micron mesh. Dissolved oxygen levels are randomly monitored and found at 100% saturation. When required, incubation water temperature may be increased to accelerate egg development or chilled to decelerate development/growth to unify their rates of maturity. The heating and chilling technique is used to bring the timing of swim up stage together in all production groups.

9.1.5) Ponding.

Swim-ups are transferred from incubation to ponds during button-up. The average length is 40 – 45 mm and the weight is 900 fish per pound.

9.1.6) Fish health maintenance and monitoring.

At Rock Creek, green eggs are water hardened in 100 ppm iodophore for 30 minutes. Samples of fish tissue and ovarian fluid from parent fish are taken to determine the presence of any viral pathogens. Eggs from infected parents are discarded and buried. Fungal infections in eggs are controlled by treating eggs with 1250 ppm formalin for 15 minute drip 4 x weekly. Water entering the incubation facility is disinfected with UV. All dead eggs are picked with a machine. Juvenile fish are treated for bacterial infections with oxytetracycline, aquamycin or florofenicol medicated feed as per instructions on the label. Fish health status is always determined prior to release or ponding.

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.

Spring Chinook Salmon eggs and alevins are incubated on filtered and UV sterilized water and treated with formalin to minimize potential disease in program fish or transfer to listed species. Incubation effluent water is discharged into 100' X 180' abatement pond to meet DEQ requirements for dilution to reduce impacts from water discharge. Discharge effluent

is monitored and reported quarterly under a 0300J permit through DEQ - NPDES. This helps ensure that discharged water meets certain water quality standards to reduce any potential impacts on listed species.

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.

See Table 9.1.1-1.

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

Rock Creek Hatchery densities stated are for temperatures below 58° F. For all raceways and rearing containers, Rock Creek Hatchery has goals of meeting or exceeding a flow density of 8 - 10 pounds of fish per gpm water flow. Rearing space goals are one pound of fish per cubic foot of rearing area. Currently flows have been adjusted to meet these goals.

9.2.3) Fish rearing conditions.

Water source and holding facilities are described in sections 4.1, 5.3, and 5.5 respectively. During rearing, water temperatures are monitored three times daily. Fish are visually checked daily for overall health parameters: behavior, depth in water column, signs of disease, mortality. Dissolved oxygen is monitored during times of crisis, critical high water temperature, high fish density or low water flow situations. Rearing containers are flushed or cleaned 1-2 times weekly as needed. Cleaning includes using a brush to remove organic material from the bottoms of the raceways. Discharge water from cleaning treatments pass into the abatement pond. Containers are protected from predators with a mesh cover. Rearing fish are fed via hand broadcasting of the food.

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.

This Excel program calibrates the amount of food fed daily to the fish based on species, number of fish, length of rearing, K factor, the food conversion rate and %AGR. A 100% AGR value is equal to all of the food a fish will eat. Values below 100% represent a food schedule that is restricting food to slow growth rates, while values over 100% are accelerating growth.

Table 9.2.4-1. Summary of Excel Growth Program for fall released spring Chinook Salmon at Rock Creek Hatchery.

Date	Water Temp.	Feed/day	# fish per pound	% Body weight	Number of Fish	K Factor	Feed Conversion	% AGR*
March 1, 2004	44.9F	5.47 lbs	950	3.66	145,000	0.00037	1.1	100
Oct. 1, 2004	53.9	216.5	8.4	1.255	145,000	0.00037	1.1	100
Total Food		18,918 over 215 days						

Table 9.2.4-2. Summary of Excel Growth Program for spring released spring Chinook Salmon at Rock Creek Hatchery.

Date	Water Temp.	Feed/day	# fish per pound	% Body weight	Number of Fish	K Factor	Feed Conversion	% AGR*
March 1, 2004	44.9F	8.46 lbs	950	3.01	267,000	0.00037	1.1	84
Jan. 31, 2005	42.7	207.8	5.91	0.46	145,000	0.00037	1.1	84
Total Food		49,414 over 337 days						

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

See Tables 9.2.4-1 and 9.2.4-2 for growth and food conversion ratios. Energy reserve data are not available.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

See Tables 9.2.4-1 and 9.2.4-2 for feeding rates and food conversion efficiency.

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

Fish health and behavior monitoring is done daily. Mortality collected and analyzed daily and continuously. Scheduled pathology examinations at random and as needed and as prophylactic. Parasitic and bacterial infections treated as needed under prescription of ODFW pathologist. Viral infections monitored by Pathology section. Proper disinfecting is used as the primary prevention of lateral transfer of viral infection.

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

Usually fish age, size, condition factor, and coloration development indices are used as smolt development indices. No ATPase gill enzyme activity is measured.

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

N/A

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.

This is a spring Chinook Salmon propagation program which is a non-listed species. See

Sections 5.8, 6.3, 7.9, 8.5 and 9.1.7 for risk aversion measures taken under this propagation program.

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	N/A			
Unfed Fry	N/A			
Fry	N/A			
Fingerling	N/A			
Yearling	150,000 192,000	10/lb 8/lb	Oct. 1 February 1	Rock Creek Rock Creek

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

Stream	Watershed Code	Fish Age	Release Point	Watershed	Basin
Rock Creek	1600202000	Yearling	Rock Creek hatchery	North Umpqua	Umpqua
North Umpqua R.	1600200000	Yearling	Rock Creek hatchery	North Umpqua	Umpqua

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

Release Year	Eggs/ Unfed Fry	Avg size	Fry*	Avg. size	Fingerling*	Avg. size	Yearling	Avg. size fish/lb	Release Dates
1988	26,299	N/A	29,900	132	19,950	70.0	336,288	8.6	Feb 17 - Aug 31

1989	482,033	N/A	48,499	133	174,373	62.2	273,257	7.2	Feb 28 - Sep 12
1990	267,766	N/A	91,150	110	126,879	65.9	313,990	7.4	Mar 7 - Sep 11
1991	206,129	N/A	237,606	221			315,692	6.9	Mar 6 - Sep 27
1992	15,843	N/A			79,121	89.0	315,276	6.6	Feb 24 - Sep 19
1993			69,935	125	84,825	65.0	303,137	6.7	Feb 22 - Sep 17
1994			104,735	103			214,724	6.4	Mar 8 - Oct 3
1995	43,921	N/A					302,030	6.2	Feb 15 - Oct 2
1996	67,219	N/A					540,837	8.3	Feb 1 - Nov 18
1997							100,352	8.0	Sep 28
1998							298,358	6.8	Feb 2 - Oct 2
1999							401,018	7.0	Feb 1 - Sep 30
2000	40,384	N/A					442,237	7.9	Feb 1 - Sep 27
2001							422,422	7.6	Feb 1 - Oct 22
2002			90,855	140			402,778	7.1	Jan 28 - Oct 21
2003	81,003	N/A	79,716	118			410,267	7.0	Feb 2 - Oct 21
2004			42,295	106			415,381	7.6	Feb 4 - Sep 30
2005							348,715	7.4	Feb 11 - Oct 1
2006					95,914	88.0	289,331	7.4	Jan 29 - Jun 20
2007			1,955	234	3,998	78.4	341,964	7.1	Feb 1 - Oct 10
2008					87,289	76.6	295,883	7.4	Feb 1 - Oct 2
2009							349,100	7.0	Feb 12 - Oct 1
2010			45,735	118			523,245	7.6	Feb 12 - Nov 1
2011							242,543	8.2	Feb 14 - Oct 1
2012							383,940	8.3	Feb 17 - Oct 15
2013							369,576	7.1	Feb 5 - Sep 25
2014					57,002	93.5	552,677	6.6	Feb 26 - Oct 14
2015			24,000	120			3,525	6.0	May 22 - Nov 2
Average	136,733	N/A	72,198	136	81,039	72.2	339,591	7.3	

*All fry and fingerling releases from 2002 to the present were to standing waterbodies.

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

For fish release dates see above Section 10.3. Fish are released volitionally from Rock Creek Hatchery at peak smoltification and natural migration time. Also see below section 10.6 for accliumation procedure.

10.5) Fish transportation procedures, if applicable.

N/A

10.6) Acclimation procedures.

Since spring Chinook Salmon smolts are reared on Rock Creek water and volitionally released into Rock Creek. This program is considered an acclimation program. During October and February, the rearing raceway outlets are adjusted so Chinook in smolt condition can volitionally pass downstream. Fish are given 2-3 weeks to voluntarily emigrate. Any fish remaining at the end of the release period (normally less than 20% of the total) are flushed out.

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

All fish (100%), are adipose clipped, and about 50,000 smolts receive a coded-wire tag (CWT).

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

N/A

10.9) Fish health certification procedures applied pre-release.

Per ODFW Fish Health Management Policy fish health status is examined prior to any transfer or release, and only certified fish are released.

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

Rock Creek Hatchery will contact district biologist to initiate pre-established contingency plan. The Emergency Contingency Plan entails releasing or transferring broodstock depending on species, and releasing indigenous juveniles in order of closest to release date. The fish which will not be released immediately will be kept on life support until transport is available or the emergency is resolved.

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.

Fish are reared to a 1-year smolt size and released volitionally at peak smoltification and migration time to ensure survival and minimize competition in natal areas. Release numbers have been relatively stable since 1998. Most natural and hatchery spring Chinook Salmon juveniles emigrate downstream prior to listed Coho Salmon fry outmigration, which minimizes potential impacts. Thus the current timing of hatchery releases will be continued to maintain this spatial and temporal difference with listed Coho Salmon.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

A description of monitoring and evaluation for each "Performance Indicator" is provided in the table of benefits and risks in Section 1.10.1.

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

As with all state programs, budgets are approved by the Legislature for a two-year period. No commitment of funds can be made past the approved budget period. Funds for various projects associated with this HGMP come from a variety of sources including license dollars, state general funds, federal sport fish restoration funds as well as a variety of other federal funds (BLM, USFS, etc.). Competitive grants from Fish Restoration and Enhancement, OWEB, Umpqua Fishery Enhancement Derby, and Oregon Wildlife Heritage Funds are occasionally approved for special projects. Mitigation funds are available through the PacifiCorps settlement agreement. Some funds are committed for portions of the HGMP monitoring but can change with relatively short notice. Winchester Dam operations are funded by Sport Fish Restoration funds.

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.

- Any listed natural Coho Salmon encountered during spring Chinook Salmon spawning surveys will not be handled or subjected to unnecessary stress.
- Any adult natural Coho Salmon encountered at Winchester Dam counting station during the spring Chinook Salmon monitoring period will be immediately passed upstream unharmed. Juvenile Coho Salmon are able to pass Winchester Dam freely at all times.

SECTION 12. RESEARCH

12.1) Objective or purpose.

- Determine stray rates of hatchery produced North Umpqua spring Chinook Salmon, in order to maintain genetic integrity of the naturally produced spring Chinook population.

No anticipated impacts on native wild Coho Salmon should result from the study.

- Continue coded wire tagging of hatchery produced North Umpqua spring Chinook in order to determine marine harvest rates and distribution. No anticipated impact to wild Coho Salmon should result from the study.
- Continue monitoring returns over Winchester Dam counting station to determine total abundance and the ratio of hatchery produced fish. No anticipated impact to wild Coho Salmon should result from the study.
- Conduct radio telemetry study on North Umpqua spring Chinook Salmon if funding becomes available. This project would provide distribution, migration rates and habitat use of naturally produced and hatchery spring Chinook Salmon in the North Umpqua basin. No anticipated impact to wild Coho Salmon should result from the study.
- Conduct genetics study if funding becomes available to determine the similarities/differences in genetic markers between hatchery and naturally produced chinook; and to look at timing loci between spring and fall chinook. No anticipated impact to wild Coho Salmon should result from the study.
- If funding and technology become available, sample natural and returning broodstock for environmental factors such as chemical concentrations and/or toxicology issues. May also sample hatchery juveniles or eggs. Samples (tissue, scale, organ, etc.) would be determined by the best science available used for the evaluation.

12.2) Cooperating and funding agencies.

ODFW Southwest Regional Office. Other partners as noted in section 11.1.2.

12.3) Principal investigator or project supervisor and staff.

Greg Huchko —ODFW Umpqua District Fisheries Biologist.
ODFW West Region fisheries staff.

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

North Umpqua River spring Chinook Salmon stock are not ESA listed.

12.5) Techniques: include capture methods, drugs, samples collected, and tags applied.

- Conduct post spawning carcass counts in the North Umpqua River and record distribution of hatchery and naturally produced spring Chinook Salmon.
- Implant coded wire tags in sub-sample of hatchery spring Chinook smolts prior to release from Rock Creek hatchery.
- Monitor 24-hour video counts of anadromous fish passing over the Winchester Dam counting station.
- Capture adult spring Chinook Salmon at Winchester fishway from April to August, using a mechanical holding cell. Orally implant selected adult and jack spring Chinook with gastric radio-tags, not to exceed two percent of the body weight of the fish in size. Immediately release the radio-tagged fish to continue their upstream migration, and begin monitoring tagged individuals.

- Collect tissue sample from a portion of the hatchery and naturally produced spring Chinook as they pass through Winchester Dam, Rock Creek ladder or post-spawning of broodstock. Label and preserve sample for laboratory analysis.

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

- Video counts at Winchester Dam counting station are conducted 24 hours, year round.
- Radio tagging would be conducted from April to August.
- Coded wire tagging will be done at Rock Creek hatchery prior to the October and February release.
- Carcass counting on the North Umpqua would be conducted from August to November.
- Genetic/environmental sampling would be done April – October for adults and October to June for juveniles.

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

Radio-tagged spring chinook would be held for less than 24 hours in the trap facility at Winchester Dam. Spring chinook would be tagged by biologists during the time of low water temperatures and released immediately to resume migration. Similar methods would be used for obtaining tissue samples from spring chinook.

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

Incidental mortality of spring chinook during the radio-tagging procedure is expected to be 3-5%. One to four spring Chinook Salmon would probably die as a result of handling stress with a target study size of 50-60 radio-tagged fish. Tissue sampling would likely have even less mortality. In some cases, tissue from spawned brood fish could be used. No take of native wild Coho Salmon is anticipated.

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

No take of listed natural Coho Salmon as a result of spring Chinook research activities is anticipated.

12.10) Alternative methods to achieve project objectives.

Radio-telemetry: Conduct visual inspection of potential spawning areas to determine distribution of naturally produced North Umpqua spring Chinook Salmon. This method would produce less complete information than a telemetry study, due to difficulties in discerning clipped and non-clipped fish plus the rugged terrain and limited access of much of the North Umpqua River basin.

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

- Spring Chinook Salmon—1 to 4 adult moralities if a telemetry study was conducted.

- Spring Chinook Salmo --1 to 3 adult mortalities if genetic sampling was conducted.
- Fall Chinook Salmon—No mortality for radio telemetry, 1 to 3 mortalities if genetic sampling was conducted.
- Summer Steelhead—No mortality.
- Winter Steelhead—No mortality.
- Cutthroat Trout—No mortality.

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

If native wild Coho Salmon appear at Winchester Dam during radio-tagging operations, they will immediately be passed over the fishway unharmed. If numerous Coho appear, tagging operations will be curtailed or suspended until no CohoSalmon are present. Outmigrating coho juveniles encountered at Winchester Dam will be allowed to pass freely downstream, and will not be disturbed.

SECTION 13. ATTACHMENTS AND CITATIONS

References:

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

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

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

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

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

Miller, B.A. and S Sadro. 2003. Residence Time and Season Movements of Juvenile Coho Salmon in the Ecotone and Lower Estuary of Winchester Creek, South Slough, Oregon. Transactions of the American Fisheries Society 132:546-559.

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

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

Nickelson, T.E. 2000. Population assessment: Oregon coast coho salmon ESU. Oregon Department of Fish and Wildlife, Northwest Region Research and Monitoring Program, Corvallis.

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

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

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

Rodgers, J. D., S. L. Johnson, T. E. Nickelson, and M. F. Solazzi. 1993. The seasonal use of natural and constructed habitat by juvenile coho salmon (*Oncorhynchus kisutch*) and

preliminary results from two habitat improvement projects on smolt production in Oregon coastal streams. *In* Proceedings of the coho workshop, May 26-28, 1992 at Nanaimo, B.C.

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

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the

purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

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

Signature: _____Date:_____

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

Signature: _____ Date:_____