HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Umpqua River Winter Steelhead Program**
Species or Hatchery Stock:	**Winter Steelhead *Onchoryhnchus mykiss* Stock-18**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**Umpqua Watershed District, West Region**
Date Submitted: **First Update Submitted:** **Second Update Submitted:**	**March 8, 2006** **October 1, 2014** **August 12, 2016**
Date Last Updated:	**August 12, 2016**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Rock Creek Hatchery, Umpqua River Basin Winter Steelhead Program.

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

Winter Steelhead *Oncorhynchus mykiss* (stock-18). Umpqua basin naturally produced steelhead are part of the Oregon Coast Steelhead Evolutionarily Significant Unit (ESU), which was listed as a candidate species under the Federal Endangered Species Act (ESA) on March 19, 1998 (Federal Register Notice 1998). Oregon coastal wild steelhead populations are also considered a "Vulnerable" species under the State of Oregon's Sensitive Species Rule (OAR 635-100-0040).

1.3) Responsible organization and individuals.

Lead Contact:

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

Onsite Lead Contacts:

Name (and title):	Greg Huchko, District Fish Biologist
Agency or Tribe:	Oregon Department of Fish and Wildlife
Address:	4192 North Umpqua Hwy, Roseburg, OR 97470
Telephone:	541-440-3353
Fax:	541- 673-0372
Email:	Greg.F.Huchko@state.or.us
Name (and title):	Evan Leonetti, Umpqua District STEP Biologist
Agency or Tribe:	Oregon Department of Fish and Wildlife
Address:	4192 North Umpqua Hwy, Roseburg OR 97470
Telephone:	(541) 440-3353
Fax:	(541) 673-0372
Email:	Evan.Leonetti@state.or.us

Hatchery Contact:

Name (and title):	Dan Meyer, Rock Creek Hatchery Manager
Agency or Tribe:	Oregon Department of Fish and Wildlife
Address:	P.O. Box 374, Idleyld Park, OR 97447
Telephone:	(541) 496-3484
Fax:	(541) 496-0469
Email:	Dan.H.Meyer@state.or.us

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

The Oregon Department of Fish and Wildlife (ODFW) plus Salmon and Trout Enhancement Program (STEP) volunteers from the Umpqua Fishermen's Association (UFA), Cow Creek Band of the Umpqua Tribe of Indians, and fishing guides cooperate on this program. The program also works with the City of Canyonville Water Treatment staff.

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

Volunteers annually spend over 4,000 hours to assist this program with broodstock collection, monitoring the acclimation sites and assisting at fish ladders. The volunteers pay for the cost of construction, utilities, equipment, and maintenance at the acclimation sites via membership fees, sponsorships, donations, in-kind labor and grants. The operational cost for this winter steelhead program has been about 16.6% of the ODFW's Rock Creek Hatchery budget. Staffing includes Rock Creek Hatchery personnel (5 permanent full-time employees), an acclimation site guard, volunteer labor, 1 or 2 ODFW seasonal personnel, and assistance from the STEP biologist. Funds for seasonal personnel have varied from ODFW/United States Fish and Wildlife Service Fish Management funds to various grants and organizations.

Table 1-4 . Estimated annual costs of the program.

Item	Cost/Value	Source
Operations	$3,000 – 20,000	Memberships, donations
Rearing	$58,800	ODFW
Technical Assistance	$10,000	ODFW STEP Bio & Truck
Acclimation Site Guard	$2,800	Grants
Seasonal Personnel	$10,000 – 30,000	Varies: Grants, ODFW
Labor	$88,000	Volunteers
Minimum Annual Cost	**$174,000**	

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

<u>Brood Collection and Adult Trap Sites</u>

- *Galesville Dam Trap Facility* - located at RM 60 on Cow Creek, a tributary to the South Umpqua River, below Galesville Reservoir Dam. Naturally-produced and some hatchery-produced adult fish are collected and transported to Rock Creek Hatchery for spawning.

- *Canyon Creek Fishway* - the facility is located at on lower Canyon Creek, a tributary that flows into the South Umpqua at river mile 51. Hatchery fish are trapped and transported to Rock Creek Hatchery for broodstock or utilized to fulfill local food bank needs. Naturally-produced steelhead are passed upstream of the fishway into Canyon Creek.

- *South Umpqua Falls Fishway* - this is located at RM 85 on upper South Umpqua River. Both naturally-produced and hatchery-produced steelhead are trapped and then transported to Rock Creek Hatchery for broodstock.

- *South Umpqua Hook-and-Line* – OSP and ODFW permitted guides and other volunteers assist the collection of wild brood fish while fishing on the South Umpqua during the regular angling season.

- *Tangle Netting* – may be used to augment brood collection from RM 0 to RM 70 on the South Umpqua.

Spawning/Egg Incubation/Rearing

- *Rock Creek Hatchery*- This facility is used for spawning of all adults, incubation of eggs, and rearing of the fish to the smolt stage. Rock Creek Hatchery is an ODFW operated facility located on Rock Creek, a tributary to the North Umpqua River at RM 36 in the Umpqua Basin. The hatchery is located on 26.5 acres of land 23 miles East of Roseburg in Douglas County, Oregon, at latitude 43º 20' 07'' N and longitude 123º 00' 05" W.
- *Barrett Creek Facility*- A small portion of the production (~10,000 smolts) may be incubated and reared at this location. Barrett is a volunteer run facility with hatchboxes and rearing troughs. It is a tributary of Rice Creek which joins the South Umpqua at RM 28.

Acclimation/Releases

- *Canyonville Acclimation Facility* - located at RM 51 on lower Canyon Creek, a tributary to the South Umpqua River. Smolts are acclimated in a concrete raceway that discharges into Canyon Creek. Angler-captured brood are collected and held at this facility, and then transported to Rock Creek Hatchery.

- *Seven Feathers Acclimation Facility* - this facility is located at RM 51 behind the Cow Creek Band of the Umpqua Tribe of Indians Seven Feathers Casino in Canyonville. The site currently has two acclimation ponds. Smolts are acclimated at the facility and then released into the South Fork of the Umpqua River.

- *Cow Creek* - From 2000 to 2002, smolts were acclimated in net pens below the dam. No winter steelhead have been acclimated here since then.

- *Eastwood Elementary* - Deer Creek at RM 11 of the South Umpqua. The site has two 1,500 gallon concrete raceways. Smolts are released into Deer Creek from the site.

- *Lookingglass* - this is a potential acclimation site which enters the South Umpqua at RM 25.

- A small number (<4,000) are released as unfed fry as part of an ODFW school education program. Release sites are approved by the STEP biologist and are generally in the South Umpqua River or tributaries to the South Umpqua River, near the individual school sites.

- All steelhead smolts were directly released into the South Umpqua between Canyonville and River Forks (RM 51 - RM 0) prior to 1999. Now most of the steelhead smolts are acclimated, although it may be necessary to direct release more smolts if the acclimation sites cannot hold all of the smolts produced.

Watershed Codes for Facilities

- South Umpqua: 1600300000
- Canyon Creek: 1600302000
- Cow Creek: 160050000
- Rock Creek: 1600200000
- Deer Creek: 1600301000
- Barrett Creek: 1600300164

1.6) Type of Program.

The Umpqua River winter steelhead program is managed as a "Harvest Augmentation" program.

1.7) Purpose (Goal) of program.

The goal of this program is to provide a significant number of hatchery steelhead for recreational fishing in the Umpqua River Basin. This program enhances angling opportunity to approximately 228 miles of the Umpqua Basin that is currently open to winter steelhead angling. As per current regulations, only hatchery steelhead can be harvested in the Umpqua Basin. We are managing the stray rates of hatchery steelhead in the South Umpqua Basin to an aggregate of less than 10% on the spawning grounds. To accomplish harvest and escapement goals, the program had been releasing about 120,000 hatchery winter steelhead smolts annually.

In 2014 the Coastal Multi-Species Conservation and Management Plan (CMP) was adopted by the Oregon Fish and Wildlife Commission. The CMP has approved the increase of winter steelhead release from 120,000 to 150,000 smolts annually into the South Umpqua River. This increase will take into effect once the current release of 120,000 smolts has been attained on a consistent basis.

In 2016, this program is tentatively scheduled to work in cooperation with the Hatchery Research Center on an egg acclimation study. This program is described further in the research section.

When available, about 3,000 eggs are also used for the STEP classroom incubator program and helps educate school children about fish life cycles of salmon and steelhead,

mathematics (counting, survival estimates, etc.), aquaculture and other fish management issues.

1.8) Justification for the program.

This program is intended to enhance the very popular winter steelhead fishery and create harvest opportunity for anglers in the Umpqua River Basin. Since the steelhead smolts are acclimated to tributaries of the South Umpqua River and return to the South Umpqua as adults, they provide angling opportunity in both the main-stem Umpqua River and South Umpqua River. Some program fish also return to the North Umpqua where they provide angling opportunities.

Overall, this program has a minimal effect on ESA-listed naturally-produced Coho Salmon in the basin. Program steelhead return in mid-winter (December-April), after most of the Coho Salmon adults have migrated through the main-stem river and have returned to the basin's tributaries to spawn. Steelhead spawning occurs after most Coho Salmon spawning, from January through May. Steelhead are also more apt to use smaller tributaries and migrate farther upstream than naturally-produced Coho Salmon. Since the acclimation program was started in the South Umpqua in 1999, most program fish return to Canyon Creek, therefore reducing spatial overlap between the two species. Some winter steelhead enter the North Umpqua River and likely to return to Rock Creek. About 7-9% of the steelhead crossing Winchester Dam from December 1 to May 1 are hatchery-produced fish. It is unknown how many of these fish are actually winter steelhead that were acclimated at Canyonville or how many are early arriving hatchery summer steelhead. Radio telemetry studies in the North Umpqua indicated that most of the hatchery-produced fish spawned in Rock Creek, thus impacted less than 86% of the Coho Salmon habitat available in the North Umpqua River.

Due to differences in arrival times of the winter steelhead and Coho Salmon, there is little potential for incidental harvest of coho during winter steelhead angling. There is also no impact to Coho Salmon due to broodstock collection operations. All steelhead smolts are released as either 1 or 2-year old fish at a size and time intended to promote rapid downstream migration. This reduces the time that the smolts spend in the basin prior to out-migrating to the ocean. Consequently, the spatial and temporal overlap between Coho and program juveniles is reduced. Program juveniles are also released into or near the mainstem South Umpqua where no competition with Coho Salmon fry is expected.

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

BENEFITS Performance Standards	BENEFITS Performance Indicators	BENEFITS Monitoring & Evaluation
Provide hatchery winter steelhead for recreational harvest.	• Release approximately 150,000 winter steelhead smolts annually. • Produce an average 4,000-6,000 adult hatchery	• All releases are properly documented and release numbers are in compliance with the CMP 2014. • Counts at various traps are used

	steelhead returning to the basin. • Program fish provide a freshwater fishery and harvest opportunity.	to document the population size and trends of the hatchery and naturally produced winter steelhead. • Estimate harvest rates of program fish. • Quantify the number of program fish released and observed in the fishery to evaluate their survival, performance, contribution to the fishery, and escapement.
Program fish provide societal benefits.	• Program fish provide a venue for community and volunteer involvement. • Program fish are part of a school education program.	• Document the number of volunteers interested and involved in the program. • Teacher's evaluation of students' active participation.
Program winter steelhead are identifiable.	• All juveniles released will be marked for identification.	• Verify that mark quality goals are being met by using mark efficiency checks prior to release.
Healthy winter steelhead between one and two years old are released.	• Smolt age at release will mimic naturally produced steelhead. • Smolts are released in close proximity to the South Umpqua to reduce interactions with wild coho juveniles.	• Document size, age, and indicators of smoltification of program fish prior to release. • Evaluate the cost-benefit and biological benefits of 1 and 2 year old smolts. • Periodically monitor the size and age distribution of naturally produced winter steelhead smolts.
Winter steelhead hatchery program will meet the criteria provided by the Native Fish Conservation Policy.	• A Conservation Plan will be developed for the appropriate Species Management Unit, if necessary.	• Procedures for assessing stock status and risks will be developed in conjunction with the Conservation and Hatchery Management Plan. • Public input will be sought during the development of the plans.
Collection of winter steelhead broodstock presents a minimal impact to naturally-produced Coho Salmon.	• Temporal differences between adult winter steelhead and coho are maintained. • No Coho Salmon are trapped during winter steelhead broodstock collection.	• Monitor all the brood collection traps regularly. • Operate traps from late January to May when adult coho are not present. • If an adult coho is trapped, it is allowed free-passage.
RISKS Performance Standards	**RISKS Performance Indicators**	**RISKS Monitoring & Evaluations**

Life history characteristics of program winter steelhead will not diverge significantly from naturally produced steelhead.	• Releases of program fish mimic the emigration of naturally produced steelhead. • Run timing of adult hatchery winter steelhead does not differ from run timing of naturally produced fish. • Behavioral and morphological characteristics of program fish are similar to naturally produced winter steelhead. • Broodstock collection is random and reflects the natural timing and age classes represented in the natural population. Both hatchery and wild fish are utilized for broodstock. • Brood collection standards will meet or exceed the Native Fish Conservation Policy.	• Appropriate downstream monitoring techniques will be periodically used to monitor juvenile emigration, size, and smoltification. • At least 90% of the smolts will be acclimated to the South Umpqua Basin for 17 to 21 days. • Counts at various traps will be used to verify run times of natural, program, and listed fish. • Develop a program to periodically sample hatchery juveniles and returning adults for phenotypic and genotypic characteristics to measure the similarities/differences with naturally produced steelhead. • If funding/technology become available, sample returning natural and hatchery broodstock for chemical/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. • Develop a marking system to distinguish early returning summer steelhead from straying winter steelhead. • As new acclimation sites are added, monitor adult return and stray rates to ensure compliance with the Native Fish Conservation Policy.
Releases of program juveniles have a minimum impact on listed natural Coho Salmon juveniles.	• Most program fish are released as 1 or 2-year old smolts to reduce residualism in the South Umpqua. • Program fish are checked for appropriate signs of smoltification prior to release. • Program fish are primarily released in Feb - April to	• Appropriate downstream monitoring will be periodically conducted for program fish and naturally-produced coho in the basin. • Develop a program to evaluate residualism of different aged winter steelhead smolts.

	reduce the temporal/spatial overlap with naturally-produced Coho emigration.	
Harvest of program steelhead has a minimal impact on naturally-produced Coho Salmon.	• Temporal differences in run timing between the species reduces impacts to returning adult Coho. • Fishing regulations reduce incidental harvest of Coho.	• Conduct periodic creel surveys to document incidental catch of wild coho during the winter steelhead season. • Periodically review angling regulations to ensure appropriate season/gear limitations to reduce potential impacts to Coho Salmon.
Hatchery operations comply with the Fish Hatchery Management Policy and other state and federal guidelines and permits.	• Hatchery operations conform to applicable fish health, sanitation, and operational guidelines. • Hatchery operations conform to DEQ/NPDES guidelines for water quality. • Hatchery intake operations are appropriately screened. • Hatchery operations allow passage of listed species.	• 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 sanitation and maintenance activities. • Appropriate protocols will be followed to monitor water quality standards for fish health and facility effluent. • Monitor stream flows and water qualities between the facility intake and outflow so flows can be appropriately adjusted for fish passage and the hatchery effluents comply with the NPDES permit.

1.11) Expected size of program.

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

To meet production goals, between 80 and 130 pairs of winter steelhead are necessary.

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	South Umpqua & tributaries near schools	4,000 in groups of 100 per class
Fry	N/A	
Fingerling	N/A	
Yearling (1 - 2 year old smolts)	Canyonville Acclim. Canyon Ck. Seven Feathers, Canyon Ck. Eastwood Elem., Deer Ck.	150,000 smolts divided between the sites, with 1 to 5 releases per site.

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

Table 1.12-1. Escapement of hatchery winter steelhead to various sites.

Year *	Number Released	Return to Canyon Creek***	Return to Galesville	Return to Winchester Dam
1994	82,000	n/a	n/a	n/a
1995	72,809	n/a	n/a	n/a
1996	101,366	n/a	n/a	68
1997	105,908	n/a	n/a	599
1998	50,890	n/a	n/a	838
1999	99,104	121	n/a	1,161
2000	107,997	557	311	1,766
2001	61,474	419	100	1,320
2002	90,288	857	569	1,257
2003	78,691	n/a	n/a	800
2004	92,210	n/a	n/a	1,619
2005	117,129	262	n/a	856
2006	64,927	n/a	n/a	1112
2007	16,648	n/a	n/a	1254
2008	28,224	n/a	n/a	470
2009	90,808	52	n/a	191
2010	101,261	33	n/a	562
2011	93,597	84	n/a	400
2012	108,968	43	n/a	897
2013	93,057	39	n/a	857
2014	65,966	136	n/a	757

*Returns are mostly 2-salt fish, so most fish acclimated in 1999 would return in 2001 for example. Winchester Dam counts may also include some early returning summer steelhead

** The acclimation program at Canyon Creek began in 1999 and fish were acclimated at Galesville from 2000 - 2002.

*** Data from Canyon Creek is likely underestimated. STW are not accounted for that pass over the trap during high water events and/or when the trap is not in operation.

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

The Umpqua River winter steelhead hatchery program began in the Smith River in 1947. From 1969 to 1996, the Smith River was stocked with Alsea stock hatchery winter steelhead. The Smith River program was discontinued after 1996. The North Umpqua River was stocked from 1961 to 1992 with North Umpqua stock winter steelhead. The winter steelhead program in the North Umpqua was discontinued after 1992. The South Umpqua hatchery program was started in 1961. From 1971 to 1993, Alsea stock hatchery winter steelhead were stocked in the South Umpqua River. The program discontinued the Alsea stock after 1993 and used a combination of South Umpqua and North Umpqua steelhead for broodstock until 1998. The program has used 100% South Umpqua winter steelhead for broodstock since 1999, with a combination of wild and hatchery fish. All hatchery smolts have been 100% marked since 1988. An increase in the South Umpqua smolt allocation from 88,000 per year to 120,000 per year was approved in 2001. The 2014 CMP approved a future increase to 150,000 smolts.

1.14) Expected duration of program.

The South Umpqua winter steelhead program is ongoing and will be evaluated periodically under the 2014 ODFW CMP.

1.15) Watersheds targeted by program.

The Umpqua River hatchery winter steelhead program is targeted for the South Umpqua River and the mainstem Umpqua River. Some hatchery fish also return to Rock Creek Hatchery on the North Fork of the Umpqua River.

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.

The key issues for the winter steelhead program in regard to ESA listed naturally-produced Coho Salmon are: the impacts of steelhead smolts on Coho Salmon smolts, temporal and spatial overlap of adult run times and spawning between program fish and Coho, incidental take of Coho Salmon during broodstock collection and incidental take during recreational angling. Since 1998, significant changes have been made to improve this program to minimize adverse impacts on listed Coho Salmon and naturally produced winter steelhead. Broodstock was changed to 100% South Umpqua River stock steelhead in 1999. These guidelines require the Department to pass 75% of the returning wild fish at the trapping location, and require at least 10% wild fish inclusion into the hatchery brood. Most program fish in the South Umpqua are returning to the Canyonville (RM 51) with the upper basin at South Umpqua Falls (RM 96) having less than 2% hatchery fish. In 2003 ODFW staff walked or snorkeled multiple South Umpqua tributaries within 10 miles above and 10 miles below the mouth of Canyon Creek. No hatchery fish were detected in these streams. During that same year 93% of the steelhead returning to the

Canyon Creek trap were hatchery fish. In 2012 these spawning ground surveys were again conducted by ODFW volunteers to evaluate the number of wild and hatchery adults on the spawning grounds adjacent to Canyon Creek. No hatchery fish were detected during these surveys.

Hatchery fish returning to Canyonville or Galesville are handled in accordance to the Hatchery Management Policy and as detailed in the MOU between the Cow Creek Band of Umpqua Indians, the ODFW, and the Umpqua Fishermen's Association. Some program fish are also returning to Rock Creek.

There is little temporal overlap between returning listed Coho Salmon and winter steelhead adults. Most Coho Salmon have already entered tributaries and spawned prior to winter steelhead arriving, from January to May. Steelhead tend to use smaller tributaries and will frequently spawn in habitat upstream from Coho Salmon spawning areas. Because of this run time difference, there is little incidental take of Coho Salmon during angling for winter steelhead, and there has been no incidental take of Coho during broodstock collection activities.

1.16.2) Potential Alternatives to the Current Program.

(1) Eliminate the Winter Steelhead Hatchery Program.

Pros: Eliminating the winter steelhead program would reduce any potential interactions between hatchery-produced winter steelhead and listed Coho Salmon. It would also reduce interactions between hatchery and naturally produced steelhead and enlarge an existing conservation area for naturally produced winter steelhead in the Umpqua basin. Based on funding levels and other program objectives, the elimination of the winter steelhead program could allow other hatchery programs at Rock Creek hatchery to be expanded.

Cons: The communities of Douglas County and adjacent areas have a strong support for a hatchery winter steelhead fishery. The elimination of the hatchery program would eliminate any harvest opportunity for winter steelhead in the entire basin. This could also lead to even more catch-and-release pressure and impact to wild winter steelhead. Present regulations in the Umpqua Basin do not allow the harvest of naturally-produced fish. Elimination of hatchery program would eliminate all consumptive harvest opportunity for anglers on the mainstem Umpqua, South and North Umpqua rivers. Elimination of the hatchery program and the opportunity for consumptive harvest would decrease economic revenues to Douglas County communities which rely on angler dollars. Cities directly affected by the hatchery program include; Reedsport, Elkton, Roseburg, Winston, Myrtle Creek, Canyonville and Glide.

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 of the reduction. Since winter steelhead is likely to have a minimal impact on naturally-produced coho, the greatest impacts due to a decrease in the smolt allocation would be a reduction of a popular fishery, a reduction in the economic benefit of the fishery, and increased catch-and-release pressure and poaching on naturally-produced winter

steelhead.

(2) Release the hatchery smolts volitionally at Rock Creek Hatchery.

Pros: Hatchery winter steelhead are currently reared at Rock Creek Hatchery. Some adults show a strong tendency to home back to their original rearing facility. Thus, we see an average of about 750 hatchery winter steelhead per year return pass Winchester Dam on the North Umpqua River, although some of these hatchery fish may be early arriving summer steelhead. Releasing all program fish at Rock Creek Hatchery would allow the fish the opportunity to home to their rearing destination, verses an acclimation site. Fish would not have to be transported to an acclimation site and current acclimation facilities could be closed.

Cons: Releasing all hatchery winter steelhead at Rock Creek Hatchery would add additional hatchery smolts to the North Umpqua River. The ODFW currently releases 342,000 hatchery spring Chinook Salmon smolts and 165,000 summer steelhead smolts. This clustering of several species of hatchery smolts would add additional interactions with naturally-produced listed Coho Salmon in the basin. Angling opportunity would be greatly decreased in the South Umpqua without the acclimation program. This would also decrease the economic contribution of the fishery to communities such as Winston, Myrtle Creek, and Canyonville. Closure of the acclimation sites would significantly reduce community and volunteer support of the ODFW.

1.16.3) Potential Reforms and Investments.

Reform/Investment 1: The exisiting winter steelhead program was crafted to minimize impacts on listed Coho Salmon. No other reforms or investments are available at this time that would reach program goals and reduce impacts any further.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID

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 winter steelhead program was submitted to NMFS on 03/08/2006 for approval and ESA coverage. This is an updated version of the previously submitted HGMP, and is consistent with the ODFW's Coastal Multi-Species Conservation and management Plan (CMP) 2014.

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 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 Salmon populations in the Umpqua

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 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 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.

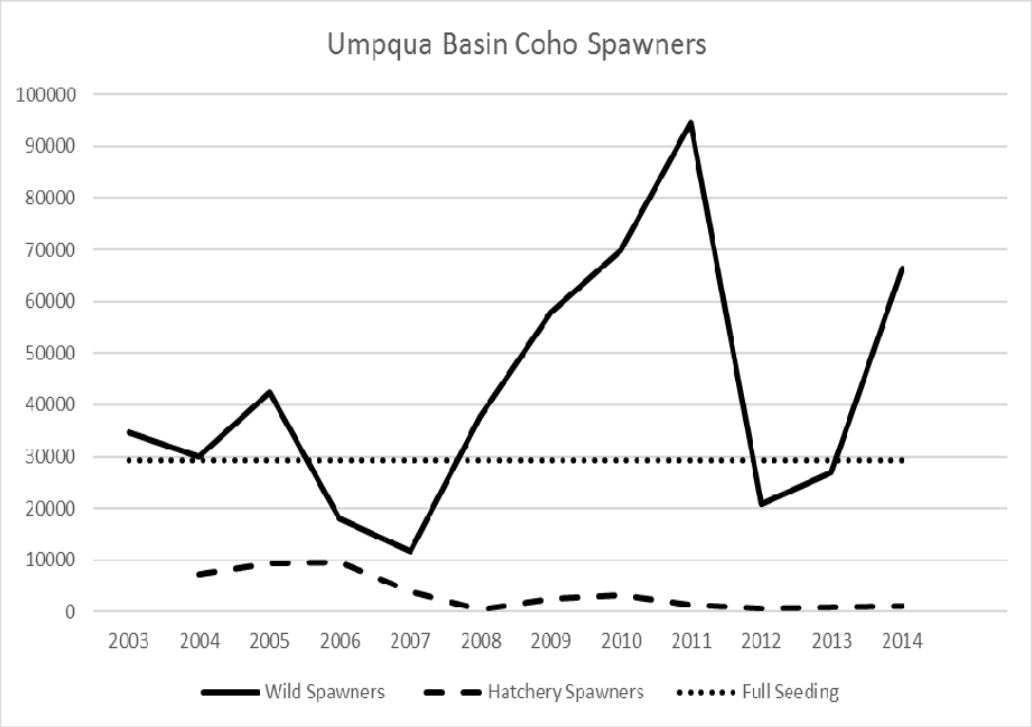

Figure 2.2.2a. The abundance of Coho Salmon spawners in the Umpqua River Basin (2003-2014) showing a marginal line for full seeding levels within the basin.

- 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.

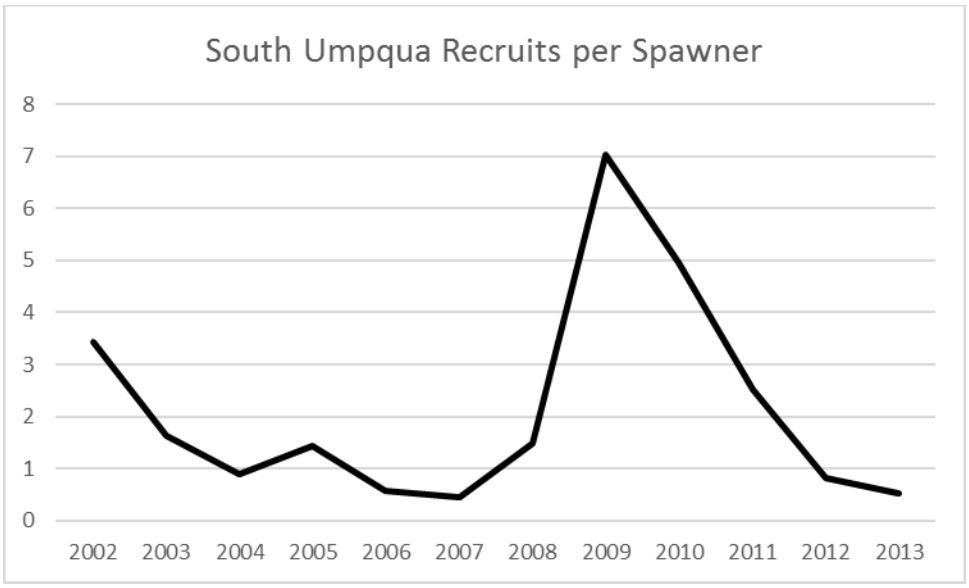

Figure 2.2.2b. Number of recruits per spawner of Coho Salmon for the South River Umpqua basin, 2002-2013.

-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 Coho Salmon 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 15,295 wild Coho Salmon 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.

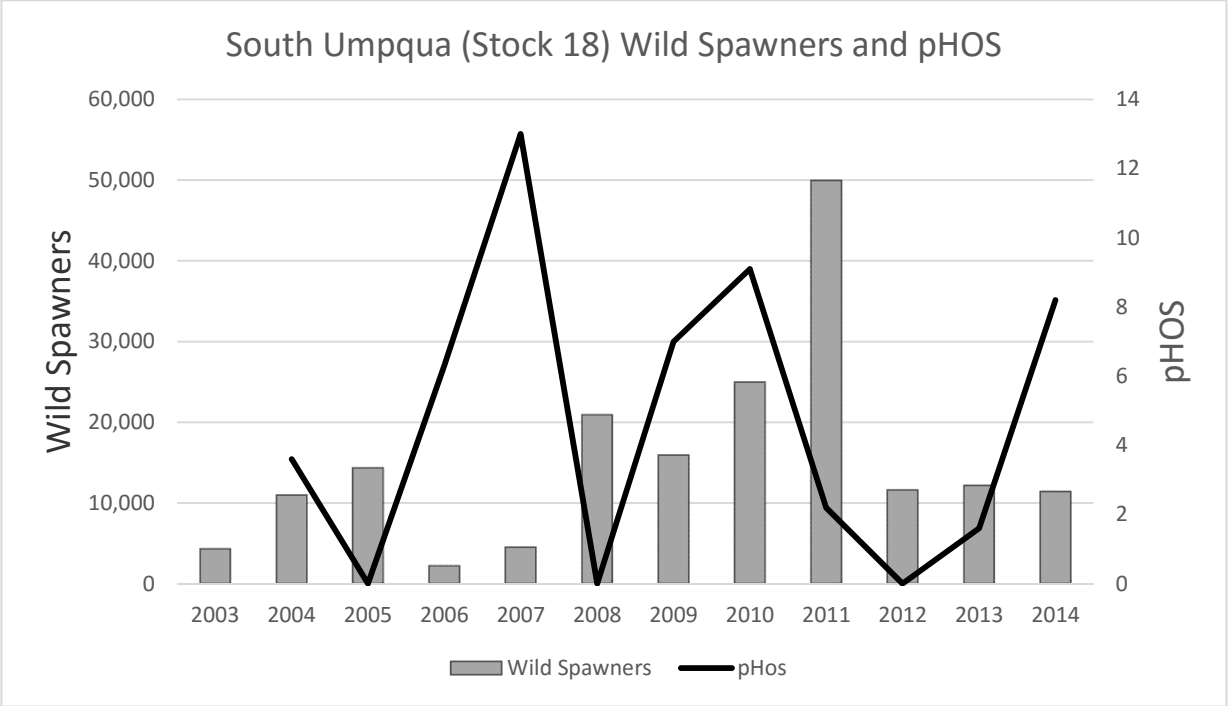

Figure 2.2.2c. The number of wild- and hatchery-origin Coho Salmon in the South Umpqua River basin compared to NEQ seeding levels.

The percentage of hatchery origin spawners (pHOS) of winter steelhead in the South Umpqua Basin has varied greatly through time, but shows a decreasing trend since 2003. From 2003 through 2015 the South Umpqua averaged a 17% stray rate throughout the basin. However, this percentage includes surveys conducted in Canyon Creek, which is the acclimation site for the South Umpqua River winter steelhead program. Excluding surveys conducted in Canyon Creek the pHOS decreases to an average of 4% from 2003 through 2015. In 2015 there were no hatchery origin winter steelhead found on spawning grounds (ODFW 2015).

Fish counts over Winchester Dam on the North Umpqua River provide additional information in regards to South Umpqua winter steelhead strays. From the year 2003 through 2013 hatchery-origin winter steelhead represent 8% of total steelhead crossing the dam. When estimated harvest of hatchery winter steelhead above the Dam is taken into account, the stray rate into the North Umpqua averages 3% since 2003.

The upper South Umpqua River Basin stray rates are also periodically monitored through counts at South Umpqua Falls Fishway. From 2004-2013 (years in which the trap was operated) the percentage of hatchery-origin winter steelhead was 0.7%.

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.**

Galesville Dam & South Umpqua Falls
These sites are not operated for winter steelhead until after adult Coho Salmon have migrated through the system (February/March – May). No downstream migrants occur at Galesville Dam. Coho Salmon juveniles can pass freely through the South Umpqua fishway or down South Umpqua Falls.

Canyon Creek Fishway
Trapping for winter steelhead at this site does not begin until late January. Although Coho Salmon may be present at this time, to date none have been captured. If a Coho Salmon was captured, it would be placed above the trap with a minimum of handling. Coho Salmon juveniles can migrate downstream through the fishway.

South Umpqua Hook-and-Line
Angling for naturally produced winter steelhead occurs from late January to the end of the winter steelhead angling season in April. Coho Salmon migrating through the South Umpqua basin have already entered spawning tributaries by this time. Tackle used for winter steelhead angling is generally too large for Coho Salmon smolts to ingest. If a Coho was hooked, it would be released with a minimum of handling.

Tangle Netting
Tangle netting for broodstock would be done if other, more passive methods were unsuccessful in obtaining enough brood. Netting operations would be done in February or later to ensure that adult Coho Salmon were not present.

Canyonville and Seven Feathers Acclimation Sites
These sites use water out of Canyon Creek for the acclimation raceways. Both facilities are operated from February to May, after Coho Salmon adults have already passed the intakes. Both sites are also screened to avoid impacting emigrating Coho Salmon juveniles. Other acclimation sites such as Eastwood Elementary or sites developed in the future will be similarly operated and screened to avoid impacts to listed species.

Galesville Acclimation Net pens
The net pens were used in March – April when no Coho Salmon adults are present. There is no emigration of Coho juveniles from above the dam. The net pens are stationary in the water and do not require any water intake.

- **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 incidental Coho take has occurred during winter steelhead broodstock collection activities or acclimation activities on the South Umpqua since 1999.

- **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).**

Few adult Coho Salmon may still be present in the South Umpqua River during the late January to May broodstock collection period for winter steelhead. Therefore, few adult Coho are expected to be captured during this period. Steelhead brood handling mortality at trap sites is generally less than 1% of the total fish captured. Hook and line activities also take place after most Coho have passed out of the mainstem South Umpqua. Tangle nets have not been used for capturing broodstock in recent years. This technique would be used in February or later to ensure that no adult Coho Salmon would be present. Thus no capture or take would be expected.

Emigrating Coho Salmon smolts are not impeded by steelhead broodstock collection or smolt acclimation activities at the various sites. Winter steelhead smolts are released near or in the South Umpqua River from February to May. Since generally 2-year old smolts are used, the hatchery smolts move rapidly downstream to tidewater, reducing any temporal overlap with Coho Salmon. Predation of juvenile Coho Salmon by hatchery winter steelhead smolts is unlikely due to their spatial separation from rearing Coho. Coho juveniles are found mostly in the tributaries, and emigrating hatchery steelhead smolts typically remain in the main-stem river.

See Table 2.2.3-1 below for projected take levels for listed fish.

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

Listed species affected: Coho Salmon	**ESU/Population: Oregon Coastal Coho Salmon**			
Activity: South Umpqua Hatchery Winter Steelhead Program				
Location of hatchery activity: Rock Creek	**Dates of activity: Ongoing**			
Hatchery program operator: Dam Meyers, ODFW				
	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	50 – 100	50	
Collect for transport b)	0	0	0	
Capture, handle, and release c)	0	0	25	
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0	
Removal (e.g. broodstock) e)	0	0	0	
Intentional lethal take f)	0	0	0	
Unintentional lethal take g)				
Other Take (specify) h)	0	1	1	

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

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

- **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 all trap sites and broodstock collection activities to detect the presence of any adult coho salmon. No take of adult Coho Salmon during the late January to May period is anticipated. However, if any adult Coho Salmon are encountered in the various broodstock collection efforts, they will be passed upstream with a minimum of handling. If problems occur, the ODFW will modify winter steelhead broodstock collection procedures to reduce or eliminate incidental Coho Salmon mortality. Emigrating juvenile Coho Salmon are not handled at the traps or acclimation sites, and pass downstream unimpeded.

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.

This hatchery program is managed consistent with the North Umpqua River Fish Management Plan (approved by the Oregon Fish and Wildlife Commission 3/21/1986) and the 2014 CMP. The CMP will supersede the previous documents.

Additionally, until May 2000, the Umpqua River hatchery winter steelhead program operated under a Section 10 Incidental Take Permit for take of Umpqua River cutthroat trout. The ODFW requested that this permit be withdrawn as a result of the delisting of the Umpqua cutthroat trout in April 2000. This winter steelhead program is currently operating under the interim guidelines of the Native Fish Conservation Policy and the Fish Hatchery Management Policy (FHMP) which were adopted by the Oregon Fish and Wildlife Commission in 2002 and 2003. The program is also consistent with the 2014 CMP. As stated previously, this plan allows for an increase in the number of smolts releases from 120,000 to 150,000.

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) ODFW Native Fish Conservation Policy, adopted 2002.
3) ODFW Fish Hatchery Management Policy, adopted 2003.
4) ODFW Commission Approval for the South Umpqua Winter Steelhead Program (2000).
5) ODFW Fish Health Management Policy.
6) U.S. 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) U.S. Army Corps of Engineers - General Authorization permit number for improving fish habitat in Western Oregon.
9) NPDES general permit 300J for hatchery operations and DEQ Memorandum of Agreement regarding fish carcass distribution in Oregon streams.
10) ODFW STEP Project Proposals (2002), Cow Creek Band of the Umpqua Tribe of Indians.

11) Nonprofit status, Umpqua Fishermen's Association, IRS #93-0978100.

12) STEP Oregon Regulatory Statues (496) and Oregon Administrative Rules (635) Program Guidelines.

13) STEP Program ORS 537.142 Water Rights.

14) FERC license agreement for Galesville Dam owned and operated by Douglas County.

15) Memorandum of Understanding: The Cow Creek Band of Umpqua Tribe of Indians, Oregon Department of Fish and Wildlife, and the Umpqua Fishermen's Association. Supporting: Distribution of excess winter steelhead from the Canyonville trap on Canyon Creek, 2014.

16) Coastal Multi-Species Conservation and Management Plan (CMP), 2014.

This HGMP is consistent with all of the permits and agreements above.

3.3) Relationship to harvest objectives.

Winter steelhead hatchery smolts are 100% marked for identification. The ODFW maintains a select fishery in the Umpqua Basin, only fin-clipped winter steelhead can be harvested. As a result of the acclimation program, angling opportunity and effort has increased on the Mainstem and South Umpqua River in recent years. Harvest benefits include a very popular recreational fishery which spans over 200 river miles and has a high economic benefit to the Umpqua basin from the coast to Canyonville.

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

There are no estimated harvest rates available for program fish in the ocean. Harvest card data indicates an average of 2,165 hatchery winter steelhead is harvested annually in the Umpqua Basin (Table 3-1).

Table 3-1. Hatchery-produced winter (Dec 1st- Apr 30th) steelhead harvest by area during 2000-2012.

Year	North Umpqua Hatchery Harvest	Mainstem Hatchery Harvest	South Umpqua and Cow Creek Hatchery Harvest	Total Hatchery Harvest
2000-01	1223	888	508	2619
2001-02	1305	493	1019	2817
2002-03	1373	558	470	2401
2003-04	1014	981	783	2778
2004-05	561	1066	297	1924
2005-06	651	912	1140	2703
2006-07	454	1624	1523	3601
2007-08	193	622	1715	2530
2008-09	255	346	325	926
2009-10	212	390	431	1033
2010-11	170	429	422	1021
2011-12	512	536	574	1622
Average	**660**	**737**	**767**	**2165**

Note: Data was generated from ODFW's Bridge Harvest Card Database.
2011-12 is the most up to date data point as of August, 2014.

3.4) Relationship to habitat protection and recovery strategies.

Habitat conditions appear to be improving in the Umpqua Basin as well as in the ocean, which are benefiting survival of all salmonids in the basin. For example, local watershed councils, in conjunction with federal and state agencies, are implementing numerous habitat improvement projects throughout the basin. Projects include fencing riparian habitats, placing large woody debris in the streams, decommissioning roads, replacing culverts, and improving fish passage. The passage of the North West Forest Plan and the Oregon Forest Practices Act has also benefited fish by increasing the width of riparian buffer strips and improving forest management. The Oregon Department of Fish and Wildlife also has an active screening program which has screened 45 irrigation pumps in the Umpqua Basin. In addition, ocean conditions have improved since the year 2000 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 out-migrating steelhead 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 Northern Pikeminnow and Cutthroat Trout on the wild steelhead population are unknown. Stomach analysis of Smallmouth Bass over a four-year period verified Smallmouth Bass eat salmonid smolts

but suggested the overall impact on wild populations is insignificant in the Umpqua basin. Studies conducted in San Francisco Bay documented salmonid predation by Striped Bass. Impacts from Striped Bass in the Umpqua basin are unknown at this time. Little is known about the interactions between hatchery winter steelhead and naturally produced Coho Salmon. However the spatial and temporal differences between these two species would suggest that the impacts are probably minimal. 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 winter steelhead and wild Coho Salmon. However, competition for food and space may negatively impact the naturally-produced Coho and wild steelhead in the basin; but spatial and temporal differences between listed and hatchery smolts would suggest that interactions are minimal. The steelhead hatchery program is designed to mimic naturally produced steelhead populations in spawning, run timing, and genetic background to minimize any negative effects on naturally-produced steelhead and Coho Salmon.

(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 significant role in the predator-prey relationships and community ecology during periods of low natural productivity.

SECTION 4. WATER SOURCE

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

Rock Creek Hatchery
Water source for Rock Creek Hatchery is 23 cfs from Rock Creek during the months of October through June, and 25 cfs from the North Umpqua during June through October. Rock Creek's water temperatures are too high in the summer for fish health, which necessitates the need for the cooler North Umpqua River 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.

At Rock Creek Hatchery both intakes are equipped with NMFS specified mesh screening. The Rock Creek intake is equipped with 0.0689 inch stainless steel wedge wire, and the Umpqua intake with 5/64 inch perforated aluminum panels. Sixty percent of the waste discharged from the facility raceways are abated in a large 100' x 80' pond before dismissal to Rock Creek. Hatchery effluent are monitored and reported quarterly to DEQ as per NPDES general permit 0300J.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

- Galesville Dam Trap Facility - This is located at RM 60 on Cow Creek, a tributary to the South Umpqua River, below Galesville Reservoir Dam. Naturally produced and some hatchery adult fish are collected and transported to Rock Creek hatchery for spawning. The remaining hatchery fish are transported downstream to augment the recreational catch, or released into Galesville Reservoir for the fishery.

- Canyon Creek Fishway - This facility is located at RM 51 on lower Canyon Creek, a tributary to the South Umpqua River. The trap at this facility is a fish ladder with a V-notch placed in one of the holding steps. Hatchery fish can pass upstream, be trapped and transported to Rock Creek Hatchery for broodstock, or handled as otherwise stated in the Hatchery Management Plan and/or as described in the MOU between the Cow Creek Band of Umpqua Indians, the Oregon Department of Fish and Wildlife, and the Umpqua Fishermen's Association, 2014 for surplus fish. Naturally produced steelhead are passed upstream of the fishway into Canyon Creek.

- South Umpqua Falls Fishway - This is located at RM 85 on upper South Umpqua River. This is a fish ladder with a V-notch placed in the upper-most pool during trapping. Naturally-produced and hatchery-produced steelhead are trapped and either passed or transported to Rock Creek hatchery for broodstock.

- South Umpqua Hook-and-Line - Guides and other volunteers assist the collection of wild brood fish while fishing on the South Umpqua River during the regular angling season.

- Tangle Netting – This may be used to augment brood collection. Netting could occur from RM 0 to RM 70 on the South Umpqua River.

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

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

5.3) Broodstock holding and spawning facilities.

Rock Creek is the only facility used to hold winter steelhead. Holding pens are 12' x 30' concrete structures. Water depth can be adjusted from 1.5' to 4' deep, and is normally kept at a 4' depth. Water is supplied from Rock Creek from October to June, and the North Umpqua River from June to October. Flow is adjustable, but normally is set at 1.5 cfs. All winter steelhead adults are held in this collection/holding pond until spawning. Spawning occurs in an adjacent hatch house building inside the shop area converted during times of spawning.

5.4) Incubation facilities.

Rock Creek Hatchery: Incubation takes place in 20 Marisource stack incubators. The water from Rock Creek is 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 diverted to the 80' x 100' hatchery effluent abatement pond.

Barrett Creek Facility: Incubation of a small portion may also occur at Barrett Creek. Barrett Creek has several wooden hatchboxes as well as 2 Marisource stack incubators. The water is supplied by a small diversion and settling pond in the headwaters of Barrett Creek.

5.5) Rearing facilities.

Rock Creek Hatchery: The hatchery has 21 rearing containers in all: two 30' x 80' concrete; six 20' x 80' concrete; six 145' x 20' concrete; one 20' x 80' concrete with center wall; six 16' Canadian troughs. All the containers use single pass water. Flows are adjustable in all containers. All containers with the exception of the Canadian troughs carry a maximum 5' depth.

Barrett Creek Facility: The facility has two above ground containers for rearing. Each tank can hold approximately 5,000 gallons

5.6) Acclimation/release facilities.

- *Canyonville Acclimation Facility* - This facility is located at RM 51 on lower Canyon Creek, a tributary to the South Umpqua River. Smolts are acclimated in a 47'-8" x 12' x 4'-8" concrete raceway that discharges into Canyon Creek. Water is supplied by gravity flow from the City of Canyonville intake on Canyon Creek.

- *Seven Feathers Acclimation Facility - Seven Feathers Acclimation Facility* - This is located at RM 51 behind the Cow Creek Band of the Umpqua Tribe of Indians Seven Feathers Casino in Canyonville. The site currently has two acclimation ponds; a 23' x 4' x 4'-9" above ground plastic lined Modutank, and a 5.5' x 24' x 12' above ground concrete tank. Smolts are acclimated at the facility and then released into the mouth of Canyon Creek near the confluence with the South Fork of the Umpqua River. The primary pump system is a skid mounted pump station consisting of two 150 gpm pumps

located adjacent to the acclimation ponds. A backup pump system is also in place and consists of a 10' high, screened vertical culvert is used to enclose the two 1.5 horsepower sewage pumps used for water flow. Each pump runs at 100 – 120 gpm.

- *Galesville Reservoir* - This acclimation net pen is located below the Galesville Dam. From 2000 to 2002, smolts were acclimated in net pens at this reservoir.

- *Eastwood Elementary* - The school is situated at Deer Creek at RM 11 of the South Umpqua River. The site has two 1,500 gallon concrete raceways. The facility uses a 1.5 hp sewage pump to provide water to a holding tank for water flow.

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

In 2004, 936 of 11,814 (7.9%) steelhead smolts died at the Seven Feather's concrete raceway. The mortality occurred during a high water event that plugged the pumps. As a result of this fish loss, a contingency plan was adopted. An additional pump was installed, plus a center water-spray and fresh flow aerator added to increase oxygen levels. In addition, Seven Feather's staff agreed to do live checks of the fish hourly during high flow events rather than just relying on the float alarm.

On 4/1/13 a pump failure contributed to the loss of 20,672 one-year old winter steelhead smolts at the Seven Feather's site. A re-fabrication of the tank's outlet as well as new pumps for the intake have been added since this loss in an effort to increase oxygen and increase flow rates to 250 gal/min.

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 state-of-the-art 245 kW emergency generator which has the capacity to run the N. Umpqua pump station and hatchery facility concurrently. The facility is staffed 24 hours a day, 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 facility grounds audio siren in case of water emergencies. The hatch house is equipped with an intruder security system connected to same radio and siren. Both intakes are equipped with screens meeting NOAA Fisheries screening criteria.

Canyonville Acclimation is monitored by volunteers and a host to monitor water flow nearly 24 hours per day during acclimation. The raceway also has a flow alarm system. The water system is also hooked into the City of Canyonville water system so it is also monitored by the city. Backup trash pumps are set up and volunteers are trained so if water flow is interrupted the pumps can be immediately turned on to provide sufficient flow.

Seven Feathers has a float alarm that is checked hourly by tribal personnel. Every other

hour, staff makes a live check of the fish in the raceway. During high flow events, staff conducts a live check hourly.

Eastwood Elementary has a two-pump system which fills a holding tank. If water flow to one pump is slowed a phone tree calling system is activated, a flashing light alarm comes on and the second pump automatically turns on. Water from the holding tank can continue to gravity feed the system for 1 – 2 hours if both pumps failed. This would allow time to setup a backup trash pump or back flush and clean a main pump.

Barrett Creek has been re-plumbed to include a main and backup waterline. Sites are checked regularly by volunteers when in use.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

The South Umpqua River wild and hatchery winter steelhead adults are used as broodstock for the program.

6.2) Supporting information.

6.2.1) History.

The Umpqua River winter steelhead hatchery program began in the Smith River in 1947. From 1969 to 1996, the Smith River was stocked with Alsea River stock winter steelhead smolts. The Smith River program was discontinued after 1996. The North Umpqua River was stocked from 1961 to 1992 with North Umpqua River (stock-55) winter steelhead smolts. The winter steelhead program in the North Umpqua was discontinued after 1992. The South Umpqua hatchery program was started in 1961. From 1971 to 1993, Alsea winter steelhead were stocked in the South Umpqua basin. The program discontinued the Alsea stock after 1993 and used a combination of South Umpqua and North Umpqua steelhead for broodstock until 1998. The program has used 100% South Umpqua winter steelhead (stock-18) for broodstock since 1999.

The South Umpqua hatchery program was re-founded in 1999 with the use of 100% South Umpqua steelhead as brood. Wild winter steelhead will continue to annually compose of 20% to 60% of the broodstock for this program. The fish are collected throughout the duration of their run, from January through early May. They are checked weekly at the hatchery for ripeness for spawning. The South Umpqua program is the only winter steelhead hatchery program in the Umpqua basin. Only hatchery fish can be harvested in the Umpqua Basin, and the hatchery fish enhance the harvest opportunities on the Mainstem and North Umpqua.

6.2.2) Annual size.

This program uses 80 – 130 pairs of South Umpqua winter steelhead for broodstock.

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

This program has used over 60% naturally-produced winter steelhead in its broodstock from 1999 to 2012. Guidelines established by the NFCP, Conservation Plans and best available science will be used to determine broodstock collection strategies in the future. Presently the program plans to increase the number of hatchery origin fish used for broodstock and decrease wild brood. The proposed level of natural fish in broodstock may vary from 20-60% annually depending on the stock status of natural fish and other

plans and policies. See table 7.4.2. for the past broodstock collection levels for winter steelhead.

6.2.4) Genetic or ecological differences.

No genetic, phenotypic, or ecological differences between hatchery and naturally produced South Umpqua winter steelhead has been detected by ODFW staff.

6.2.5) Reasons for choosing.

The brood was chosen to represent the local winter steelhead population of the South Umpqua basin.

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

The South Umpqua River local winter steelhead will continue to be the primary source of broodstock for this program. A percentage (20-60%) of wild fish will be incorporated into the hatchery broodstock each year to produce smolts that will be genetically similar to naturally produced steelhead. Phenotypic traits or characteristics will not be considered while selecting brood fish. Brood will be collected throughout the run from January through April to represent the genetic diversity of the population. All age classes will be represented in the broodstock. Ripe brood fish will be randomly spawned and fertilized by a 10 x 10 matrix. No adverse genetic or ecological impacts to listed Coho Salmon are anticipated while collecting broodstock for the steelhead program since most Coho Salmon have already migrated into the basin's tributaries and spawned by the time collection begins.

SECTION 7. BROODSTOCK COLLECTION

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

Between 80 and 130 pairs of adult winter steelhead will be collected within the South Umpqua basin to produce 150,000 winter steelhead smolts. Hatchery origin steelhead will make up the majority of the broodstock (40%-80%).

7.2) Collection or sampling design.

- **Canyon Creek Fishway:** This trap is operated from January through April. All naturally produced fish are passed upstream. Hatchery fish are either used for brood, taken to local food banks, passed, or transported to Galesville Reservoir for angling opportunity. Normally 20 pairs of hatchery fish are collected per month during February, March and April. This corresponds to peak run times and provides about 80% of the total broodstock.

- **Galesville Dam Trap:** This trap is operated from March through May. Any hatchery fish will either be used for brood, taken to local food banks, passed, or transported to Galesville Reservoir for angling opportunity. One out of every four wild fish may be collected with the rest being passed back into Cow Creek.

- **South Umpqua Hook-and-Line:** Guides and volunteers catch wild brood fish for the program in the South Umpqua from January until the season closes. The permits issued to the guides and volunteers allow capture of wild fish from RM 0 to RM 81 on the South Umpqua River, and up to RM 10 on Cow Creek. Most fish are caught below RM 55. Fish captured are held in a live box in the boat and transferred to the Canyonville Acclimation Pond. There they are placed in a large cage, then hauled up to Rock Creek Hatchery. This method catches between 50% and 100% of the wild steelhead used for broodstock.

- **South Umpqua Falls Fishway:** This trap is operated from March through May to supplement wild fish as needed to meet broodstock goals. In some years hook-and-line methods provided most of the naturally produced broodstock and only a few fish are needed from this trap. Wild fish will be collected at a no greater rate than 25% of the total number of fish in the trap during any particular trapping episode.

- **Tangle Netting:** This method has not been used for collecting winter steelhead to date. If used, the nets will be set up on the South Umpqua River during the peak migration period. Wild fish for the hatchery broodstock will be selected at random from the fish captured.

7.3) Identity.

All hatchery steelhead are marked with a fin clip and are easily identifiable at the time of

capture. In addition to a standard adipose fin clip, some steelhead are also marked with a left ventral or maxillary clip.

7.4) Proposed number to be collected:

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

About 80 – 130 pairs will be collected with a goal of a 1: 1 sex ratio.

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

Table 7.4.2-1. Past broodstock and egg collection levels, and juvenile production for the South Umpqua River winter steelhead program, 2002-2014.

Brood Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
2002	150 (84% wild)	103 (73% wild)	0	332,000	266,983
2003	125 (18% wild)	73 (19% wild)	0	211,100	153,135
2004	141 (40% wild)	89 (30% wild)	0	252,741	203,620
2005	121 (100% wild)	101 (100% wild)	0	229,423	180,156
2006	86 (51% wild)	85 (56% wild)	0	218,379	178,127
2007	79 (70% wild)	49 (76% wild)	0	224,157	200,758
2008	90 (72% wild)	47 (68% wild)	0	189,790	166,888
2009	81 (88% wild)	52 (83% wild)	0	201,407	172,495
2010	127 (76% wild)	85 (73% wild)	0	262,027	235,123
2011	81 (62% wild)	54 (69% wild)	0	209,516	186,858
2012	105 (71% wild)	81 (77% wild)	0	212,509	175,459
2013	89 (91% wild)	79 (72% wild)	0	154,076	125,497
2014*	86 (37% wild)	86 (49% wild)	0	150,456	115,049

*First year of management action implemented to decrease number of wild brood.

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

Hatchery fish returning to Canyon Creek will be handled according to the ODFW Hatchery Management Plan disposition guidelines and/or in accordance to the Memorandum of Understanding between the Cow Creek Band of Umpqua Tribe of Indians, Oregon Department of Fish and Wildlife, and the Umpqua Fishermen's Association regarding distribution of excess winter steelhead from the Canyonville trap on Canyon Creek, 2014. With the current low stray rates of hatchery fish in the South Umpqua, Canyon Creek is designated as an area of hatchery influence.

7.6) Fish transportation and holding methods.

Fish captured by hook-and-line are held in a live box with an aerator until deposited at Canyonville Acclimation Pond. Once at Canyonville, they are placed in the cage (approximately 8' x 4' x 4'). They are held at Canyonville for 24 to 72 hours and then transported to Rock Creek Hatchery via a 200 gallon push-in tank with aeration, or a 250 gallon tank with aeration and oxygen. Loading is one pound of fish per gallon of water. PolyAqua (synthetic slime) is added to the tank to reduce potential handling abrasions. Fish are in transit from Canyonville Acclimation Pond to Rock Creek Hatchery for about one hour. The Canyon Creek Fishway is only 100' above the Canyonville Acclimation Pond so the transit time is the same. All fishways are checked and cleared at least every 72 hours with the exception of Galesville. Personnel working at the dam call ODFW staff and inform us about the number of fish. This trap is cleared weekly. Hauling methods are the same for all sites. Transit time to Rock Creek Hatchery from South Umpqua Falls is about 2 hours, while transit time from Galesville Reservoir is about 1.5 hours. If broodstock from two traps are hauled on the same day, transit time is about 6 hours.

7.7) Describe fish health maintenance and sanitation procedures applied.

Fish are treated with 167 ppm formalin for 1.0 hour upon receipt at Rock Creek Hatchery and continue to receive 3 treatments weekly until spawning, for fungus prevention. If recommended by ODFW pathology staff, fish are treated upon arrival, with an injection of oxytetracycline HCL (Oxytet 100) at a dosage of approximately 10 mg/kg body weight for treatment of furunculosis. Spawned adults are sampled and tested for viral and bacterial infection by ODFW pathology staff. Tanks are disinfected with chlorine. All equipment is disinfected with iodophor.

7.8) Disposition of carcasses.

Carcasses are placed into mid to upper reaches of Rock Creek and East Fork Rock Creek for nutrient enrichment, following DEQ protocol for carcass placement for stream enrichment.

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

It is unlikely that this broodstock collection program for winter steelhead will have any genetic impacts on naturally-produced listed Coho Salmon populations. However, to minimize adverse ecological effects, any incidental catch of naturally-produced Coho Salmon during steelhead broodstock collection will be released unharmed or taken as brood for the Coho Salmon propagation program. However, due to temporal differences between the run time of Coho and winter steelhead, no take of Coho Salmon is expected. Health risks to naturally-produced Coho Salmon will be minimized by monitoring water flows and properly maintaining fish trap facilities to allow Coho Salmon migration during their run time.

SECTION 8. MATING

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

8.1) Selection method.

Brood fish are randomly chosen to mirror the natural run model of migration. During spawning operations brood fish are selected at random from the ripe fish on the spawning day. Spawning operations are conducted throughout the entire natural spawn timing window.

8.2) Males.

Males are used one time only. Live spawning in the Umpqua Basin would have more impact on wild steelhead than the kill spawning currently used at Rock Creek. Using a live spawning would require collecting 15% more brood fish since fewer eggs can be emitted from the females, and spawning uses a 1:1 ratio. Due to using MS222 to calm the fish for handling the fish would have to be held for 21-days post spawning per FDA standards since there is year-round steelhead fishing in the Umpqua where the fish would out-migrate. Holding the fish would decrease body condition, potentially lead to mortality and delay out-migration. Unlike smaller coastal streams, steelhead swimming to the South Umpqua River have traveled 112-200 miles. Consequently fewer kelts survive to become repeat spawners in the Umpqua than other streams. Thus holding fish and releasing them as kelts would likely have little positive impact on the wild population. Whatever was gained from a few repeat spawners would be lost in the increase number of brood needed for live spawning.

8.3) Fertilization.

Eggs are fertilized in a 10 male x 10 female matrix. Ovarian fluid and tissue samples are drawn on 60 fish to monitor viral presence. Fish are examined by a fish pathologist to monitor overall health and condition. 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.

Winter steelhead in the Umpqua basin is not an ESA listed population, and therefore it is unlikely that the mating process for winter steelhead will have any adverse genetic or ecological effects on listed natural fish populations. However, to maintain the genetic quality of this propagated fish, ripe broodstock will be randomly picked for the mating

scheme in order to represent the entire adult migration time, and efforts will be made to incorporate as much diversity as possible to mimic the natural population's characteristics. A matrix mating scenario will be used to further diversify the genetic quality of propagated fish. The entire window of spawn timing is incorporated into the hatchery progeny to carry forth the acquired diversity of that brood year.

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. Number eggs taken and survival rates of winter steelhead at different life stages, 2002-2014.

Brood Year	Egg Take #	Egg Survival %	Fry Survival %	Juvenile Survival %	Smolt goal
2002	332,000	91.0	91.8	58.7	120,000
2003	211,100	76.2	95.1	44.6	120,000
2004	252,741	87.6	92.7	55.9	120,000
2005	229,423	87.8	90.2	27.2	120,000
2006	218,379	89.2	92.1	39.8	120,000
2007	224,157	92.1	98.2	53.1	120,000
2008	189,790	92.9	95.6	69.4	120,000
2009	201,407	89.5	97.0	19.9	120,000
2010	262,027	92.0	98.7	82	120,000
2011	209,516	93.6	99.0	62.6	120,000
2012	212,509	91.0	94.8	77.7	120,000
2013	154,076	94.6	87.9	78.0**	120,000
2014	150,456	87.5	96.2	n/a	120,000

** Only includes STW-18, 2013 1year old smolts.

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

To achieve the goal for smolt production surplus eggs may be collected. These 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. If the pathology diagnosis detects the presence of pathogens at an unacceptable level, all eggs taken from the infected parents/matrix would be buried. If egg take is adequate for the smolt program, a small number of eggs (less than 3,000) are used for the STEP classroom incubator program. The eyed eggs are distributed to classes in 100-egg groups, to schools in the South Umpqua and Mainstem Umpqua basins. Eggs collected in excess of the program and classroom requirements may be frozen and buried.

9.1.3) Loading densities applied during incubation.

Trays used for incubation are Marisource replica to Heath. The estimated size of green egg is 125 eggs per ounce and eyed egg is 75 eggs per ounce. The density of green eggs in tray is 64 ounces per tray; and the density in hatching tray is 48 ounces per tray. Water flow is set at 5 gallons per minute for egg and fry incubation.

9.1.4) Incubation conditions.

Incubation temperatures are monitored and recorded at 8 am and 4 pm daily. Hatch house water is filtered with 20 micron screens and passes through UV sterilization. Dissolved oxygen is randomly monitored, and is generally found at 100% saturation. When required, water temperature may be increased or decreased to unify rates of development between fish of different spawning dates.

9.1.5) Ponding.

Forced ponding is practiced when approximately 99% are buttoned-up, and at a mean length of about 36 mm. Average weight is about 2,000 fish per pound.

9.1.6) Fish health maintenance and monitoring.

Green eggs are water hardened in 100 ppm PVP iodiphore for 30 minutes. Pathology samples of tissues and ovarian fluid are taken to detect the presence of any viral infection on each species. Fungal infections are controlled with 1,670 ppm formalin via a 15 minute drip 4 times per week. Hatch house water is disinfected with UV. All dead eggs are picked out by machine. Juvenile fish are treated for bacterial infections with oxytetracycline, aquamyacin or florofinical medicated feed as per instructions on the label. Fish health status is always determined prior to release or ponding, and only certified fish are used for stocking.

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.

Winter steelhead in the Umpqua basin is not a listed population. However, eggs are incubated in filtered water to minimize loss due to siltation. Fry are incubated on filtered and UV sterilized water to minimize losses due to disease. Incubation effluent water is diverted into an abatement pond at both hatcheries for further treatment to minimize ecological impacts to the receiving streams and the inhabiting biota. Effluent is monitored and reported quarterly to DEQ as per NPDES permit 0300J to ensure water quality standards. This reduces the impact to habitats of both listed and non-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 , or for years dependable data are available.

Data provided in Table 9.1.1-1.

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

Densities stated are for temperatures below 58^{o}F. For all raceways and rearing containers there is a goal of meeting or exceeding a flow density of 8 – 10 pounds of fish per gpm water flow. Rearing space density goals are one pound of fish per cubic foot of rearing area.

9.2.3) Fish rearing conditions.

Water source, fish holding and rearing facilities are described in sections 4.1, 5.3, and 5.5 respectively. During rearing, temperature is monitored 3 times daily. Fish are visually checked daily for overall health parameters, e.g. fish behavior, depth in water column, sings of disease, mortality etc. Dissolved oxygen is monitored during times of crisis, critical water temperatures, high fish density or low water flow conditions. Rearing containers are flushed or cleaned 1-2 times weekly as needed. Discharge water from cleaning treatments are diverted into the pollution abatement pond. Rearing fish are fed via hand broadcasting of 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.

Table 9.2.4a. Fish growth information (fish/lb) for winter steelhead released at one year old.

Month	Weight (fpp)
June	697.0
July	187.5
August	88.5
September	53.5
October	37.0
November	27.0
December	22.5
January	19.5
February	16.6
March	15.2

Table 9.2.4b. Fish growth information (fish/lb) for winter steelhead released at two years old.

Month	Weight (fpp)
June	1430.0
July	656.0
August	284.8
September	145.4
October	107.6
November	80.2
December	82.8
January	69.0
February	59.2
March	49.6
April	40.5
May	33.0
June	24.9
July	17.6
August	13.1
September	9.5
October	8.0
November	7.5
December	7.1
January	6.3

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

See Tables 9.2.4a and 9.2.4b

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*).

Table 9-2-6. Food type, feeding protocol and food conversion ratios for winter steelhead at Rock Creek Hatchery.

Food Type	Range for Use (fpp)	Food Conversion (avg)
BioVita Starter Mash	3000-1000	1.72
BioVita Starter #0	1000 - 570	1.15
BioVita Starter #1	570 - 300	1.38
BioVita Starter #2	300 - 150	1.43
BioClark's Fry 1.2mm	150 - 90	1.19
BioClark's Fry 1.5mm	90 - 60	1.29
BioClark's Fry 2.0mm	60 - 25	1.02
BioClark's Fry 2.5mm	25 - 11	1.18
BioClark's Fry 3.0mm	11 - 6	1.19

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

Fish health and behavior are monitored daily. Mortalities are collected and analyzed daily. Scheduled pathology examinations are conducted monthly or as needed. Parasitic and bacterial infections are treated as needed, under prescription of an ODFW pathologist. Viral infections are monitored by the ODFW fish health section. Disinfecting of equipment and facilities is conducted to prevent the lateral transfer of viral infection.

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

The smolt development indices used in this program are generally the age of fish, length frequency, condition factor, color, behavior of fish etc. No ATPase enzyme activity studies are conducted.

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

No natural rearing methods are applied. However, smolts are released at multiple age classes (1-year old, 2-year, 3-year) to more closely resemble natural smolts age classes.

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 propagation program is for winter steelhead which are not listed as threatened or endangered. 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. (*Use standardized life stage definitions by species presented in Attachment 2. "Location" is watershed planted (e.g. "Elwha River"*).)

Table 10-1. Proposed fish release numbers, size at release and release locations.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	N/A	N/A	N/A	N/A
Unfed Fry	3,000	2000/lb	May - June	S. Umpqua R. Mainstem Umpqua
Fry	N/A	N/A	N/A	N/A
Fingerling	N/A	N/A	N/A	N/A
Yearling	150,000	5-15/lb	January – early May	Canyon Creek/S. Umpqua

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

Table 10-2. Proposed fish release locations, release point and age of fish.

Stream/Site	Watershed Code	Fish Age	Release Point	Watershed	Basin
Canyonville Acclimation: Canyon Ck	1600302000	1 – 3 yrs	RM 2	South Umpqua	Umpqua
Seven Feathers Acclimation: S. Umpqua	1600300000	1 – 3 yrs	RM 51 confluence of Canyon and South	South Umpqua	Umpqua
Galesville Dam Net pens: Cow Creek	160050000	1 – 3 yrs	RM 61	South Umpqua	Umpqua
South Umpqua	1600300000	1 – 3 yrs	RM 25 – 50 Direct releases	South Umpqua	Umpqua
South Umpqua Mainstem	1600300000 1600100000	Unfed fry	In or near South or Mainstem near schools in Canyonville, Days Creek, Roseburg, Winston, Tenmile, Lookingglass, Sutherlin, Oakland, Elkton, Reedsport	South Umpqua and Mainstem	Umpqua
Eastwood Elem. Deer Creek	1600301000	1 – 3 yrs	RM 2 above confluence with South at RM11	South Umpqua	Umpqua
Lookingglass	1600310000	1 – 3 yrs	Near confluence with South at RM 25	South Umpqua	Umpqua
Rock Creek Hatchery: Rock Ck	1600200000	1 – 3 yrs	RM36 of North Umpqua	North Umpqua	Umpqua

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

Table 10-3. Past release numbers by age classes and size fish at release, 1991-2014.

Release Year	Eggs/ Unfed Fry*	Avg size	Fry	Avg size	Fingerling	Avg size	Smolt	Avg size	Release Dates
1991							36,770	12.3	Apr 10 - May 13
1992							18,692	7.1	Apr 13
1993							18,334	7.5	Apr 22
1994							82,000	12.6	n/a
1995	92,731	n/a			23,818	21.3	72,135	6.4	Mar 30 - Apr 25
1996	278	n/a			17,627	55.8	104,539	6.1	Mar 27 - Oct 7
1997							78,882	7.1	Feb 13 - Apr 22
1998							44,706	5.5	Feb 3 - Apr 6
1999	52,163	n/a					99,073	7.6	Mar 2 - Apr 8
2000	1,350	n/a					87,109	7.3	Mar 6 - Apr 28
2001	1,305	n/a					62,101	5.9	Mar 5 - May 18
2002	1,530	n/a					90,288	5.4	Feb 11 - Apr 15
2003							78,691	6.3	Mar 3 - May 2
2004	1,350	n/a					92,216	5.1	Feb 13 - Apr 23
2005	1,350	n/a					117,129	5.5	Feb 24 - Apr 29
2006	1,080	n/a					64,927	5.8	Mar 3 - Apr 27
2007	1,778	n/a					16,648	7.3	Apr 26 - Apr 30
2008	1,715	n/a					28,224	4.7	Mar 31 - Apr 25
2009	2,179	n/a					90,808	5.0	Feb 23 - Apr 29
2010							101,261	5.7	Feb 23 - Apr 28
2011					17,534	17.2	76,043	9.7	Feb 22 - Apr 27
2012	1,425	n/a					108,968	9.7	Feb 14 - Apr 4
2013	1,513	n/a			11,489	17.0	60,590	8.0	Feb 20 - Apr 7
2014							78,403	5.4	Feb 14 - Apr 29
2015					12,000	16.0	93,140	7.3	Jan 27 - Mar 31
Average	**11,553**	**n/a**			**16,494**	**21.3**	**72,067**	**6.4**	

*STEP releases. Source: ODFW HMS database.

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

For actual fish release dates, see Table 10-3 above. In 1999 the program began acclimating winter steelhead smolts at the Canyonville acclimation pond and a second acclimation site was established at Seven Feathers in 2003. The goal is to acclimate over 80% of the smolts released. The program has successfully acclimated 100% of the smolts released since 2002. Acclimation consists of holding the smolts at the acclimation

site for 17 to 21 days. They are fed a maintenance diet each week. Mark quality, length frequency, condition factor and smolt condition data is collected during each release. The smolts are force-released via a pipe to the water body. Eastwood Elementary may have to bucket their unfed fry to the creek. The program normally acclimates and releases 3 to 4 groups of fish at each site. This allows the program to release fish throughout the normal late January to early May migration period for winter steelhead smolts. To represent a more natural age at smolting and reduce residualism the program experimented with releasing 1-year old to 3-year old smolts. The program now currently releases primarily 1-year old smolts. Generally over 90% of these fish are in smolt condition upon release, and quickly migrate out of Canyon Creek.

10.5) Fish transportation procedures, if applicable.

Smolts are transported to the various acclimation sites via the transportation tanks and methods described in section 5.2. Smolts not acclimated are directly released from the transport tank into the South Umpqua between RM 0 to 55. Most releases are near RM 40 (Myrtle Creek) or RM 50 (Stanton Park). Since 2002, 100% of the smolts have been acclimated.

10.6) Acclimation procedures.

See section 10.4.

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

Winter steelhead smolts are 100% adipose clipped.

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

The past number goal of 120,000 and releasing older smolts, there has not been a surplus in recent years. The program is scheduled to increase to 150,000 smolts once the current production goals can be consistently met. If a surplus was identified, the smolts could be released as trout, in local reservoirs above anadromous fish distribution.

10.9) Fish health certification procedures applied pre-release.

As per ODFW Fish Health Management Policy, a certified ODFW fish pathologist examines fish health 30 days prior to 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 the district biologist to initiate a pre-established contingency plan. The contingency plan entails releasing or transferring broodstock depending on species, and releasing indigenous juveniles in order of closest to release

date. The fish that are not released immediately will be kept on life support until transport is available, or the emergency is resolved.

At the acclimation sites, each site has an alarm system that would lead to the call of the STEP Biologist or District Biologist. Depending on the specifics of the flood/water system failure and the nearness the smolts are to the scheduled release date, ODFW staff would either recommend initiating life support measures or releasing the fish. All sites are equipped with additional pumps and sprayers to aerate the raceways. Personnel, hosts and volunteers associated with each acclimation site have been trained in emergency procedures. ODFW staff would assist release procedures.

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 one and two-year smolt size and released throughout the normal smoltification and migration time to ensure better survival, quick downward migration and minimize competition in natal areas.

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 under Section 1.10.

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 activities associated with this monitoring program 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, Oregon Wildlife Heritage Funds, and the Cow Creek Band of the Umpqua Tribe of Indians are occasionally available for special projects. Funds are committed for this monitoring program, but can change with relatively short notice. Winchester Dam counts have been ongoing since 1946 and are currently funded through Sport Fishing and Restoration Act dollars.

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.

ODFW staff has not identified any potential genetic or ecological risks from the monitoring activities of this program.

SECTION 12. RESEARCH

12.1) Objective or purpose.

- Continue monitoring of adult returns over Winchester Dam counting station to determine abundance, run timing, and the ratio of hatchery produced fish which do not return to the South Umpqua. No anticipated impact to naturally-produced listed Coho Salmon.
- Continue punch-card records of harvest or other statewide harvest estimates as determined by the best available science.
- If funding becomes available, conduct radio telemetry studies of hatchery and naturally produced South Umpqua winter steelhead. This project would provide additional data on distribution, migration rates and habitat use of hatchery and naturally produced steelhead in the South Umpqua basin. No anticipated impact to listed Coho Salmon.
- If funding becomes available studies may be conducted to find whether genetic similarities/differences between hatchery and naturally produced winter steelhead exist.
- If funding and technology become available, sample returning natural and hatchery 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.
- Conduct an intensive creel survey of the South Umpqua to evaluate the contribution of the program fish to the fishery and to the local economy. Due to differences in run time, there would be no anticipated impact to naturally-produced Coho Salmon due to the creel survey.
- Egg Acclimation Study: The main goal of this study will be to determine the effects of acclimating winter steelhead to Canyon Creek water at the embryonic (eyed egg) stage. Eggs will be held on Canyon Creek water at both acclimation sites for a period of 3-5 weeks beginning in 2016. This project will take place for three consecutive years (2016, 2017, and 2018). After treatment eggs will be delivered back to Rock Creek Hatchery, reared, and fin-clipped uniquely to distinguish them from non-egg acclimated fish. Adult returns, primarily to the Canyon Creek trap, will then be analyzed to determine the effectiveness of egg acclimating relative to standard smolt acclimations.

12.2) Cooperating and funding agencies.

ODFW Southwest Regional Office and other partners and potential grants as noted in Section 11.1.2.

12.3) Principle investigator or project supervisor and staff.

Principal Investigator: Greg Huchko, District Fisheries Biologist, Umpqua Watershed District, ODFW, Roseburg.
Investigators: Umpqua Watershed fisheries staff, ODFW, Roseburg.

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

N/A

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

- Fish counts at Winchester Dam are made via a 24-hour video of fish passage.
- Punch-card data is collected statewide and broken down into basins and reaches for each species. This data is currently posted on the ODFW website.
- A radio telemetry and/or tagging study would involve capturing naturally produced and hatchery steelhead, then monitoring their movements. The fish would have to be hook-and-line or tangle-netted. Sex and length of fish would be noted and a gastric radio would be inserted and immediately released.
- To collect genetic or environmental samples, naturally-produced winter steelhead would have to be captured using the method described above or captured at South Umpqua Falls Fishway. Tissue samples would be taken, labeled and sent to a laboratory for analysis. Hatchery steelhead could be captured and a sample obtained as they returned to Canyon Creek. Tissue samples could also be collected from brood spawned at the hatchery.
- A statistical creel protocol would be developed to conduct angler surveys, angler counts, and rig counts.

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

Dates for all of the research projects would take place from January through May.

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

None of the projects described above involve holding the fish beyond the length of time they are held under current procedures in the fish ladder(s). Most handling would take less than 5 minutes to identify, sex, measure and either insert a gastric tag or take a tissue sample. Fish would be released in the same location that they were captured.

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

Incidental mortality of winter steelhead would be approximately 3 to 5 percent. With a target sample of 50 naturally produced fish, 3 may die as a result of handling stress for marking. Tissue sample would likely have even less mortality. No take of ESA listed coho 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 naturally-produced listed Coho Salmon is anticipated due to research activities.

12.10) Alternative methods to achieve project objectives.

- Radio-telemetry: Visual inspections of potential spawning areas could be conducted to determine the distribution of naturally produced and hatchery steelhead. However, due to difficulties in discerning marked and non-marked fish and the rugged terrain and limited access, this evaluation would be less effective than a radio telemetry study to determine distribution, migration patterns, and behavior.
- There may not be better alternative method to collecting tissue samples for evaluating toxicology and/or genetic differences in fish. External morphological and behavioral characteristics do not clearly reflect differences, similarities or chemical concentrations.
- Non-statistical creel surveys only produce some generalities which are useful but cannot accurately estimate harvest levels, effort, and economic impacts.

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

Wild Winter Steelhead —1 to 3 adult mortalities if a tagging/tissue study was conducted.
Fall Chinook—No mortality.
Spring Chinook —No mortality.
Summer Steelhead—No mortality.
Cutthroat trout—No mortality.
Coho-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.

Staff conducting any research project will be properly trained in fish identification and fish handling. Any naturally-produced coho captured will be immediately released.

SECTION 13. ATTACHMENTS AND CITATIONS

References

Federal Register Notice. 1998. Endangered and Threatened Species: Threatened Status for Two ESUs of Steelhead in Washington, Oregon, and California. Vol. 63, No 53, pp 13347-13371.

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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.

Coastal Multi-Species Conservation Management Plan (CMP), 2014. http://www.dfw.state.or.us/fish/CRP/coastal_multispecies.asp

Memorandum of Understanding between The Cow Creek Band of Umpqua Indians, and The Oregon Department of Fish and Wildlife, and The Umpqua Fishermen's Association. Supporting: Distribution of Excess Winter Steelhead from the Canyonville Trap on Canyon Creek. 2014.

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, ODFW

Signature:_____Date:_____

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

Signature: _____ Date:_____