HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	**Umpqua River Basin Summer Steelhead**
Species or Hatchery Stock:	**Summer Steelhead Stock 55**
Agency/Operator:	**Oregon Department of Fish and Wildlife**
Watershed and Region:	**Umpqua Watershed-Southwest Region**
Date Submitted:	**March 8, 2006**
Date Last Updated:	**March 7, 2006**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.
Rock Creek Hatchery, Umpqua River Basin Summer Steelhead Program, stock 55.

1.2) Species and population (or stock) under propagation, and ESA status.
Umpqua basin naturally produced steelhead (*Oncorhynchus mykiss*) 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).

Umpqua basin naturally produced coho (*Oncorhynchus kisutch*) has been delisted from the federal ESA. These fish are a sensitive species under Oregon's Sensitive Species Rule (OAR 635-100-0040).

1.3) Responsible organization and individuals

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:
Unlike other Umpqua basin fisheries programs the summer steelhead hatchery program is run solely by ODFW personnel. Occasionally volunteers may help with spawning at the hatchery. The Umpqua National Forest, Steamboaters and the North Umpqua Foundation employ up to 4 personnel from June-October as part of a "Fish Watch" program to help reduce poaching of

steelhead in summer resting pools.

1.4) Funding source, staffing level, and annual hatchery program operational costs.
Annual operating costs for Rock Creek Hatchery is funded 50% by State General Funds and 50% with state fishing license revenues. Rock Creek Hatchery has a staff of 5 permanent full-time employees plus seasonal employees that vary based on the need for property guards and fin clippers.

Table 1.1 shows the budget for the summer steelhead program at Rock Creek Hatchery.

Table 1-1. Annual program budget.

Year	Total Budget	(Species) Budget	Percent of Total
1999	$343,507	STS	22%
2000	$372,504	STS	22%
2001	$372,504	STS	23%
2002	$396,996	STS	24%
2003	$352,000	STS	17%

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

Current Facilities

- Winchester Dam Trap Site: This facility is located at RM 7 on the North Umpqua River, a tributary to the mainstem Umpqua River. Winchester Dam has a counting station for monitoring the number of returning adults moving upstream, plus it has a capture facility. Summer steelhead adults are captured here and transported to Rock Creek Hatchery for use as broodstock. Watershed code is 1600200000.
- Rock Creek Fish Hatchery: The hatchery is located on Rock Creek (RM 0.25), a tributary to the North Umpqua River at RM 36. Steelhead can bypass the hatchery or return and be captured at the hatchery via a fish ladder and a finger weir trap. Steelhead captured can be used for broodstock, food bank programs, or recycled back into the fishery for angler opportunity. If nutrient enrichment programs are expanded, the carcasses could be used for stream enrichment. Watershed code is 1600202000.

Spawning and egg incubation facilities:
Rock Creek Hatchery is responsible for the spawning of all adults and incubation of eggs.

Egg incubation and rearing facilities:
Egg incubation and rearing occur at Rock Creek Hatchery.

Release sites:
The release of summer steelhead smolts occur from Rock Creek Hatchery downstream to River Forks Park at North Umpqua RM 0. Presently 67% of the summer steelhead smolts are volitionally released from Rock Creek Hatchery, 18% are transported and released down river at Whistlers Bend Park at RM 21, and the remaining 15% are transported and released at Amacher Park at RM 7. A small number (<2,000) are released as unfed fry as part of a school education program

sponsored through ODFW's Salmon and Trout Enhancement Program (STEP).

1.6) Type of program.
The Umpqua summer steelhead program is managed as harvest augmentation program.

1.7) Purpose (Goal) of program.
The goal of this program is to provide a significant number of hatchery-produced steelhead for recreational fishing in the Umpqua basin. The North Fork of the Umpqua River is known nationally as an excellent fishery for summer steelhead. The goal of this program is to provide approximately 5,000 hatchery-produced steelhead to the fishery. When available, about 2,000 eggs are provided for classroom incubators as part of a STEP project to help educate school children about salmonid biology, critical life cycles, and habitat requirements.

1.8) Justification for the program.
The Oregon Department of Fish and Wildlife began counting adult summer steelhead over Winchester Dam in 1946. For the first ten years the average number of wild fish returning was approximately 3,300. The public demand for increased opportunities to harvest summer steelhead, in conjunction with management goals for escapement, lead to the initiation of a summer steelhead hatchery program in 1958. In 1986, the ODFW adopted the North Umpqua River Fish Management Plan, which has an objective of increasing wild summer steelhead to a minimum of 6,000 fish. Another objective of the plan is to maintaining a return of about 5,000 adult hatchery-produced summer steelhead to Winchester Dam to provide a freshwater fishery. Presently, the ODFW has fishing regulations that target hatchery-origin fin-clipped summer steelhead for harvest. This reduces potential harvest impacts to naturally produced steelhead and salmon. Overall, this program has a minimal impact on naturally-produced coho while still providing fish for a very popular summer steelhead fishery. Adult summer steelhead return to the Umpqua basin from May through November, the bulk of the run (and fishery) occurs prior to the return of coho adults in October through January. Adult summer steelhead in the North Umpqua primarily spawn in the Steamboat Creek basin which sees limited coho spawning activity. This spatial and temporal difference in run timing and spawning distribution reduces the incidental impacts on coho due to summer steelhead angling efforts and broodstock collection. Hatchery-produced summer steelhead spawning (January - February) could potentially overlap with coho salmon (November - January). However, radio telemetry data collected from 1998 through 2000 on 107 hatchery summer steelhead showed 65% of the hatchery fish were harvested (Loomis et al 2003). Of the remaining 37% of the hatchery steelhead, 70% spawned in the Rock Creek sub-basin, 19% spawned below the confluence of Rock Creek and the North Umpqua, and 5% spawned above the Rock Creek/North Umpqua confluence (2 transmitters were lost). Of the 142 miles of coho habitat in the North Umpqua, the Rock Creek basin only contains 13.6% of the coho habitat. Therefore, the general spatial and temporal separation in spawning timing and habitat between hatchery steelhead and wild coho should minimize the potential for impacts to coho. Another strong justification is that, the program is designed to educate Oregon school students about salmonid biology, their critical life stages and special habitat requirements. This aspect of the program involves multiple schools and has had strong public support and participation. In the long run, such educational programs will help in the conservation and management of the natural resources of the State of Oregon.

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

BENEFITS **Performance Standards**	**BENEFITS** **Performance Indicators**	**BENEFITS** **Monitoring & Evaluation**
Provide hatchery summer steelhead for recreational harvest.	• Release approximately 165,000 summer steelhead smolts annually. • Maintain an average annual run of 5,000 hatchery summer steelhead crossing Winchester Dam. • Program fish provide a freshwater fishery.	• All releases are properly documented. • Annual Winchester Dam counts are used to document the population size and trends of the hatchery- and naturally-produced summer steelhead. • Quantify the number of program fish released and observed in the fishery to evaluate their survival, performance, contribution to the fishery, and escapement.
Program summer steelhead are identifiable.	• All juveniles released will be marked.	• Verify that mark quality goals are being met by using mark efficiency checks prior to release.
Healthy summer steelhead between 1 - 3 years old are released.	• Over half of the smolts will be volitionally released. • Smolt age at release will mimic naturally produced steelhead.	• Document size, age, and indicators of smoltification of program fish prior to release. • Evaluate the cost benefits and biological benefits of 1, 2, and 3-year old smolts. • Periodically monitor the size and age distribution of naturally produced summer steelhead smolts.
Summer 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. • Based on the Conservation Plan and the Fish Hatchery Management Policy, a Hatchery Management Plan will be developed.	• 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 summer steelhead broodstock does not impact naturally-produced coho.	• Temporal differences between adult summer steelhead and coho are maintained. • No coho are trapped during summer steelhead broodstock collection.	• Monitor the passage of all fish species at Winchester Dam to ensure no coho are present while collecting summer steelhead broodstock from May - September. During October & November, steelhead brood collection is incidental to coho brood collection and follows the Coho HGMP protocols. • If an adult coho is documented in the Winchester Dam during the May - September time period, it is allowed free-passage.
RISKS **Performance Standards**	**RISKS** **Performance Indicators**	**RISKS** **Monitoring & Evaluations**
Life history characteristics of program summer steelhead will not diverge significantly from naturally produced steelhead.	• Releases of program fish mimic the emigration of naturally produced steelhead. • At least half of the annual releases are volitional. • Run timing of adult hatchery summer steelhead does not differ from run timing of naturally produced fish. • Behavioral and morphological characteristics of program fish are similar to naturally produced summer steelhead. • Broodstock collection is random and reflects the natural timing and age classes represented in the natural population. • Brood collection standards will meet or exceed the Native Fish Conservation	• Appropriate downstream monitoring techniques will be periodically used to monitor juvenile emigration, size, and smoltification. • Smolts will be reared at least one month on Rock Creek/North Umpqua water. • Counts at Winchester Dam will be used to verify run times of natural, program, and listed fish. • Steelhead passing Winchester Dam will be monitored to document morphological characteristics of program and natural summer steelhead. • Develop a program to periodically sample hatchery juveniles and returning adults for

	Policy.	phenotypic and genotypic characteristics to measure the similarities/differences with naturally produced steelhead.
Releases of program juveniles have a minimum impact on naturally-produced coho juveniles.	• Most program fish are released as 1 or 2-year old smolts to reduce residualism in the North Umpqua. • Program fish are checked for appropriate signs of smoltification prior to release. • Program fish are primarily released as smolts to reduce the temporal/spatial overlap with wild coho emigration.	• Appropriate downstream monitoring will be periodically conducted for program fish and wild coho in the basin. • Develop a program to evaluate residualism of different aged summer steelhead smolts.
Harvest of program steelhead has a minimal impact on naturally-produced coho.	• Temporal differences in run timing between the species reduces impacts to returning coho. • Fishing regulations reduce incidental harvest of coho. • Fishing gear restrictions reduce incidental capture or mortality of emigrating coho juveniles.	• Use Winchester Dam fish counts to document the run times of returning adult summer steelhead and coho. • Conduct periodic creel surveys to document incidental catch of wild coho during the summer steelhead season. • Periodically review angling regulations to ensure appropriate season/gear limitations to reduce potential impacts to coho.
Hatchery operations comply with the Fish Hatchery Management Policy and other state and federal guidelines and permits.	• Hatchery operations conform to applicable fish health, sanitation, and operational guidelines. • Hatchery operations conform to 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 between the facility intake and outflow so flows can be appropriately adjusted for fish passage and water temperature.

1.11) Expected size of program.

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

To meet current production goals we need to collect 110-140 pairs of adult North Umpqua summer steelhead. Native Fish Conservation Policy standards will be met or exceeded. The guideline states that greater than 30% wild brood will be used and 75% of wild stocks passing through Winchester Dam will be passed. In recent years, 100% of the broodstock were naturally produced summer steelhead.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs	NA	NA
Unfed Fry	North Umpqua or tributaries to the North.	2,000 in groups of 100 by schools.
Fry	NA	NA
Fingerling	NA	NA
Yearling	Rock Creek Hatchery Whistlers Park Amacher Park	110,000 30,000 25,000

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

- Creel surveys conducted during the 1997-2000 recreational summer steelhead fishery above Winchester Dam, estimated a sport harvest of approximately 27% and a spawning escapement of 73% (natural & hatchery summer steelhead). The 1998-2000 North Umpqua Steelhead Radio Telemetry Project showed approximately 63% harvest rate on hatchery summer steelhead. Minimal spawning for summer steelhead is thought to occur below Winchester Dam.

- Adult Umpqua hatchery summer steelhead production for the last ten years has ranged from 1,650 to 5,472 with an average return of 3,350. These numbers are from the ODFW Winchester Dam counting station. The total counts since 1992 were made using a video camera. The hatchery production/return target is a return of 5,000 fish crossing Winchester Dam.

Estimated Umpqua hatchery summer steelhead smolt-to-adult escapement rate to North Umpqua

River.

Release year	Hatchery Smolts Released	Hatchery Adult Returns 1-salt	Hatchery Adult Returns 2-salt	Hatchery Adult Returns 3-salt	Repeat Spawners (10%)	Hatchery smolt to adult escapement rate (%)**
1988	228,768	1,854*	6,129	113	810	3.2%
1989	91,862	395	930	518	184	1.8%
1990	152,242	1,178	1,344	228	275	1.6%
1991	171,827	224	1,817	279	232	1.2%
1992	176,730	407	1,435	588	243	1.2%
1993	127,528	390	1,783	214	239	1.7%
1994	75,134	335	1,274	391	200	2.4%
1995	164,526	2,467	4,730	775	797	4.4%
1996	166,843	740	4,027	242	501	2.7%
1997	131,018	905	1,506	292	270	1.4%
1998	125,636	940	3,994	85	502	5.4%
1999	66,368	1,408	3,494	132	503	3.8%
2000	167,225	1,336	3,769	NA	NA	NA
2001	98,469	1,300	NA	NA	NA	NA
2002	103,060	NA	NA	NA	NA	NA
2003						
Average	138,379					2.6%

* Estimate based on % of 1 salt returns to total returns per brood year and averaged from 1988-2000.

** Estimates obtained by dividing adult hatchery returns to Winchester dam by the number of hatchery smolts released in a given brood year.

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

The Umpqua River summer steelhead program began in 1958 and is planned to continue into the future.

1.14) Expected duration of program.

The Umpqua summer steelhead program is ongoing and will continue into the future.

1.15) Watersheds targeted by program.

The Umpqua River summer steelhead program is targeted at the North 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 summer steelhead hatchery program in regard to naturally-produced coho are: the impacts of hatchery smolts on coho smolts, the overlap in spawning ground use between program fish and coho, the accidental collection of adult coho during the summer steelhead brood collection, and the incidental take of coho during the summer steelhead fishery. Since 1987 significant changes have occurred to the summer steelhead program to improve the hatchery broodstock. These changes also reduced impacts to wild

coho. In 1987, the summer steelhead program started using 100% naturally produced steelhead for broodstock. In 1999, modifications were made at Rock Creek Hatchery (RCH) to rear and evaluate the release of 1 to 3-year-old smolts. Releasing multiple age-classes of smolts more closely mimics the life history of wild summer steelhead. This change minimized the potential impact to wild coho by reducing the number of smaller hatchery juvenile summer steelhead residualizing in the mainstem North Umpqua River. Stocking locations have also changed. Previously, hatchery summer steelhead were planted upstream of RCH as 1 year old fish. Currently, all releases occur at or below RCH. Deadline Falls, which is just upstream of the confluence of Rock Creek and the North Umpqua River, is a barrier to upstream migration of juvenile hatchery steelhead. Therefore, the spatial overlap between the program juvenile fish and wild coho was reduced. Additionally, telemetry studies have documented that most hatchery summer steelhead are using Rock Creek for spawning, which reduces the overlap in spawning ground use between the species.

Approximately 80% of the summer steelhead brood fish are collected at Winchester Dam prior to water temperatures becoming too warm to handle fish without causing excessive mortality (usually in July). There are no returning adult coho present in the North Umpqua during this time, and juvenile coho can freely emigrate past Winchester Dam. When the water temperatures cool, (usually September) summer steelhead are again collected. During October and November, when coho are present in the Winchester Dam ladder, the last of the summer steelhead brood is collected incidental to the coho broodstock collection. All protocols necessary for handling of naturally-produced fish species are enacted during this period since coho are the target brood.

Most of the summer steelhead harvest occurs between May - September, prior to the return of coho adults. All of the hatchery steelhead are marked, and the fishery is presently managed as a select fishery. Therefore, accidental harvest of non-clipped, naturally produced, coho is reduced during October and November when a spatial and temporal overlap occurs. In addition, tackle used for steelhead fishing is generally too large to be ingested by emigrating juvenile coho.

1.16.2) Potential Alternatives to the Current Program

Alternative 1: Eliminate the summer steelhead hatchery program.
Pros: Eliminating the summer steelhead hatchery program would eliminate any potential risks to Oregon Coastal coho due to interactions between the two species. It would also eliminate the interaction between hatchery and naturally produced summer steelhead and eliminate the need to collect broodstock. Based on funding levels and other program objectives, the elimination of the summer steelhead program could allow other hatchery programs to be developed or expanded at Rock Creek Hatchery due to the increase in available rearing space.

Cons: If the hatchery program was eliminated, the goals of the 1986 ODFW North Umpqua Fish Management Plan would no longer be met. The elimination of the program would reduce a popular fishery. Creel statistics from 1997-1999 for the bait-allowed section of the North Umpqua River estimates that 1,100-1,900 anglers spend 39,000 to 66,000 hours fishing for summer steelhead. 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 summer 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 and reduced economic benefit of the fishery.

Alternative 2: Increase hatchery summer steelhead production
Pros: Impacts from the summer steelhead hatchery program are minimal to Oregon Coastal coho. Increasing the summer steelhead hatchery program could provide an increase in recreational angling opportunity, an increase in harvest and an increase in economic benefits to Douglas County. It would ensure that management, harvest and escapement goals were met. The current five year average (00-04) of 4,859 returning hatchery steelhead is below the 1986 minimum goal of 5,000 returning hatchery adults. Therefore an increase in smolt production could increase the average return.

Cons: More rearing space would be needed at Rock Creek Hatchery to increase the number summer steelhead smolts. This could lead to other programs at the hatchery being reduced or eliminated. More broodstock would have to be collected in order to increase production. More hatchery steelhead smolts would be present in the mainstem North Umpqua. Although the impacts are not clearly understood, there is some temporal and spatial overlap between program smolts and coho juveniles during emigration.

Alternative 3: Release all smolts below Winchester Dam at an acclimation site lower in the North Umpqua River.
Pros: Releasing the program fish from an acclimation site below Winchester Dam would reduce the interaction between hatchery summer steelhead and coho on spawning grounds in Rock Creek and between coho and juvenile program smolts during some of their out-migration in the mainstem North Umpqua. All hatchery summer steelhead could be sorted at Winchester Dam and prevented from migrating upstream.

Cons: By releasing all the smolts below Winchester Dam there would be a reduction of hatchery returns further up the North Umpqua. This would concentrate the fishery lower in the North Umpqua, likely causing increased angler crowding and reduced fishing effort due to less public area for angling. This would decrease the economic benefit of the program to Douglas County. It would be necessary to purchase, build, and operate a downstream acclimation site. For the aforementioned costs, this alternative would not significantly reduce impacts to naturally-produced coho. This alternative would fail to meet the 1986 North Umpqua Management Plan objectives. Warm water temperatures which are common below Winchester Dam during the summer would likely negatively impact hatchery summer steelhead holding downstream. These fish may stray into lower tributaries which are currently not used by summer steelhead.

1.16.3) Potential Reforms and Investments

Reform/Investment 1: If the summer steelhead hatchery program was to be discontinued, a new North Umpqua Management Plan, or similar plan would need to be developed and approved. There would be some economic impacts due to a reduction in the recreational fishery. Current angling regulations (catch and release on wild summer steelhead) would likely continue with minimal impacts to naturally produced summer steelhead. Cost would be unknown for using the rearing space for another program.

Reform/Investment 2: Since rearing space at Rock Creek Hatchery is limited, the addition of more summer steelhead smolts would require a reduction in another program or the construction of additional rearing ponds. The water delivery system would also need to be upgraded for the additional rearing and broodstock holding. More broodstock would need to be collected at Winchester Dam and held at Rock Creek Hatchery prior to spawning. Costs would be high if additional construction and plumbing was necessary.

Reform/Investment 3: A suitable downstream acclimation site would need to be identified and purchased. Purchasing a new off-site acclimation facility would be very expensive and may not be feasible. Water for the acclimation facility could be provided only in part from a water rights transfer. The transfer could leave Rock Creek Hatchery short of needed water and still may not provide enough for the acclimation facility. Currently no water is available from the North Umpqua River during the summer months. Additional personnel would be necessary to operate the acclimation site. If all hatchery fish were sorted at Winchester Dam, additional personnel would be necessary to allow sorting and removal of the hatchery fish. Total costs for this alternative would be high, but cannot be estimated until more precise information on an acclimation site and water rights was available.

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

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

Rock Creek hatchery has been operating under an incidental take permit (number 1017) for Umpqua cutthroat trout which were classified as endangered under the Federal Endangered Species Act in 1995. This species was removed from the ESA list in April, 2000 and subsequently the Oregon Department of Fish and Wildlife withdrew their application for the incidental take permit. The ODFW submitted an HGMP for coho to NOAA/NMFS in March 2003. Oregon Coast Coho also has been delisted from the federal ESA.

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

Oregon Coastal coho salmon are currently not listed under the federal ESA. However, no take of naturally-produced coho is expected from this summer steelhead hatchery program.

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

Umpqua Complex

One of the major naturally-produced salmonid populations in the Umpqua Complex is coho salmon inhabiting the Umpqua Basin. Populations are found in Smith River, lower mainstem tributaries, and the North Fork and South Fork subbasins. There is an estimated 1,230 miles of spawning habitat available to the coho salmon of this complex.

Coho Salmon Life History

Adult coho salmon migrate into fresh water in the fall to spawn. Spawning of wild coho salmon usually occurs from mid-October through January. Adult spawning coho salmon are typically 3 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. The eggs are covered by digging and displacing gravel from the upstream edge of the nest. Each female lays about 2,500 eggs. The adults die soon after spawning. Sex ratios of spawning adults tend to average around 50:50 at most locations (Table 2-1). However, Moring and Lantz (1975) observed 77% males in three small Alsea River tributaries over a period of 14 years. They concluded that males tend to move around a lot and visit multiple streams.

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

Table 2-1. Observations of coho salmon sex ratio at adult traps.

Population Complex	Percent males	Percent females	Location	Run years	Data Source
Nehalem	52%	48%	North Fork trap	1998-1999	Life Cycle Monitoring
Siletz	50%	50%	Mill 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 based on what is known it appears migrations are mostly limited to coastal waters. Initial ocean migration appears to be to the north of their natal stream (Fisher and Pearcy 1985; Hartt and Dell 1986). After the first summer in the ocean, a small proportion of the males attain sexual maturity and return to spawn as jacks. Migration patterns during the fall and winter are unknown. Those fish remaining at sea grow little during winter but feed voraciously during the next spring and summer, growing to about 60-80 cm in length. During this second summer in the ocean, a substantial percentage of these maturing adults are caught in ocean troll and sport fisheries, usually to the south of their natal stream (Lewis 2000). The survivors return to their home streams or neighboring streams where they spawn and die to complete the life cycle.

Habitat Use and Freshwater Distribution

Spawning and rearing of juvenile coho salmon generally take place in small low gradient (generally <3%) tributary streams, although rearing may also take place in lakes where available. Coho salmon require clean gravel for spawning and cool water temperatures (53-58°F preferred, 68°F maximum) for rearing (Reiser and Bjornn 1979). Fry emerge from

February to early June (Moring and Lantz 1975) and occupy backwater pools and the stream margins (Mundie 1969; Lister and Genoe 1970; Nickelson et al. 1992a). During summer, coho prefer pools in small streams, whereas during winter, they prefer off-channel alcoves, beaver ponds, and dam pools with complex cover (Nickelson et al. 1992a, 1992b). Habitat complexity, primarily in the form of large and small wood is an important element of productive coho salmon streams (Nickelson et al. 1992b; Rodgers et al. 1993). Little is known about residence time or habitat use of estuaries during seaward migration. It is usually assumed that coho salmon spend only a short time in the estuary before entering the ocean. However, recent research is finding that rearing in the upper ends of tidal reaches can be extensive.

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

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

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

The critical level of coho population for the Umpqua Complex is 4,900 adult spawners (Nickelson 2001). The habitat of this complex has the potential to support a viable population because high quality habitat is estimated to be present in 169 miles of stream, well above the 45-mile threshold (Nickelson 2001).

The abundance of coho salmon spawners of the Umpqua Complex has ranged from about 3,000 to about 12,800 and has averaged about 7,200 over the past 10 years (Figure 1 and Table 2-2). In four of the past ten years, spawner abundance fell below the critical threshold of 4,900 fish. Recruits per wild spawner have exhibited a downward trend over the last 7 years, with the last three falling to below one (Table 2-2 and Figure 2). Hatchery fish have been common in the spawning population in most years of the last decade (Table 2-2).

b) Provide the most recent 12 year (e.g. 1990-present) progeny to parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of data.

A Life-Cycle Monitoring Site (Solazzi et al. 2000) is located at West Fork Smith River. Adult abundance in West Fork Smith River in 1999 was estimated to be 264 fish (Table 2-3). In addition, a mark-recapture estimate for adult coho salmon crossing Smith River Falls (1999) yielded an estimate of 1,541, of which 55% were males. Smolt production in the West Fork Smith River has ranged from about 10,900 to about 22,400. Estimated smolt abundance for the entire Umpqua Complex

ranged from 472 thousand to 686 thousand for the 1997-99 broods (Table 2-4). Also see Table 2-2 for recruits per spawner.

c) Provide the most recent 12 year (e.g. 1990-2002) annual spawning abundance estimates, or any other abundance information. Indicate source of data.

See Figure 1 below.

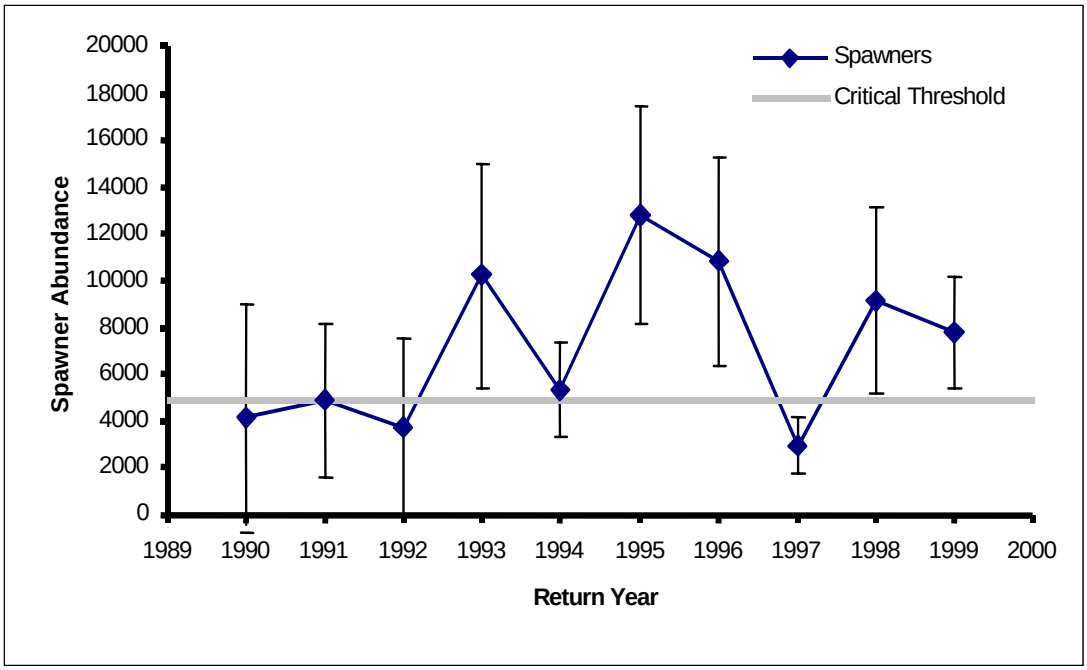

Figure 1. Trend in adult coho salmon abundance relative to the critical population level for the Umpqua Complex. Error bars are 95% confidence limits.

Table 2-2. Population parameters for the Umpqua Complex coho salmon.

Return Year	Wild spawners	Hatchery strays	Percent hatchery	Pre-harvest wild population	Recruits per spawner
1990	4,113	5,979	59%	13,225	
1991	4,875	-	-	8,929	
1992	3,759	-	-	7,687	
1993	10,244	-	-	17,754	4.3
1994	5,338	672	11%	5,727	1.2
1995	12,809	163	1%	14,622	3.9
1996	10,824	7,259	40%	11,804	1.2

1997	2,960	197	6%	3,379	0.6
1998	9,124	789	8%	9,896	0.8
1999	7,821	251	3%	8,464	0.8
Annual mean	7,187	2,187	18%	10,149	1.8

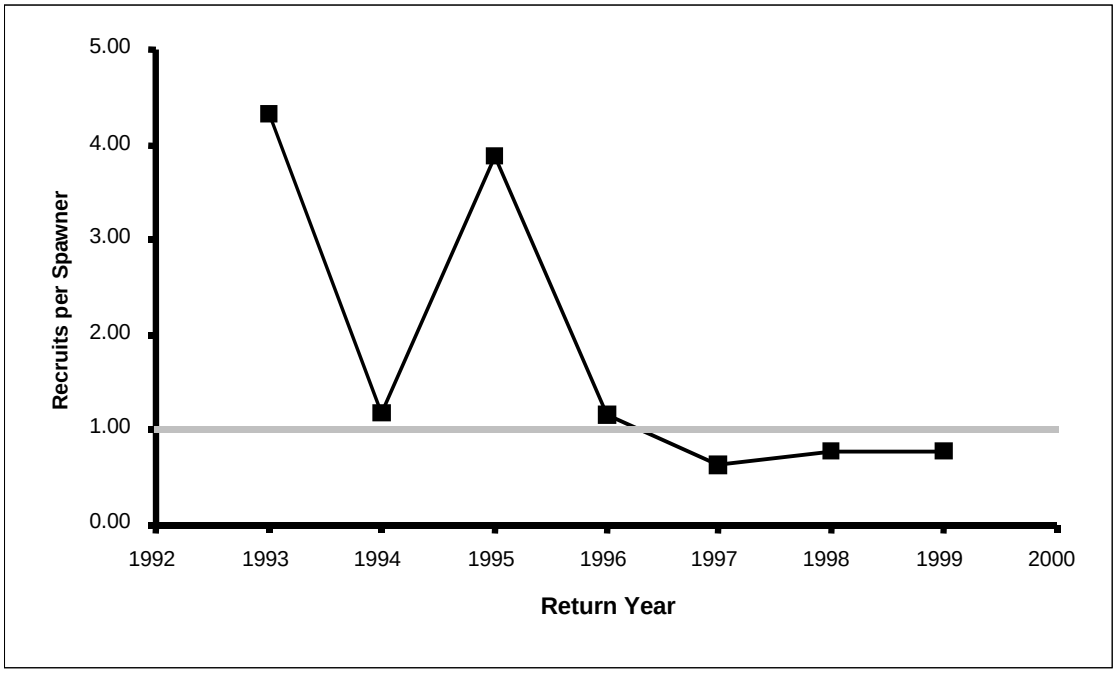

Figure 2. Trend in recruits per spawner for Umpqua Complex wild coho.

Table 2-3. Summary of life cycle monitoring for the West Fork Smith River.

Brood Year	Estimated egg deposition	Smolts Produced	Returning Adults			Freshwater survival	Marine survival
			Males	Females	Total		
1995							
1996		22,412	160	104	264		1.2%
1997		10,866					
1998		14,851					

1999	291,955						

Table 2-4. Estimates of abundance of juvenile life stages based on spawner abundance.

Population	1997 Brood (millions)				1998 Brood (millions)				1999 Brood (millions)			
Complex	Eggs	Fry	Parr	Smolts	Eggs	Fry	Parr	Smolts	Eggs	Fry	Parr	Smolts
Umpqua	3.700	2.405	1.398	0.472	11.405	7.413	2.029	0.686	9.776	6.355	1.928	0.652

d) 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.

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.

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

Winchester Dam

Upstream migrating fish, including coho salmon, pass over Winchester Dam via a fish ladder in which a fish counting station is located. The dam may cause some brief delays in fish passage while salmon find the entrances to the fish ladder. The counting station does not impede fish passage unless the fishway is blocked. The fishway is only blocked during broodstock collection. Personnel, via a hydraulic door, shunt adult summer steelhead into the fish capture facility. Coho salmon are passed untouched upstream. Adult summer steelhead may be held in the holding facility for a maximum of 48 hours until loaded by net and hydraulic lift onto a hatchery liberation truck for transport to Rock Creek hatchery. Mortality on adult summer steelhead rarely occurs in the holding facility and is less than 1% on a yearly basis.

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

During summer steelhead collections at Winchester Dam between 1996 through 2000 no wild coho were handled or died.

c) 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).

Adult coho are not present in the North Umpqua River during the May to July broodstock collection period for summer steelhead. Therefore, no adult coho are expected to be taken during this period. During the October-November hatchery coho broodstock collection period wild coho could be present. Therefore, all the precautions for coho established in the coho HGMP are used. Some summer steelhead are also captured incidental to the coho brood collection during October and November. However, the numbers are small, since less than 24 pairs of steelhead are needed during the fall collection period.

Emigrating coho smolts are not impeded by summer steelhead broodstock collection program at Winchester Dam. Summer steelhead smolts are released from Rock Creek Hatchery, Whistler Bend Park and Amacher Park, primarily in March. The hatchery smolts move rapidly downstream to tidewater. Predation of juvenile coho by hatchery summer steelhead smolts is unlikely due to the spatial separation of rearing coho (tributaries), and emigrating hatchery summer steelhead smolts, (mainstem river). In addition predation of juvenile coho is unlikely because steelhead are not very piscivorous.

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

The ODFW will continue to monitor the Winchester Dam counting station for the presence of adult coho salmon during the May - July summer steelhead broodstock collection period. No take of adult coho during the May to November period is anticipated. However, if any adult coho are encountered during this period they will be allowed to pass upstream. During October and November, protocols established in the coho HGMP will be followed, and steelhead broodstock collection will be incidental to the collection of coho broodstock. Emigrating juvenile coho are not handled at Winchester Dam, and pass downstream unimpeded. If problems do occur, ODFW will modify summer steelhead broodstock collection procedures to reduce or eliminate incidental coho mortality.

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). Additionally, until May 2000,

the Umpqua River hatchery summer steelhead program operated under a Section 10 Incidental Take Permit for take of Umpqua River cutthroat trout. ODFW requested that this permit be withdrawn as a result of the delisting of the Umpqua cutthroat trout in April 2000. The ODFW submitted the Umpqua Coho HGMP to NOAA/NMFS in March of 2003. This program is currently operating under the interim guidelines of the Native Fish Conservation Policy (NFCP) and the Fish Hatchery Management Policy (FHMP) which were adopted by the Oregon Fish and Wildlife Commission in 2002 and 2003. As stock status reports become available, Conservation Plans will be developed for each Species Management Unit (SMU) identified by the ODFW's Conservation and Recovery program. Once the Conservation Plans are completed and approved, Hatchery Program Management Plans (HPMP) will also be developed and this HGMP may be revised, if necessary. The HPMPs are required under the FHMP and will be based on guidance in the NFCP Conservation Plans and in the FHMP.

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) U.S. Army Corps of Engineers permit number 2000-00552.
5) 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.
6) U.S. Army Corps of Engineers- General Authorization permit number for improving fish habitat in Western Oregon.
7) NPDES permit 300J for the Rock Creek Hatchery operation and DEQ Memorandum of Agreement regarding fish carcass distribution in Oregon streams.
8) ODFW North Umpqua Basin Management Plan, 1986.

3.3) Relationship to harvest objectives.

Summer steelhead hatchery smolts are 100% marked for hatchery identification. Thus, the ODFW currently maintains a select fishery in the North Umpqua for summer steelhead, which only allows the harvest of hatchery steelhead. When coho are present, only hatchery coho (fin-clipped) can be harvested in the sport fishery of the Umpqua. The current harvest levels are meeting the objectives of the North Umpqua Management Plan. The five year average return rate of hatchery fish has nearly achieved the minimum goal of 5,000 summer steelhead per year. Harvest benefits include a very popular recreational fishery which has a high economic benefit to the area.

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

There is very little ocean harvest of steelhead, and the hatchery smolts released for this program are not uniquely marked to allow identification in marine harvests. Thus, there are no harvest rates for program fish in the ocean fishery. Average harvest in the freshwater fishery is 64% (creel data). Table 3-1 shows harvest card and creel estimates of freshwater harvest for program fish from 1985-2000. A creel program was conducted for Umpqua

basin fisheries from 1998-2000. Angler access in the vicinity of the Whistler Bend Park and Amacher Park releases is good. In addition angler access near Rock Creek hatchery is excellent. A Douglas County park and an USDA Forest Service park span a mile of river including and immediately below the mouth of Rock Creek. This stretch of river includes several large, deep, holding pools where hatchery summer steelhead are intensely harvested during the recreational fishery.

Table 3-1. Hatchery summer steelhead harvest for North Umpqua River program.

Year	*Harvest Above Winchester Dam	*Harvest Below Winchester Dam	Total Harvest	Harvest Rate (%)
1985	5,894	658	6,552	86%
1986	6,473	190	6,663	56%
1987	7,087	464	7,551	49%
1988	5,354	641	5,995	52%
1989	5,333	333	5,666	64%
1990	4,886	576	5,462	72%
1991	1,193	354	1,547	66%
1992	1,240	180	1,420	67%
1993	1,669	183	1,852	75%
1994	1,272	189	1,461	69%
1995	2,186	191	2,377	88%
1996	3,405	241	3,646	92%
1997	3,761	194	3,955	67%
1998	*NA	NA	NA	NA
1999	--------	----------	1,730	64%
2000	**NA	NA	NA	NA

* 1998 Creel data by catch
** 2000 survey incomplete.

3.4) Relationship to habitat protection and recovery strategies.

Natural production of summer steelhead in the Umpqua basin has fluctuated widely over the past decades. Reasons for these fluctuations include: poor ocean conditions; predation; lack of screening at irrigation diversions & pumps; degradation of sufficient suitable habitat (spawning gravel and large woody debris); road building; timber harvests; poaching; unfavorable environmental conditions created by hydroelectric dams; and inadequate fish passage at culverts.

Habitat conditions appear to be improving in the Umpqua Basin as well as in the ocean, which are benefiting survival of summer steelhead and all other salmonid populations. 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 summer steelhead by increasing the width of riparian buffer strips and improving forest management. The Umpqua Fish Watch program has helped reduce some of the poaching of summer steelhead in summer holding pools. 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 2000 which has improved smolt survival and increased adult growth. The summer steelhead hatchery program is consistent with these habitat protection and recovery strategies.

3.5) Ecological interactions.

a) *Species that could negatively impact program.*

Predatory fish that could impact out-migrating steelhead smolts include two native fishes (Umpqua pikeminnow and coastal cutthroat trout) and two non-native fishes (smallmouth bass and striped bass). Effects of predation by pikeminnow and cutthroat trout on the wild 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 summer 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 summer 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.

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.

The water right for Rock Creek Hatchery is 16 cfs from Rock Creek during the months of October through June, and 22 cfs from the North Umpqua during June through October. Rock Creek's temperatures are too high in the summer for fish health, which necessitates the need for the cooler North Umpqua water supply.

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

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

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock adults can be collected at two locations. Winchester Dam is the primary trap site.

1) Winchester Dam ladder and trap facility, on the North Umpqua in Winchester are at RM 7. The trap facility is equipped with a hydraulic door which is manually activated, and leads into a concrete 10' x 15' covered holding area. The fish are lifted to the transportation tank by means of a 200-gallon gondola type tank.
2) Rock Creek Hatchery ladder and fish trap, on Rock Creek (a tributary to the North Umpqua) are at RM 36. Fish can be trapped in a collection pen after swimming over a finger weir located in the upper end of the fish ladder which ascends from Rock Creek. The collection pen is a 20' x 30' raceway of concrete and wood. The trap can also be blocked to prevent fish from swimming into the facility.

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

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

5.3) Broodstock holding and spawning facilities.

Rock Creek is the only facility used to hold and spawn summer steelhead for this program. Holding pens are12' x 30' concrete structures. Water depth can be adjustable 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 from June to October. Flow is adjustable, but normally is set at 1.5 cfs. All adult steelhead are held in this collection/holding pond until spawned or released into the North Umpqua or Rock Creek. Spawning occurs in an adjacent hatch house building inside the shop area which is converted during times of spawning.

5.4) Incubation facilities.

Eggs are incubated at Rock Creek Hatchery in 20 Marisource stack incubators. The water taken

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 returned back to Rock Creek except for during times of treatment. Treated incubation water is diverted to the abatement pond before dismissal into Rock Creek.

5.5) Rearing facilities.

- There are 20 rearing containers at Rock Creek Hatchery: two 30' x 80' concrete; six 20' x 80' concrete; six 145' x 20' concrete; one 20' x 80' concrete with a center wall; and six 16' Canadian troughs. All of the structures are single pass containers with adjustable flows. All containers carry a maximum 5' depth except for the Canadian troughs, which are 2' deep.
- For the STEP classroom incubator program, schools raise 100 - 500 eggs in 10- to 20-gallon, aerated aquariums. Eyed eggs are transferred to the schools and after incubation they are released as unfed fry. Presently there are about 5 schools participating in the classroom incubator program which use summer steelhead eggs (<2,000 eggs).

5.6) Acclimation/release facilities

There are 3 release sites:

1) Rock Creek Hatchery is the only rearing site and is also used as an acclimation site to volitionally release about 67% of the summer steelhead smolts.
2) Whistlers Bend Park (RM 21) is a direct release site where about 18% of the steelhead smolts are transported from Rock Creek Hatchery and released directly into the North Umpqua River.
3) Amacher Park (RM 7) is a direct release site where about 15% of the steelhead smolts are transported from Rock Creek Hatchery and released directly into the North Umpqua.
4) Classroom incubator programs release unfed summer steelhead fry into the mainstem North Umpqua. Fry are released in close proximity to the participating schools.

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

At Rock Creek Hatchery disease outbreaks pose the greatest operational difficulty. Coho and steelhead suffer from Cold Water Disease and Gill Ameba. Cold water disease has been controlled substantially by insertion of vexar substrate in incubator trays and feeding of medicated fish "pills". Gill ameba is treated with formalin. Coho have a very high resistance to "Ich" which is very lethal to steelhead. Also, a large November storm occurred in 1996 resulting in the collapse of the Rock Creek intake and an emergency release of 1,200 coho broodstock. In addition, premature release of 245,000 chinook smolts (two months early), and 15,000 steelhead smolts took place into Rock Creek during the peak of the torrent. The gradual degradation of the 60-year old Rock Creek intake prompted building a new intake in 1998. The new intake structures comply with the NMFS screening criteria.

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.

The Umpqua River summer steelhead is not an ESA-listed population, although a candidate for listing. However, risk aversion measures are taken to prevent any catastrophic losses of the program fish. The Rock Creek Hatchery is equipped with a state of the art 245 kw emergency generator which has the capacity to run the North 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 a facility grounds audio siren in case of water emergencies. The hatch house is equipped with an intruder security system connected to the same radio and siren. Both intakes are equipped with NMFS criteria screening. All fish are routinely examined on a monthly and as-needed basis by an assigned ODFW fish pathologist located at Oregon State University. Brood fish are also thoroughly checked for viral pathogens at the spawning stage and no eggs of infected females are incubated at the hatchery facility.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

North Umpqua River summer steelhead are the only source of broodstock for the program. The hatchery program normally exceeds the NFCP interim guidelines and has used up to 100% naturally produced steelhead for broodstock in recent years.

6.2) Supporting information.

6.2.1) History.

The first returns of hatchery summer steelhead to the Umpqua River occurred in 1959, and have continued to the present day. The only source of broodstock for the summer steelhead program has been and continues to be North Umpqua River summer steelhead. Since 1987, only naturally produced steelhead have been used for the program's broodstock. This helps ensure genetic similarity between hatchery and naturally produced. The program will continue to meet or exceed the guidelines established by the NFCP in the future.

6.2.2) Annual size

This program uses 110-140 pairs of North Umpqua summer steelhead annually for broodstock. The primary source of brood is naturally produced summer steelhead. At 140 pairs, this represents less than 7% of the naturally produced summer steelhead which passed Winchester Dam annually from 1999 - 2003.

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

Since 1987 the program has used 100% naturally-produced fish for broodstock. Guidelines established by the NFCP and the future Conservation Plan will be used to determine brood collection strategies in the future. Presently the program plans to continue with the current high level of natural fish in the broodstock.

6.2.4) Genetic or ecological differences.

Broodstock for this program is 100% naturally produced fish. No genetic, phenotypic, or ecological differences between hatchery and naturally produced Umpqua summer steelhead have been detected by ODFW staff.

6.2.5) Reasons for choosing.

The brood was chosen to represent the local population of the Umpqua Basin. This program will normally exceed the interim guidelines of the NFCP. The guideline states that greater than 30% wild brood will be used and 75% of wild stocks passing through Winchester Dam will be passed. Broodstock taken from the naturally produced population of summer steelhead will be used to reduce genetic impacts from straying. These fish are not a listed species. Incorporation of a higher percentage of brood from the wild population will produce smolts that will be genetically similar to naturally produced steelhead. Phenotypic traits or characteristics will not be used as part of the selection criteria. Brood will be collected during the early (May - July) and late (September - November) portion of the run. During July and August, brood collection is stopped if water temperatures exceed 70 degrees. Temperatures in excess of 70 degrees become lethal for steelhead handling and hauling. All age classes (jack, one-salt, two-salt, etc.) will be represented in the broodstock. Brood fish will be randomly spawned when ripe.

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.

North Umpqua River summer steelhead will continue to be the primary source or broodstock for this program. No adverse genetic impacts to naturally-produced coho salmon are anticipated while selecting brood for the summer steelhead. However, to minimize ecological impacts, about 80% of the broodstock will be collected outside the coho migration time, and if any coho is captured it will be released with minimum stress or donated as brood to the coho propagation program. When broodstock collection times coincide with coho migration, measures outlined in the coho HGMP are used, and summer steelhead are collected incidental to the coho brood collected.

SECTION 7. BROODSTOCK COLLECTION

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

A total of 110-140 pairs of adult wild broodstock are collected at Winchester Dam and Rock Creek Hatchery traps to produce approximately 165,000 smolts. All adults captured for broodstock represent the life history diversity of the wild population. Brood from the entire window of spawn timing is incorporated into the hatchery progeny to carry forth the acquired diversity or hereditary characters of the brood year.

7.2) Collection or sampling design.

- Winchester dam trap facility – is the primary collection site for the broodstock. The “jail” is operated manually by personnel and can be left open to allow continuous collection for 24 - 48 hours. Summer steelhead are collected May through July, and September to November to incorporate all segments of run timing. Water temperatures in August prohibit collection of summer steelhead. Proportional to their migration pattern, 80% of the run is collected during the May - July time period. All age classes are incorporated into the broodstock at the approximate same ratio as the season's returning run. During periods of potentially lethally warm water (portions of July and August), broodstock are not collected. If temperatures are $<70^{o}$F, brood may be collected during these months.
- Rock Creek Hatchery Fish Ladder – can be used to augment any insufficient numbers from

the Winchester Dam trap. Collection would be steelhead randomly entering the ladder and passing a finger weir into a collection raceway.

7.3) Identity.
All hatchery fish released from Rock Creek facility are marked with an adipose clip, and are thus easily identifiable at the time of adult collection, from naturally produced non-clipped fish.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):
About 110-140 pairs will be collected and the sex ratio would be 1:1.

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

Brood Year	Adult Females	Adult Males	Jacks	Eggs	Juveniles
1988	156	61		218,422	152,000
1989	185	80		261,900	168,000
1990	145	117		216,844	197,318
1991	115	100		258,642	215,924
1992	105	81		201,443	162,008
1993	88	70		119,745	116,974
1994	104	91		237,562	197,893
1995	120	91		239,295	202,628
1996	105	69		241,803	209,426
1997	115	72		196,753	169,969
1998	125	106		245,530	219,581
1999	114	58		299,979	204,798
2000	119	161		389,000	340,232
2001	105	107		350,000	284,287
2002	125	166		252,000	207,181

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
No hatchery-origin fish have been utilized for broodstock since 1987. Rock Creek Hatchery has the ability to open or close the fish ladder/finger weir trap on site. If an excess of hatchery fish were collected, they could be recycled downstream into the North Umpqua fishery. The Rock Creek trap is generally kept closed, and the hatchery fish are allowed to spawn naturally. Telemetry data documented that most hatchery fish spawned in Rock Creek or downstream of the confluence of Rock Creek and the North Umpqua River. If excess fish at Rock Creek Hatchery become an issue in the future, options would include selling the surplus fish to distributors or donating "eatable" fish to the local food banks.

7.6) Fish transportation and holding methods.
Adults transported from Winchester Dam are en-route for less than one hour before reaching Rock Creek Hatchery. Adult summer steelhead are transported in one of the 1,000 to 3,000-gallon fish liberation trucks. The loading rate is one pound of fish per gallon of water, but normally hauling is capped at 100 fish per truck load. Oxygen level is maintained at 9-11 ppm. Water temperature

ranges from 50 to 60°F. A synthetic "slime" (Polyaqua) is incorporated into the water to aid fish in recovering from handling. In addition, MS222 is occasionally used to reduce transportation stress.

7.7) Describe fish health maintenance and sanitation procedures applied.

To prevent fungal infection fish are treated with 167 ppm formalin for 1 hour upon receipt at Rock Creek Hatchery. The fish continue to receive 3 treatments weekly until spawning. Any outbreaks of frunculosis are monitored, and antibiotic (oxytetracycline) injections are applied if the situation warrants. Spawned adults are sampled and examined by ODFW's pathologists to detect the presence of any viral and bacterial infections. Eggs taken from any infected females will be frozen and buried to prevent transmission of diseases. Tanks are disinfected with chlorine and the chlorine is neutralized before being discharged into the abatement pond. Equipment is disinfected with an iodiphore solution.

7.8) Disposition of carcasses.

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

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

It is unlikely that the broodstock collection of summer steelhead with have adverse genetic effects on naturally-produced coho. However, to minimize ecological effects any coho captured during steelhead brood collection will be released unharmed or donated to the coho propagation program. The health risks to wild coho will be minimized by monitoring water flows and properly maintaining the Winchester Dam ladder and fish trap facilities. Overall due to temporal differences during most of the collection period, no take is expected on the naturally-produced species. Where the late collection for summer steelhead coincides with the coho run, the Winchester Dam trap will be operated according to protocols established by the coho HGMP for coho broodstock collection. Summer steelhead will only be collected incidental to coho collections. Also see Section 6.3 which described risk aversion measures to minimize adverse ecological effects to natural fish.

SECTION 8. MATING

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

8.1) Selection method.

Broodstock is collected during the entire run period, and randomly chosen throughout the migration to mirror the natural run model. Ripe fish are randomly selected from the fish ripe during each spawning episode. Spawning episodes are spread through the entire spawn timing window.

8.2) Males.

Males are used one time only. Our collection goal of 1:1 (male:female) is easily obtainable. Jacks are incorporated at random during spawning episode. The number of jacks spawned is proportional

to their existence in the run during that year.

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 the presence of pathogens. The donor or parent fish are examined by an ODFW fish pathologist to monitor overall health condition. Fertilized 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.

Summer steelhead in the Umpqua Basin is not an ESA-listed population. However, to maintain within population genetic diversity, broodstock are randomly selected for the mating scheme in order to represent the entire adult migration time, and to incorporate as much diversity as the natural population maintains. All steelhead, representing all collection episodes, are pooled together and are checked weekly for ripeness, from December to April. All females ripe in a given week are spawned. An equal number of ripe males are also spawned. A 10 x 10 matrix mating process is performed to further randomize the mating process. The entire window of spawn timing is incorporated into the hatchery progeny to carry forth the acquired genetic quality 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.

Brood Year	Egg Loss %	Fry Loss%	Juvenile Loss %	Smolts released	Smolt goal
1988	15.1	17.8	39.5	91,862	165,000

1989	21.7	18.0	8.9	152,242	165,000
1990	7.1	2.1	12.8	171827	165,000
1991	12.6	4.3	18.2	176730	165,000
1992	13.0	6.6	21.3	127528	165,000
1993	11.6	2.3	35.8	75,134	165,000
1994	14.0	2.7	16.9	164,526	165,000
1995	12.4	3.3	18.1	166,843	165,000
1996	10.0	3.4	17.6	172,584	165,000
1997	15.2	1.0	30.9	117569	165,000
1998	9.2	1.4	50.1	109,705	165,000
1999	6.8	2.2	22.6	158,650	165,000
2000	10.7	2	20	143,905	165,000
2001	16.9	3.1	32	115,735	165,000
2002	15.4	1.4	31	125,521	165,000

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

The smolt production program receives first priority and requires a large numbers of eggs. Surplus eggs are kept until it is determined that egg loss is normal for the year and until pathology diagnosis of the adults is complete. If the pathology diagnosis would come back positive and require action, all eggs taken from the infected parents/matrix would be frozen and buried. If egg take is adequate for the smolt program, a small number of eggs (< 2,000) are used for the STEP classroom incubator program for schools on the North Umpqua. The eyed-eggs are distributed to classes in 100-egg groups. The fish produced in classroom incubators are released as unfed fry into the mainstem North Umpqua. At 0.7 to 3% survival, no impact is expected from the release of these small numbers of fish. Surplus eggs remains, would be raised up to the fry/pre-smolt stage and released in local reservoirs such as Galesville where downstream passage is sufficiently blocked to prevent any interaction with listed species or any anadromous populations.

9.1.3) Loading densities applied during incubation.

Rock Creek

Trays are Marisource replica to Heath
Green egg size is 125 per ounce.
Eyed egg size is 75 per ounce.
Density for green eggs is 64 ounces per tray.
Egg density for hatching trays is 48 ounces per tray.
Water flows set at 5 gallons/minute/tray for both egg and fry incubation.

9.1.4) Incubation conditions.

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

9.1.5) Ponding.

Forced ponding of fry is at 99% button-up stage. Mean length = 36mm. Average weight = 2,000 fish per pound.

Year	Ponded	Tu.'s	F/lb
1988	152,000	NA	NA
1989	168,000	NA	NA
1990	197,318*	1,075	2,491
1991	215,924	1,154	2,034
1992	162,008	1,116	2,230
1993	116,974	1,138	2,435
1994	197,893	1,069	2,107
1995	202,628	1,138	2,100
1996	209,426	1,062	2,210
1997	169,969	1,049	2,045
1998	219,581	1,072	1,081
1999	204,798	1,108	1,832
2000	340,232	1,072	1,998
2001	284,287	1,184	1,793
2002	207,181	1,100	2,000
2003	133,000	1,126	2,504

* Due to IHN 37,128 raised on-site and remainder ponded at Bonneville Hatchery.

9.1.6) Fish health maintenance and monitoring.

At Rock Creek, green eggs are water hardened in 100 ppm iodiphore for 30 minutes. Samples of tissue and ovarian fluid from parent fish are taken to determine the presence of any viral pathogens. Eggs from infected parents are discarded and buried. Fungal infection of eggs are controlled by treating the eggs with 1,250 ppm formalin for a 15 minute drip, 4 times per week. Water entering the incubation facility is disinfected with UV. All dead eggs are picked out with a 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.

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.

Summer steelhead is not a listed population in the basin. To minimize any adverse ecological effects to the biota of the receiving stream, summer steelhead eggs and alevins are incubated on filtered and UV sterilized water and treated with formalin as necessary to minimize potential disease in program fish or transfer to naturally-produced fish species. Incubation effluent is discharged into 100' X 180' abatement pond to meet DEQ requirements for dilution to reduce impacts from water discharge. Discharge effluent is monitored and reported quarterly to DEQ as per NPDES permit 300J. This helps ensure that discharged water meets certain water quality standards to reduce any potential impacts on listed or any other species in the receiving stream.

9.2) <u>Rearing</u>:

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

See Table 9-1 for fish survival data.

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

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

9.2.3) Fish rearing conditions

Water source and holding facilities are described in sections 4.1, 5.3, and 5.5 respectively. During rearing, water temperatures are monitored 3 times daily. Fish are visually checked daily for overall health parameters e.g. fish behavior, depth in water column, symptoms of diseases, mortality etc. Dissolved oxygen is monitored during times of crisis, critically high water temperatures, high fish density or low water flow situations. Rearing containers are flushed or cleaned 1-2 times weekly as needed. Cleaning includes using a brush to remove organic material from the bottoms of the raceways. Discharge water from cleaning operations pass into the abatement pond. Containers are protected from predators with a mesh cover. Rearing fish are fed via hand broadcasting of the food.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Table 9-3. Summary of Excel growth program for summer steelhead released to one year old.

Date	Water Temp.	Feed/day	# fish per pound	% Body weight	Number of Fish	K Factor	Feed Conversion	% AGR*
June 1, 2004	55.6	2.03 lbs	1900	9.666	40,000	0.00037	1.1	113
March 1, 2005	44.9	58.04	5.05	0.733	40,000	0.00037	1.1	113
Total		8,701 lbs						

Food		over 274 days						

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

Table 9-4. Summary of Excel growth program for summer steelhead released to two years old.

Date	Water Temp.	Feed/day	# fish per pound	% Body weight	Number of Fish	K Factor	Feed Conversion	% AGR*
June 1, 2003	55.6	1.32 lbs	1900	3.593	70,000	0.00037	1.1	42
May 25, 2004	54.2	20.2	29.98	0.865	70,000	0.00037	1.1	56
March 1, 2005	44.9	49.45	5.19	0.367	70,000	0.00037	1.1	56
Total Food		14,832 lbs over 640 days						

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

See Table 9-3 and 9-4.

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

See Table 9-3 and Table 9-4.

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

Fish health and behavior are monitored daily. Dead eggs and fish are removed daily and buried in a landfill. Mortality samples are collected and analyzed daily for disease diagnosis. Scheduled pathology examinations are conducted monthly or as needed. Parasitic and bacterial infections are treated as needed under prescription of ODFW pathologists. Viral infections are monitored by the ODFW fish health section. Disinfection methods are practiced as the primary prevention of lateral transfer of viral infections.

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, size, condition factor, color, behavior of fish etc. No ATPase studies are conducted.

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

Hatchery rearing has been modified to reflect data from scale analysis of returning naturally produced adults. Freshwater rearing from scale data shows that 5% or less of the steelhead smolt at one year old, 80% smolt at 2 year, and 20% smolt as 3 year old smolts. Thus, the program was modified to release approximately 70% or more of the project fish as 2-year

old smolts. Additionally, satiation feeding is used whereby a 7-day amount of feed is given as fast as the smolts are willing to consume the food. For example, during some weeks the smolts may eat all of their designated poundage of food in 4 days. During the rest of the week the smolts are not fed. This simulates a more natural boom/bust feeding behavior, and reduces the amount of time the fish are exposed to humans broadcasting food.

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

This is the Umpqua River summer steelhead propagation program which is not a listed species/population. See Sections 5.8, 6.3, 7.9, 8.5 and 9.1.7 for risk aversion measures taken under this propagation program.

SECTION 10 RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	N/A			
Unfed Fry	2000	2,000	June 1	North Umpqua
Fry	N/A			
Fingerling	N/A			
2 Year Old 1 Year Old	125,000 40,000	6 fish/lb. 5 fish/lb.	March 1 March 1	Rock Creek/N. Umpqua Rock Creek

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

Stream	Watershed Code	Fish Age	Release Point	Watershed	Basin
North Umpqua	1600200000	2 year	Amacher Park	North Umpqua	Umpqua
North Umpqua	1600200000	2 year	Whistlers Park	North Umpqua	Umpqua
Rock Creek	1600202000	2 year	Hatchery Outflow	North Umpqua	Umpqua
Rock Creek	1600202000	1 year	Hatchery Outflow	North Umpqua	Umpqua
North Umpqua	1600200000	Unfed fry	Glide & Winchester	North Umpqua	Umpqua

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

Release Year	Eggs/ Unfed Fry	Avg. size	Fry	Avg. size	Fingerling	Avg. size	Yearling	Avg. size
1990	N/A		N/A		N/A		152,242	5.2/lb.
1991	N/A		N/A		N/A		171,827	5.7/lb.
1992	N/A		N/A		N/A		176,730	5.5/lb.
1993	N/A		N/A		N/A		127,528	5.9/lb.
1994	N/A		N/A		N/A		75,134	6.1/lb
1995	N/A		N/A		N/A		164,526	5.4/lb.
1996	N/A		N/A		N/A		166,843	5.3/lb.
1997	N/A		N/A		N/A		131,018	5.3/lb
1998	N/A		N/A		N/A		20,784 2 yr. 84,073 1 yr.	4.2/lb. 5.6/lb
1999	600 unfed fry		N/A		N/A		14,139 2 yr. 52,229 1 yr.	4.6/lb 7.8/lb
2000	600 unfed fry		N/A		N/A		23,614 2 yr. 143,611 1 yr.	3.9/lb 9.0/lb
2001	500 unfed fry		N/A		N/A		15,039 2yr 83,430 1yr	4.96/lb 9.3/lb
2002	400 unfed fry		N/A		N/A		60,745 2yr 42,585 1yr	4.8/lb 6.86/lb
2003	0 unfed fry		N/A		N/A		73,150 2yr 33,506 1yr	5/lb 8.8/lb

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

Approximately 67% of the smolts are released volitionally from Rock Creek Hatchery in March and April during their peak smoltification and natural migration time. Approximately 18% and 15% of the smolts are transported to Whistler Bend and Amacher Park respectively and directly released into the North Umpqua. These fish are also in smolt condition and are released during March and April. Unfed fry of the STEP program are released when 99% of the fry are totally buttoned-up. They are normally released in groups of 100 fry along the edge of the mainstem North Umpqua in late May and early June.

10.5) Fish transportation procedures, if applicable.

Smolts released downstream are transported in one of the department's liberation trucks. They are released directly from the truck into the mainstem North Umpqua River. A boat ramp or other similar access point is used to facilitate the release. See Section 5.2 for details of the transportation tanks.

10.6) Acclimation procedures.

The steelhead smolts volitionally released from Rock Creek Hatchery are considered acclimated to Rock Creek. The rearing raceway outlets are adjusted so steelhead in smolt condition can volitionally pass downstream. Fish are given 2 - 3 weeks to voluntarily emigrate. Any fish remaining at the end of week-3 are flushed out (usually less than 20% of the total).

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

All 2-year old smolts are 100% adipose fin-clipped while 100% of the 1-year old smolts are adipose fin clipped and may also be left maxillary clipped.

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

See Section 9.1.2.

10.9) Fish health certification procedures applied pre-release.

The ODFW fish pathologist examines fish for parasites, viral and bacterial infection 30 days prior to release. Only certified fish are allowed to release. Refer to Appendix 2, Fish Health Protection Procedures at Rock Creek Hatchery.

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

A contingency plan for emergency situations is currently in place and Rock Creek Hatchery will contact the district biologist to initiate pre-established contingency plan. The existing 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.

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 volitionally at peak smoltification and migration time to ensure quick emigration, better survival and minimal competition in natal areas. The current timing of the hatchery releases will be continued to reduce spatial and temporal overlap with emigrating naturally-produced coho smolts.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

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

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

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

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

As with all state programs, budgets are approved by the Legislature for a two-year period. No commitment of funds can be made past the approved budget period. Funds for various projects associated with this propagation program come from a variety of sources including license dollars, state general funds, and federal sport fish restoration funds as well as a variety of other federal funds (BLM, USFS, etc.). Competitive grants from Fish Restoration and Enhancement, OWEB, Umpqua Fishery Enhancement Derby, and Oregon Wildlife Heritage Funds are occasionally available for special projects. Funds are committed for portions of the HGMP monitoring, 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 our monitoring program.

SECTION 12. RESEARCH

12.1) Objective or purpose.

- If funding becomes available, radio telemetry studies of hatchery and naturally produced North Umpqua summer steelhead would continue. This project would provide additional data on distribution, migration rates and habitat use of hatchery and naturally produced summer steelhead in the North Umpqua basin. No anticipated impacts on naturally-produced coho salmon.
- If funding becomes available, genetic studies will be conducted to determine similarities/differences between hatchery and naturally produced summer steelhead.

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) Principal investigator or project supervisor and staff.

Jim Muck, District Fisheries Biologist, Umpqua Watershed District, ODFW.
ODFW Southwest Region fisheries staff.

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

North Umpqua River summer steelhead are not ESA listed stocks.

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

- Capture adult summer steelhead at Winchester fishway from May to December, using the "jail." Orally implant selected adult and jack wild summer steelhead with gastric radio-tags, not to exceed two percent of the body weight of the fish. Immediately release the radio-tagged fish to continue their upstream migration, and begin monitoring tagged individuals.
- Use the same methods described above to capture steelhead and collect a paper-punch sized tissue sample for a portion of the hatchery and naturally produced summer steelhead for genetic studies. Label and preserve samples for laboratory analysis.

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

- Radio tagging or genetic sampling would be conducted from May to December.

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

Summer steelhead captured for radio tagging or genetic sampling would be held for less than 24

hours in the large, enclosed capture/holding facility at Winchester Dam. Summer steelhead would be handled by staff fish biologists during the time of low water temperatures and would be immediately released to resume migration.

12.8) Expected type and effects of take and potential for injury or mortality.
Incidental mortality of summer steelhead during the radio-tagging procedure is expected to be 3-5%. One to four summer steelhead would probably die as a result of handling stress with a target study size of 50-60 radio-tagged fish. Genetic tissue sampling would likely have even less mortality. No take of naturally-produced 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 anticipated take of naturally-produced coho salmon as a result of summer steelhead research activities.

12.10) Alternative methods to achieve project objectives.
Radio-Telemetry: Conduct visual inspection of potential spawning areas to determine distribution of naturally produced and hatchery summer steelhead. This method would produce less complete information than a telemetry study, due to difficulties in discerning marked and non-finclipped fish. In addition, the rugged terrain and limited access of much of the North Umpqua River basin would reduce the effectiveness of visual inspections.

Genetic Samples: There is no alternative method to look at genetic differences other than collecting tissue samples because studies only at the DNA level can accurately reflect genetic differences/similarities between stocks.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
Wild Summer Steelhead: 1 to 4 adult mortalities if a telemetry/genetics study was conducted.
Fall Chinook: No mortality.
Spring Chinook: No mortality.
Winter Steelhead: No mortality.
Cutthroat trout: No mortality.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
If naturally-produced adult coho salmon appear at Winchester Dam during radio-tagging operations they will immediately be passed over the fishway unharmed. If numerous coho appear, tagging operations will be curtailed or suspended until no coho are present. Outmigrating coho juveniles encountered at Winchester Dam will be allowed to pass freely downstream, and will not be disturbed.

SECTION 13. ATTACHMENTS AND CITATIONS

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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.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

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

Name and Title of Applicant: David Loomis, Umpqua Watershed Manager

Signature:_____Date:_____

Certified by: John Thorpe, Fish Propagation Program Manager

Signature: _____ Date:_____

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

Listed species affected: Coastal Coho **ESU/Population: Coast Coho** **Activity:**				
Location of hatchery activity: Winchester Dam **Dates of activity: April-August** **Hatchery program operator: Jim Muck**				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	50-100	50	0
Collect for transport b)	0	0	0	0
Capture, handle, and release c)	0	0	25	0
Capture, handle, tag/mark/tissue sample, & release d)	0	0	0	0
Removal (e.g. broodstock) e)	0	0	0	0
Intentional lethal take f)	0	0	0	0
Unintentional lethal take g)	0	0	1	0
Other Take (specify) h)	0	0	1	0

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, moralities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.

2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).

2. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Appendix 1

Monthly Fish Growth Information at Rock Creek Hatchery

Rock Creek

55 StS: Year 1 These are Averages

	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Jan	Feb	March	Apr.	May
F/lb	2000	800	400	200	120	85	65	54	48	42	36	30
Feed	BDS/BioVita Starter BioDry 1000											
%BDWeight	3.5	3.0	2.2	2.0	1.4	.8	.6	.5	.45	.5	.6	.8

55 StS: Year 2 These are Averages

	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Jan	Feb	March
F/lb	23	17	13	II	8.7	7.3	6.5	5.8	5.3	4.9
Feed BioDry 1000										
%BodyWt	1.0	.9	.8	.8	.7	.45	.37	.33	.33	

Appendix 2

Fish Health Protection Procedures at Rock Creek Hatchery

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

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