HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Skate Creek Rainbow Trout Plants
Species or Hatchery Stock	Rainbow Trout (*Oncorhynchus mykiss)*
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Cowlitz Subbasin/Lower Columbia Province
Date Submitted	
Date Last Updated	April 7, 2005

Section 1: General Program Description

1.1 Name of hatchery or program.

Skate Creek Rainbow Plants

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

Rainbow Trout (*Oncorhynchus mykiss*)

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

Name (and title):	Mark Johnson
	Cowlitz Complex Manager
Agency or Tribe:	Washington Department of Fish & Wildlife
Address:	1182 Spencer Road, Winlock, WA 98596
Telephone:	(360) 864-6135
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
Tacoma Public Utilities	Funding Source for Resident Trout Production

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

Funding Sources
Tacoma Public Utilities

Operational Information	Number
Full time equivalent staff	2.0
Annual operating cost (dollars)	$118,000.00*

*Trout production as negotiated in the previous Settlement Agreement is approximately 40% of the available Mossyrock Trout budget. The remainder budgets for production for additional programs are from Wildlife (State) and Dingall - Johnson (Federal Match) funding.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Goldendale Hatchery/Goldendale, WA/ Klickitat Co.
Broodstock collection location (stream, RKm, subbasin)	Goldendale Hatchery/Goldendale, WA/ Klickitat Co.
Adult holding location (stream, RKm, subbasin)	Goldendale Hatchery/Goldendale, WA/ Klickitat Co.
Spawning location (stream, RKm, subbasin)	Goldendale Hatchery/Goldendale, WA/ Klickitat Co.
Incubation location (facility name, stream, RKm, subbasin)	Mossyrock Hatchery/Mayfield Reservoir/ Cowlitz
Rearing location (facility name, stream, RKm, subbasin)	Mossyrock Hatchery/Mayfield Reservoir/ Cowlitz

1.6 Type of program.

Isolated Harvest

1.7 Purpose (Goal) of program.

Skate Creek a tributary of the Upper Cowlitz River is planted with legal rainbow trout to provide harvest and recreation to east Lewis County residents.

1.8 Justification for the program.

The goal of the resident trout program is to provide recreation to east Lewis County residents although a 2000 creel census indicated fishers from 14 different counties angle for rainbow trout in nearby Lake Scanewa (Tipping and Serl 2000). Resident trout programs provide substantial recreational fishing opportunities in both stream and lakes that have been measured by numbers of angler trips that translate into important local economic benefits. For fishery evaluations, in the late 1970's, plants were made in Skate Creek with total estimated angling effort at 26,461 hours mostly by July of the year (Danielson and Tipping 1980). In catch-able trout fisheries in nearby reservoirs; a creel census in Lake Scanewa indicated 26,616 angler hours were spent to harvest catch-able trout out of that reservoir (Tipping and Serl 2000), while a creel census in Riffe Lake the same year indicated 170,510 angler hours. Prior to 1980, trout plants of up to 400,000 catchable trout were made in the system mostly in larger tributaries of the Upper Cowlitz and the Cispus Rivers. By the early 1980's, the program was reduced to 200,000 fish to reduce impacts on wild trout and reduce wastage. WDFW then decided to prioritize plants to each major community (Packwood, Randle (Skate Creek), Mossyrock and Morton. In 1986, a new wildlife agreement was signed with Tacoma Power which provided for 50,000 pounds of catchable trout annually. Plants to the Skate Creek ranged up to 55,000 in the late 1970's and early 1980's. Through the 1990's plants ranged from 20,000 – 30,000 fish per year. From 2000 to the present, plants have been closer to 15,000 trout annually.

In the final Cowlitz Project Settlement Agreement (SA), the Cowlitz River Fisheries Technical Committee (FTC) concluded that continued trout production is not consistent with the primary goal of the Settlement Agreement; defined as achieving ecosystem integrity and the recovery of wild, indigenous salmonid runs, including ESA-listed and unlisted stocks, to harvestable levels. Hook and release mortality on steelhead smolts, angler by-catch, predation, genetic impacts that would lower native disease resistant to *Ceratomyxa Shasta* a disease endemic to the Cowlitz River, and

that planting of resident trout susceptible to this same pathogen would increase bed loads in the release stream (*Impacts of Resident Trout Fisheries on Anadromous Fish Populations"(TPU 2004)* prepared for the Cowlitz FTC. Sources of impacts cited in the document include several WDFW studies and examples of where trout plants have been discontinued in the Pacific Northwest in aanadromous streams. In the recent SA, Tacoma Power provided funding for 50,000 pounds of trout production through 2004 although plants to Skate Creek and the Tilton River were contracted out to Trout Lodge Corporation in 2004. After 2004, future trout production was to be based upon a review by the FTC of the success or failure of the program and any impacts to listed stocks (Section b, Article 5) although the resident trout program was eliminated from the final FHMP (August 2004).

Plants are staggered through out the season from late May to coincide with the June 1st stream opener with the last planting coming prior to the Labor Day weekend. The first plant can be delayed to mid-June if high water conditions exist in early June that would disperse the fish and prevent harvest opportunity. Staggered plants of up to 1,000 per location every couple of weeks provide a readily available fish throughout the season and as a catch-able size product, they can have high harvest rates soon after release in accessible locations. In the Skate Creek study an estimated 68.1% of the fish were harvested (Danielson and Tipping 1980). General characteristics of the rainbow trout used (Goldendale Hatchery strain) have been described as: few fish surviving the following year after being grown to a legal size in part due in part to intense harvest and exhibit little success at spawning (pers. comm. B.Crawford IAC 2005). Skate Creek stream plants are made at four bridge crossings: Craig Road (RKm. 1.7), Forest Service Road 47 crossing (RKm. 3.8), Forest Service Road 52 crossing (RKm. 6.9) and at Forest Service Road 52 crossing located at approximately RKm. 12.3.

For reducing hooking mortality and angler by-catch, WDFW regulations include time, size and area restrictions for stream fishing. Timing of releases until June 1st or later depending on water conditions, allows migrant steelhead to clear the area. Smolt collection monitoring at the Cowlitz Falls Fish Facility (CFFF) on Lake Scanewa indicates that most out-migrant wild steelhead smolts may have vacated Skate Creek by the time the plants commence (Serl and Morrill, Draft 2004). Since 2002, wild steelhead 90% migration (capture and transport to the Cowlitz Salmon Hatchery Stress Relief Ponds) has generally occurred by late May. In 2004, 90% collection was achieved on May 25, in 2003 90% collection was achieved on May 31, and in 2002 90% collection occurred on May 29. In the past fish releases have been variable from trout one pound each to smaller fish at 5.0 ffp. Current target size at release has been 2.5 ffp throughout the staggered release schedule. Larger fish such as one pounders are eliminated to reduce predation potential on listed fish and eliminating smaller fish (5.0 ffp) acenutates the size disparity between catch-able trout at 25 cm and migrant steelhead smolts averaging 16.8 to 19.9 cm (Serl and Morrill 2004). Selective gear restrictions are being imposed in areas to promote releasing non-targeted fish where fish populations are listed or depressed. For instance, the lower Tilton is managed for stocked fish while selective gear regulations are in place above the conjunction of the West Fork Tilton. WDFW will be seeking to increase the number of streams to implement selective gear rules in place to protect wild trout and salmon in the area and may employ such a strategy on Skate Creek and particularly in other areas not being stocked.

1.9 List of program "Performance Standards".

- See section 1.10 below.

Note: Performance Standards below only pertain to the hatchery production at Cowlitz Salmon Hatchery only and do not contain indicators for the upriver reintroduction program.

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

1.10.1 Benefits

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support WDFW mandate to provide freshwater angling opportunities	Production of up to 15,000 catch-able sized rainbow trout for stocking in Skate Creek. Provide potentially 10,000 - 20,000 hours of opportunity with a catch rate of 0.50 - 1.00 fish/hour.	Creel census and evaluation funding is being requested by WDFW to determine success of the program and to determine impact to wild fish in the stream.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the Mossyrock Hatchery facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Implement measures for broodstock management to maintain characteristics needed for the trout program goals	Broodstock protocols are followed for maximum fertilization and economic benefit of rearing a broodstock source.	Broodstock selection of 3 and 4 year crosses are followed per hatchery broodstock operation plans.
Catch-able trout can be distinguished from wild smolts.	Plant fish at a size desirable to anglers and significantly larger than listed salmonids smolts.	Size and release records are recorded on all plants made.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock yearly and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy

	Inspection of adult broodstock	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery	Control of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations.	As identified in the HGMP: Monitor size, number, and date of release.
Harvest of hatchery-produced fish minimizes impact to wild populations Catch-able trout can be distinguished from wild trout.	Explore possibility of marking (fin-clip) catch-ables in anadromous waters	Based on future evaluations, WDFW would be requesting funding if fin-clipping would be needed.
Hatchery facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including HOPPS, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in-stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.

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

Fish planted in the Cowlitz basin are a portion of 330,000 eyed eggs shipped from Goldendale Hatchery. At Goldendale Hatchery, fecundity has varied from 4,800 eggs per 3 year old broodstock to 6,800 per 4 year old broodstock and 330,000 eyed eggs would require approximately 120-150 pairs of broodstock at Goldendale Hatchery depending on the ratio of 3 and 4 year fish used.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Catch-able rainbow*	18,750^	2.0 – 3.0	See below*	Skate Creek - 4 sites	See below**	Upper Cowlitz	Lower Columbia

^ Recent plant levels have been held to 15,000 fish.
*Plants are staggered from June – September with the first plant timed for the stream opener (June 1st) and the last plant coming prior to the Labor Day weekend.

**Skate Creek plants are made at four bridges: Craig Road (RKm. 1.7), Forest Service Road 47 crossing (RKm. 3.8), Forest Service Road 52 crossing (RKm. 6.9) and at Forest Service Road 52 crossing located at approximately RKm. 12.3. .

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

In the late 1970's, mean catch was 1.42 fish per hour based on 55,000 trout planted in Skate Creek . In Lake Scanewa, the Lewis PUD mitigation license (FERC 2833) indicates a rainbow trout sport fishery catch rate of 0.50 fish per hour catch. Based on 10,000 angler hours, harvest approaching the 68% as in the earlier study would yield a catch rate of approximately 1.00 fish per hour. Based on 20,000 angler hours the catch rate would be 0.50 fish per hour.

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

The program started in 1986 including a combination of anadromous fish and resident trout released into Project reservoirs, Swofford Pond, Tilton River and upper Cowlitz River basins (primarily Skate Creek).

1.14 Expected duration of program.

With the new FERC license (July 2003), a new FHMP (2004) eliminated the resident trout program. Although the program has been funded through 2005 plants, WDFW and Tacoma Power are discussing the future of the program.

1.15 Watersheds targeted by program.

Cowlitz Subbasin/Lower Columbia Province

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

1.16.1) Brief Overview of Key Issues

Issue 1: Goals above Mayfield Dam and Impact on Natural Stock Recovery: WDFW's goal is to manage for multiple uses in the upper watershed and reservoirs including resident fish harvest and to establish a balance of harvest opportunity versus natural stock recovery. In the Cowlitz Fisheries and Hatchery Management Plan (FHMP – Final August 2004), trout plants were proposed for discontinuation based on the several points including: The elimination of resident fish stocking programs in the key spawning areas of listed species was identified in the 1999 Hatchery Biological Opinion (NMFS 1999) as a reasonable and prudent measure to reduce impacts to listed stocks. The recommendation cited the impact catch-able trout fisheries have on steelhead populations was summarized by Filbert (2002), as part of the re-licensing proceedings for the North Fork Clackamas River Hydroelectric Project. Also weighed was the "*Impacts of Resident Trout Fisheries on Anadromous Fish Populations"*(TPU 2004) prepared for the Cowlitz FTC.

Issue 2: Program Success: Catch success have been in part based on past creel census studies and angler success and benefits to the local economy have not been evaluated recently. Tacoma Power has agreed to fund production through 2005 but negotiations with WDFW are on-going for the future of the program. Future trout production should be based upon a review by the FTC of the success or failure of the program.

1.16.2) Potential Alternatives to the Current Program

DRAFT ALTERNATIVE 1: Eliminate the resident trout program.

Descriptions and Implications: In 2003, Tacoma Power eliminated funding for trout production as was called for by the FHMP in order to eliminate any impact on upper river recovery efforts. Subsequent discussions were made to contract a private fish company (Trout Lodge) to stock the waters to fulfill the mitigation for 2004. Funding was reinstated for 2005 for trout production at Mossyrock Hatchery with future years presently being discussed by the parties involved.

PROS AND CONS:

Pros – This would reduce impact on listed fish from catch-able trout harvest including hook and release mortality and angler by-catch on listed fish over 8 inches and eliminate concerns about predation, competition or genetic impacts. Not all impact would be eliminated if a fishery on resident trout were managed as in other anadromous streams such as a 12 inch minimum size and daily limit of two fish.

Cons - This would eliminate or sharply reduce a longstanding angling harvest opportunity for citizens in east Lewis County. Catch-able rainbow trout remain a desirable target for many generations of freshwater angling families and significant local economic benefits would be affected. Stream angling can give anglers who cannot afford or have the capabilities to manage boats and trailers anymore, easy access to fishing opportunities. WDFW has a mandate to provide angling opportunity for increasing public demand and will manage to do so while protecting and restoring co-occurring native fish and wildlife species.

DRAFT ALTERNATIVE 2: Continue to provide a catch-able trout opportunity in a limited number of streams.

Descriptions and Implications: In 2003, Tacoma Power eliminated funding for trout production as was called for by the FHMP to eliminate impact on upper river recovery efforts. Subsequent discussions were made to contract a private fish company (Trout Lodge) to stock the waters to

fulfill the mitigation for 2004. Funding was reinstated for 2005 for trout production at Mossyrock Hatchery with future years presently being discussed by the parties involved.

PROS AND CONS:

Pros – This would continue a longstanding angling harvest opportunity for citizens in east Lewis County. Catch-able rainbow trout remain a desirable target for many generations of freshwater angler families and significant local economic benefits would be affected. For numerous anglers, stream angling can afford anglers who cannot afford or have the capabilities to manage boats anymore easy access to fishing opportunities.

Cons - This would impact listed fish from catch-able trout harvest including hook and release mortality and angler by-catch on fish over 8 inches with some level of predation, competition or genetic impacts.

DRAFT ALTERNATIVE 3: Review the success or failure of the program

Descriptions and Implications: Current releases have been based on past creel census studies. The degree of angler success and benefits to the local economy have not been evaluated recently although some reservoir studies have been conducted in Mayfield, Riffe and Scanewa Resevoirs in the past few years. WDFW's goal is to manage for multiple uses in the upper watershed and reservoirs including resident fish species and to establish a balance of harvest opportunity versus natural stock recovery and before eliminating resident trout production would like decisions based on evaluations as mentioned in the SA.

PROS AND CONS:

Pros – After 2004, future trout production was to be based upon a review by the FTC of the success or failure of the program and any impacts to listed stocks (Section b, Article 5). WDFW agrees with the 1999 Hatchery Biological Opinion (NMFS 1999) that as a condition of stocking resident trout, the agency shall implement a monitoring and evaluation program to evaluate the potential impacts and to demonstrate whether the program jeopardizes the survival or recovery of listed fish. Concerns by the U.S. Fish and Wildlife Service (USFWS) for catch-able rainbow trout plants in Lake Scanewa which is the upper most Cowlitz system reservoir, have been discussed with NOAA Fisheries to develop an approach that will continue to monitor the program and address listed fish concerns in the Lake Scanewa trout program (Lewis PUD FERC 2833). Evaluation will allow WDFW to better manage impacts or determine the success or failure of the program to achieve goals including preserving a viable catch-able trout opportunity.

Cons - Without evaluation, the success or failure of resident trout programs to achieve all goals for the Cowlitz system above Lake Mayfield will not be determined.

1.16.3) Potential Reforms and Investments

Reform/Investment 1: WDFW is seeking funding to monitor and evaluate both impacts of trout plants in stream and in lakes included in the anadromous zone which makes up critical habitat for upriver recovery of ESA listed fish.

Reform/Investment 2: Due to the loss of Yellowjacket Pond on the Cispus River there are few places left to stock these fish. Similar type ponds that allow harvest in accessible areas would need to be explored or developed to provide some type of harvest opportunities.

Section 2: Program Effects on ESA-Listed Salmonid Populations

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

None. On March 23, 2004, NOAA Fisheries (Consultation No. 2001/02045) issued a Biological Opinion for ESA Section 7 Cowlitz River Hydroelectric Project but did not cover trout production.

2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur above Mayfield Lake where the program fish are released:

ESA listed stock	Viability	Habitat
Spring Chinook	M	L
Cowlitz Fall Chinook	L	L
Late Winter Steelhead	H	L
Coho- (Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

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

Identify the ESA-listed population(s) that will be directly affected by the program.
None

Identify the ESA-listed population(s) that may be incidentally affected by the program.
Lower Columbia River fall chinook salmon are listed as "threatened" under the ESA on May 24, 1999.
Lower Columbia River spring chinook salmon listed as "threatened" under the ESA on May 24, 1999.
Lower Columbia River Steelhead listed as threatened under the ESA on March 19, 1998.
Lower Columbia River Coho including hatchery and wild populations within the Lower Columbia River/Southwest Washington Evolutionary Significant Unit (ESU) were proposed as threatened under the federal Endangered Species Act in 2004 (NOAA 69 FR 33101; 6/14/2004).

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

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

The Settlement Agreement states that it is the responsibility of NOAA-Fisheries and USFWS to set the adult abundance values used to determine the sustainability of spring Chinook and late winter steelhead in the upper Cowlitz River and for all anadromous fish species in the Tilton River. These abundance values are used as one of the two criteria for determining when upstream adult fish passage facilities would be constructed at the Project. Minimum abundance (500 adults for all indigenous salmonids) targets for the Tilton River and upper Cowlitz River populations have been proposed by Tacoma Power in Section 3.5.1 of the Cowlitz River FHMP. These are not necessarily levels that constitutes recovery, but a minimum population size that prevents unacceptable rate of risk for extinction in the near future. It should be emphasized that these proposed abundance targets are based on the interpretation of currently available data and determining the need for adult passage facilities and should be modified as more rigorous analysis of new data is completed (Cowlitz River FHMP).

Lower Columbia River Coho *Oncorhynchus kisutch*): Cowlitz Hatchery coho stock are integrated

with the Upper and Lower Cowlitz historic population under NOAA's proposed listing determination (69 FR 33102; 6/14/2004). Coho adult re-introductions and smolt production for the upper Cowlitz has been the most successful species to date. Since 2000, escapement to Cowlitz Salmon Hatchery has averaged almost 45,000 adults with many of these adults used for upriver reintroduction and nutrient enhancement benefit (**Table 1**). An average of 6,400 wild coho yearly have been taken upriver during the same time. In the Northwest Power Planning Council's model estimated smolt production capacity of 123,123 for the lower Cowlitz River, 131,318 for Tilton River and Winston Creek, and 155,018 for above Cowlitz Falls. An average of 159,665 smolts have been collected at the CFFF and transported for release from the Cowlitz Salmon Hatchery Stress Relief Ponds since 2000 **(Appendix A).** Upriver total productivity has averaged 382,206 coho smolts during the same period with a Fish Collection Efficiency of approximately 41.7%. Fish not collected can end up in Riffe Lake as part of a resident landlocked "silver" fishery.

Table 1. Hatchery Coho adults transported to the Upper Cowlitz River Basin, 1996 - present.

Year	UM – Unmarked Coho			AD – Adipose Clipped Coho			Totals
	UM-Female	UM-Male	UM-Jack	AD - Female	AD - Male	AD – Jack	
1996-7	0	0	0	932	594	629	2,155
1997-8	0	0	0	2,774	1,262	464	4,500
1998-9	0	0	0	4,128	4,140	3,154	11,422
1999-2000	2,398	2,383	120	10,594	11,635	7,197	34,327
2000-01	514	778	284	14,653	16,674	9,566	42,469
2001-02	1,150	1,644	96	15,504	21,564	1,497	41,455
2002-03	3,661	4,688	416	23,698	30,490	6,300	69,253
2003-04	3,477	4,511	484	9,526	11,169	6,143	35,310
2004-05							
Totals	11,200	14,004	1,400	81,809	97,528	34,891	240,891

Source - ANNUAL REPORTS FOR THE COWLITZ FALLS PROJECT 1996 – Present.

Lower Columbia River spring chinook salmon (*Oncorhynchus tshawytscha*): The current spring Chinook hatchery stock is listed as a core genetic legacy population in the Cowlitz system (Myers et al. 2002), and core/legacy status (McElhany et al. 2003). Significant numbers of spring Chinook adults are placed in Lake Scanewa for upriver productivity **(Table 2).** Chinook smolts collected at CFFF have averaged approximately 27,000 since 2000 **(Appendix A).** Fish Collection Efficiency (FCE) have averaged approximately 19%. No spring Chinook smolts were found in the Lake Scanewa creel census survey (Tipping and Serl 2000).

Table 2. Spring Chinook Adults transported to the Upper Cowlitz River Basin, 1996 – present.

Year	Not sexed	Female Ad Clip	Female Un Mark	Male Ad Clip	Male Un Mark	Jack	Total
2004		4,786	116	5,928	139	502	11,471
2003		4,482	264	4,089	284	18	8,589
2002	1,465	119	Unk	179	Unk	50	1,787
2001		68	Unk	60	Unk	0	128
2000		98	Unk	106	Unk	0	204
1999		53	Unk	38	Unk	177	268
1998		0	0	0	0	0	0
1997		0	0	25	0	26	51
1996		2	Unk	4	Unk	0	6

Source - ANNUAL REPORTS FOR THE COWLITZ FALLS PROJECT 1996 – Present.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytscha*): Not applicable as productivity of fall Chinook upriver will begin until spring Chinook productivity has been determined.

Lower Columbia River Steelhead *(Oncorhynchus mykiss*): The Cowlitz system had six historical populations including three core populations (Cispus, Upper Cowlitz and N.F. Toutle) populations. All are winter steelhead stocks with the Cispus winter run population hatchery stock is listed as a core genetic legacy population (Myers et al. 2002), and core/legacy status (McElhany et al. 2003). Only late winter stock steelhead are taken to the upper Cowlitz system with both wild adults and hatchery contributions **(Table 3).** A number of tributaries to the upper Cowlitz and Cispus River potential spawning and productive waters. For the past five years, an average of 13,218 wild steelhead smolts have collected at the CFFF and hauled downstream **(Appendix A).** Additionally, late winter stock fingerlings (RV marked) supplement the wild productivity. Fingerling plants of 200,000 (80 – 100 ffp) are made in the Cowlitz watershed including the Upper Cowlitz River, Silver Creek, Johnson Creek, and Skate Creek. In the Cispus watershed plants are Upper and Middle Cispus Rivers, Yellow Jacket Creek, Iron Creek, Greenhorn Creek, and North Fork Cispus River. A portion of the late steelhead yearling production (up to 37,500) from the Cowlitz Salmon Hatchery is planned for rearing in the upper Cowlitz with some experimental groups reared and volitionally released from the Hall Creek Acclimation Pond site downstream of the town of Packwood. Steelhead Smolt FCE has averaged 50 –60% since 2000.

Table 3. Late Winter Steelhead Adults transported to the Upper Cowlitz River Basin, 1996 - present.

Year	UM – Unmarked STHD			RV-Right Ventral Clip			AD – Adipose Clip			Totals
	UM-Female	UM-Male	UM-Jack	RV - Female	RV - Male	RV – Jack	AD-Male	AD - Female	AD - Jack	
1996-7	22	12	0	5	14	0	0	1	0	54
1997-8	6	5	0	5	1	0	26	23	0	66
1998-9	15	24	13	10	29	3	6	49	8	157
1999-2000	108	107	0	28	73	0	19	77	0	412
2000-01	133	125	37	71	122	20	70	124	27	729
2001-02	346	419	1	174	492	1	453	898	3	2,787
2002-03	316	205	2	335	241	0	933	497	3	2,532
2003-4	146	146	4	100	167	0	214	619	1	1,397
2004-5										
Totals	1,092	1,043	57	728	1,139	24	1,721	2,288	42	8,134

Source - ANNUAL REPORTS FOR THE COWLITZ FALLS PROJECT 1996 – Present.

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

The hatchery activity described in this section pertains to the catch-able trout plants into Skate Creek. Due to the fact that estimated levels of take on listed salmonids cannot be determined at this time they can not be submitted in this document.

HARVEST AND FISHING MORTALITY

"*Impacts of Resident Trout Fisheries on Anadromous Fish Populations"(TPU 2004)* indicates significant loss of steelhead mortality from several case studies. The fish loss in streams was mentioned as could even be higher due to easy stream access, high hatchery stocking densities and regulations that allow for the use of bait. Fish loss in the Skate Creek fishery was mentioned as could even be higher due to easy stream access, high hatchery stocking densities and regulations that allow

for the use of bait. WDFW agrees that these impacts should be evaluated as the case studies did not involve trout plants in anadromous waters in the Cowlitz system. In a 2001 survey, on Skate Creek, 111 angler and 17 eletro-fishing caught trout were stomach sampled with 0% incidence of salmonids prey items with no anadromous fish observed in the catch. Although smolts are collected at CFFF and total smolt productivity is estimated, productivity for individual tributaries or stream reaches are unknown although Skate Creek is one of the largest tributaries capable of supporting steelhead production in the upper Cowlitz River. At the Cowlitz Falls Fish Facility (CFFF) on Lake Scanewa, smolt collection monitoring indicates that most migrating wild steelhead smolts may have vacated by the time the trout plants commence (Serl and Morrill, Draft 2004). Mortality would be on stages of steelhead not migrating the current year. Harvest by-catch along with hook and release mortality is unknown, but evaluations specific to non-migrant steelhead in the area need to be evaluated before a number of listed fish lost can be estimated. In a reservoir study, 146 steelhead (1.39%) made up the resident reservoir catch in Lake Scanewa, for 2000 (Tipping and Serl 2000).

HYBRIDIZATION

In addition to the negative interactions identified by Tipping and Serl (2000), resident fish stocking may also impact native fish populations through interbreeding (Williams et. al. 1997) which may alter their fitness and lower their resistance to diseases such as *Ceratomyxa shasta*. This would be dependent on whether fish seek tributaries for spawning or whether they survive to spawn and have not been evaluated. In statewide rainbow hatchery strains that were in large part derived from Meader Trout Farm strains in the 1930s and 40s (Idaho), carryover potential, the ability to compete in the wild (survival) and spawning success of catch-able rainbows were considered to be very low (pers. comm. B. Crawford IAC 2005). Evaluations specific to those impacts need to be evaluated before a number of listed fish lost can be estimated

COMPETITION

As mentioned previously, few fish are expected to survive the year and carryover potential of catch-able trout is considered very low by WDFW. Evaluations have not been done to confirm this and should be included in future evaluations. In Skate Creek, a creel census study from early June to early September indicated 68.1% of the fish were harvested (Danielson and Tipping 1980). In 1991, 298 tagged rainbow trout were released into Skate Creek of which 80.2% of the tags were returned (Tipping 1999). The percentage of trout surviving as holdovers (defined as fish > 36 cm) included only 58 fish out of 25,000 rainbows planted (0.232 %) that were harvested in Lake Scanewa (Tipping and Serl 2000). Some of the fish could have potentially been broodstock plants escaping from a kids fishing day seined off area.

PREDATION

As trout are planted at 25 cm fl, most listed fry, fingerling and yearling smolts (up to 100 mm fl) whether 1, 2 or 3 year freshwater smolts could be potential prey for catch-able trout. In 2001, on Skate Creek, 111 angler and 17 eletro-fishing caught trout were stomach sampled with 0% incidence of salmonids prey items. In 2000, stomach analysis on rainbow trout in Lake Scanewa, indicated that 1.1% of the smaller trout (length <30cm) consumed salmonids with 13.6% of larger fish (length >30cm) consuming salmonids. The study consisted of 351 “small trout” and 22 “large trout”. A large trout (length 46 cm) accounted for two of the three predated salmonids amoung the two large trout with salmon as prey. 5.89% of the total fish sampled though were of the larger size with the remainder (94 %) made up of smaller trout (Tipping and Serl 2000). As in the previous competition section, some of the “holdovers” could have been large broodstock fish escaping a special kids derby. Lake Scanewa behind Cowlitz Falls Dam is currently producing the most significant number of wild salmonids in the upper system and additional creel census work to further evaluate trout impacts in Lake Scanewa has been funded by Lewis PUD for 2005 (pers. comm.. M. Kohn 2005). If WDFW cannot get evaluation funding for Skate Creek or in Mayfield Lake, then findings from the Lake Scanewa results could be used to determine a level of impact.

DISEASE

Non-endemic strain of rainbow released in the Cowlitz system are believed have little resistance to *Ceratomyxa Shasta*, and the planting of trout could increase C. shasta in the stream have been cited by the FTC (Impacts of Resident Trout Fisheries on Anadromous Fish Populations, 2004). Rainbow planted from Mossyrock Hatchery (via eggs from Goldendale) have been reared on spring water and transmission of *C.Shasta* is not transmitted through eggs nor fish to fish (WDFW Fish Health). A relationship between increased water temperatures and low velocity high volume environments such as exhibited by the reservoir environments on the Cowlitz system could favor conditions required by the naturally occurring *C. Shasta.* Fish reared for 3-4 months in the FOC net pens in Mayfield Lake have been infected by *C shasta* with some loss reported by fish health staff. Environmental conditions in Skate Creek could be less condusive to *C Shasta* but impact of trout plants is unknown. See also HGMP section 9.2.7.

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.

Prior to the new Settlement Agreement, trout production in the area above Mossyrock Dam was negotiated between WDFW and TPU and additionally, in accordance to a "Supplemental Agreement Regarding Game Fish and Wildlife Mitigation Relative to the Cowlitz River Project" allowed for coho plants to be counted towards resident production.

Plants to Riffe Lake were discontinued in 1999 due to the annual recruitment of natural coho smolts dropping down from upper Cowlitz River production above Lake Scanewa which creates the landlocked "silver" fishery. From 2001-2003, both channel catfish and tiger musky production in Swofford Pond were counted as credit for part of the resident fish mitigation. Stream plants of rainbow were made to the Clear Fork of the Upper Cowlitz until 1994 and the now defunct off channel ponds on Yellow Jacket Creek (tributary to Cispus River) in 1996. Current catch-able size production includes rainbow trout plants to the Tilton River (tributary to Lake Mayfield), Skate Creek (tributary to the upper Cowlitz), to the Mayfield Lake Net Pens operated by the Friends of the Cowlitz (FOC), direct plants into Lake Mayfield by Mossyrock Hatchery and rainbow and brown trout planted into Swofford Pond.

With the proposed elimination or a resident program by the new FHMP, discussions between WDFW and TPU will be ongoing.

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

The expired mitigation agreement (2001) for Cowlitz Salmon and Trout Hatcheries was for anadomous species (salmon steelhead and sea-run cutthroat) production in the lower river (FERC PROJECT # 2016 dated Aug. 9, 1967). That license expired on December 31, 2001 with the new thirty-five year license issued March 13, 2003, and became effective on July 18, 2003. The license is for a term of 35 years and expires July 18, 2038. Originally, resident trout production was not part of the settlement but negotiated in the late 1980's. The final FHMP for the new Settlement Agreement (August 2004), has recommended ending the resident trout plants.

3.3 Relationship to harvest objectives.

The WDFW has a mandate to balance increasing the public demand for more angling opportunity for these species with the increasing need to protect and restore co-occurring native fish and wildlife species. Several WDFW policy documents attempt to balance harvest opportunity with the recovery of natural listed and non-listed stocks:

Resident Trout Stream Stocking Policy (POL-5231) – Section 3- "Fishing stocking will not cause significant impacts to other fish or wildlife species". The policy does not necessarily prevent stocking of trout into streams where listed fish are present or in streams critical for recovery of listed species. The new Settlement Agreement indicates that subsequent to 2004, future trout production (especially stream plants) was to be based upon a review by the FTC of the success or failure of the program and any impacts to listed stocks (Section b, Article 5). WDFW is in agreement with a review based on evaluation as needed.

Wild Salmonid Policy (WSP) - Introductions of fish populations (non-indigenous) are to be

managed to avoid significant adverse impacts on wild populations. WDFW agrees with the new SA priority of the recovery of historical salmonids in the upper Cowlitz. WDFW is in agreement with a review based on evaluation as needed.

Cowlitz River Fish Management Framework – General Management Focus "Interaction between stocked (trout) and native trout will be reduced in upriver tributaries and focus will be on providing trout fishing opportunities in impoundments". WDFW concurs and that trout plants have been reduced from earlier levels to reduce interaction potential and that if needed based on future evaluations, that impoundments provide freshwater opportunities in lieu of stream plants.

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

Citizens from 14 counties have utilized the fishery opportunities in Lake Scanewa (Tipping and Serl 2000). Lewis County and Pierce residents make up a majority of the anglers. In 1977, a Skate Creek creel census estimated 68.1% of the approximately 55,000 trout planted were harvested. Recent creel surveys have not been conducted on the current level of 15,000 trout planted in Skate Creek. In 2000, 40.4% of 25,000 trout planted were estimated to be harvested in Lake Scanewa (Tipping and Serl 2000).

3.4 Relationship to habitat protection and recovery strategies.

The re-licensing impact associated with TPU and Lewis PUD continued operation of hydroelectric facilities including the dams creating Mayfield Lake, Riffe Lake and Lake Scanewa are major factors that affected natural production of resident and annadromous fish species. Project impacts are to fish and wildlife but the following pertains to fish only and include:

(1) impacts to resident and anadromous fishes in the reservoirs, downstream, and upstream caused by project-related barriers, false attraction, entrainment in intakes, and other impediments to fish migration;
(2) impacts to resident and anadromous fishes in the reservoirs, downstream, and upstream caused by project-related mitigation hatchery fish interactions with remaining wild fish;
(3) impacts to resident and anadromous fishes in reservoirs from fluctuations in reservoir level;
(4) impacts to resident and anadromous fishes downstream of the dams caused by project-related flow-dependent habitat changes;
(5) impacts to resident and anadromous fishes downstream of the dams caused by project-related flow fluctuations;
(6) impacts to resident and anadromous fishes in the reservoir and downstream caused by project-related channel changes stemming from alteration of natural sediment transport;
(7) changes in dynamics of fish-predator interactions resulting from change in fish escape options;
(8) changes in water quality (e.g., temperature, dissolved gases, suspended sediment, pollutants) which can impact fish (and wildlife);
(9) interruption of the transport of large wood and nutrients from upstream to downstream reaches and nutrient transport upstream in the form of adult anadromous fish;
(10) inundation of anadromous fish spawning, incubation, and rearing habitat by Mayfield, Mossyrock and Cowlitz Falls dams, resulting in loss of anadromous fish production from the inundated reaches.

FERC Settlement Agreement: Several articles are attempting to address passage way problems in the system including: Article 1 (Downstream Fish Passage for Riffe Lake and Cowlitz Falls), Article 2 (Downstream passage for Mayfield Lake) and Article 3 (Upstream Fish Passage for the barrier Dam, Mossyrock and Mayfield) deal with future proposals and improvement needed for restoring processes upstream and down. Additionally a fish habitat fund of up to 3.0 million

dollars for identified projects has been created (Article 11).

Additional Processes:
The following processes have included habitat identification problems, priority fixes and evolved as key components to The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004).

Sub-Basin Planning
Regional sub-basin planning processes include the Cowlitz River Sub-basin Salmon and Steelhead Production Plan, September 1, 1990 with a more recent Draft Cowlitz River Subbasin Summary (May 17, 2002) was prepared for the Northwest Power Planning Council. The Sub-basin efforts provided initial building blocks for the LCFRB regional recovery plan. *The Lower Columbia fish Recovery Board (LCFRB)* has adopted The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

Habitat Treatment and Protection
Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. EDT has been modeled for productivity in the Cowlitz basin in The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans and has been used by Tacoma Power for the FERC re-liscensing agreements for the upper basin productivity goals. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis (LFA)
A WRIA 26 LFA was conducted by the Washington State Conservation Commission (May 2002). WRIA 26 was separated into seven subbasins; Coweeman, Lower Cowlitz, Toutle, Mayfield/Tilton, Riffe Lake, Cispus, and Upper Cowlitz.

3.5 Ecological interactions.

Salmonid and non-salmonid fishes or other species that could:

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program*: There are high numbers of predators in Mayfield and Riffe Lake Reservoirs, such as northern pikeminnow as well as exotic predators, such as tiger muskies, brown trout, large and smallmouth bass, bluegill, crappie, and yellow perch introduced for angling. These predators present some risk but size of catch-able trout would beyond the realm of all but the largest predators. River otters and mink are mammals with the potential to feed on trout in smaller environments such as stream plants in Skate Creek. Raptors including ospreys utilize fish exclusively in their diets and may prey on trout.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring indigenous salmon, steelhead, anadromous and resident trout populations and non-salmonid species including sculpins, minnows such as dace and could be negatively impacted by program fish due to competition or predation. Of primary concern are listed steelhead impacts by the harvest of trout and proposed for listing coho smolts migrating through the reservoir or from listed species including chinook dropping down from the upper Cowlitz re-introduction program in Lake Scanewa.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program.
Reintroduced salmonids that naturally spawn in the target stream and surrounding production areas may

positively impact program fish. Decaying carcasses may contribute nutrients that increase productivity of the overall system.

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Mayfield Lake is large impoundment with significant angling opportunities. The catch-able trout program is targeted specifically by local citizens utilizing the lake and reduces harvest on priority salmonids utilizing the system including steelhead and cutthroat including anadromous and resident strains. Although there are multi species for harvest including spiny rays and tiger musky, salmonids are desirable species for harvest.

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.

Goldendale Hatchery – The hatchery is fed from a spring source located approximately 500 feet Northeast of the hatchery. 4,500 gpm (10 Ccfs) is gravity fed through a pipeline and is a constant 50° F. A headbox at the north end of the raceway and brood stock ponds delivers water to 8 ponds total. The water is hard with some iron; chemical compositions that benefit the trout program.

Mossyrock Hatchery - Four springs (1-4), are located approximately ¾ mile north of the hatchery grounds. Up to 2,500 gpm (5.6 cfs) are gravity fed through an eighteen inch line to the head box of the raceway ponds. Water is a constant 50°F. Due to flow fluctuations ranging from 800 – 2,500 gpm depending on season, 1 hp aerators are used in raceway ponds from spring on until the catchable plants begin and can reduce loadings in the ponds and provide the fish protection from sunburn.

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.

Potential Hazard	Risk Aversion Measure
Hatchery water withdrawal	Goldendale Hatchery: Water rights total are for 100% of the available spring water at Goldendale (up to 4,500 gpm) and are formalized thru trust water right S4-*04576 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below). Mossyrock Hatchery: Water rights total are for 100% of the available spring water at Mossyrock (up to 2,500 gpm) and are formalized thru trust water right S2-*05156 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	Goldendale Hatchery: Spring source is non-fish bearing. Appropriate screen sizes are used depending on the size of the trout in the raceways to prevent loss or physical damage. Mossyrock Hatchery: Spring source is non-fish bearing. Appropriate screen sizes are used depending on the size of the trout in the raceways to prevent loss or physical damage.
Hatchery effluent discharges. (Clean Water Act)	Goldendale and Mossyrock Hatcheries operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE) WAG 13-5001 (Goldendale) and WAG 13-1013 (Mossyrock). Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Adherence with the NPDES permit will likely lead to no adverse effects on water quality from the program on any listed fish. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperatures* are monitored daily for maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

Broodstock at reared at Goldendale Hatchery. There are a total of twelve ponds that rear trout to catchable size on station. Two ponds are used to segregate 3 and 4 year aged broodstock for egg take. Younger aged fish are located in ponds 1-10. Of the younger aged fish, approximately 3,000 fish are kept on hand instead of planting in the spring. By year 3, approximately 2,400 fish are available for spawning and are kept in pond eleven. By age 4, approximately 700 females are separated in pond twelve. Broodstock ponds are 12' x 75' x 4'.

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

Broodstock do not have to be transported within station, but excess broodstock or unused fish can be transported via Cowlitz Complex 1,500 gallon tanker for lake plants. Oxygen and 5% salt solution is used on the transfer.

5.3 Broodstock holding and spawning facilities.

The spawning is done in the broodstock holding ponds. Sections are partitioned off for sorting ripe and unripe fish. A spawning table is set up in the pond.

5.4 Incubation facilities.

Goldendale Hatchery - Incubation is in shallow troughs with approximately 42 shallow baskets used for the egg take. 40,000 eggs are eyed per basket with baskets reduced to 8,000 eggs per tray prior to hatching.

Mossyrock Hatchery – Shallow troughs 15' x 1' and 6 inches deep are used. A total of 96 shallows are present in the incubation room with 24 used for the mitigation program.

5.5 Rearing facilities.

Goldendale Hatchery – Twelve outside raceways are 10'x 75' x 4'. Ponds 1-10 hold growing fish while 11 & 12 are reserved for broodstock fish.

Mossyrock Hatchery – Twelve outside raceways are 10' x 90' x 1.5'. All rear the various trout programs.

5.6 Acclimation/release facilities.

Same as above. Trout are trucked out for plants in regions 3 and 5.

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

Due to the good water supply and gravity feed system located within the hatchery grounds, there have been no disasters. Some avian predation has occurred and an efficient predator bird netting system is currently being installed.

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.

Not applicable to listed fish. For the efficiency and safe operation of the legal trout program, fish health, rearing and facility permitting guidelines are followed. Facilities are spring fed and all trout are transported out of station. FOC net pen operations follow both permitted and non-permitted (NPDES) guidelines needed to operate with-in Lake Mayfield.

Section 6. Broodstock Origin and Identity

6.1 Source.

Eggs for Mossyrock Plants have come from broodstock held at Goldendale Hatchery. The Goldendale Hatchery was built in 1938 at a large spring with a constant water temperature of 50° F. After construction in 1939, the Goldendale operation started with Meader rainbow trout.

6.2.1 History.

Mossyrock rainbow trout are from Goldendale Hatchery. Most sources appear to a derivative of rainbow from California. Rainbow from Yakima and Meader strain were combined around 1950 to form the present rainbow stock at Goldendale Hatchery that has continued to this day. The following history is from The Origin and History of the Trout Broodstocks of the Washington Department of Game (Crawford 1979).

Meader Stock - This stock was first used when the Goldendale Hatchery first opened. The W. S. Meader Trout Farm was located at Papoose Springs near Pocatello, Idaho. The source of their eggs could not be directly determined through correspondence, etc., however the circumstantial evidence strongly suggests that they were originally obtained from the U. S. Fish Commission's hatchery at Springville, Utah some time between 1910 and 1930. Springville obtained eggs from the McCloud River, Shasta County, California.

Cape Cod strain - The Cape Cod Trout Company of Wareham, Massachusetts used fish from the McCloud River near Mt. Shasta, California. Goldendale used these fish for a time in the early 1940's but Cape Cod transfers were phased out by 1948.

Yakima Strain – The Yakima Hatchery began in 1938 from a mixture of Meader and McNott stock.

Mt.Whitney Strain - In June 1962, Mt. Whitney strain rainbow trout from the Mt. Whitney Hatchery at Independence, California were shipped to Goldendale Hatchery. According to Mr. Leonard E. Nixon, California Department of Fish and Game (letter in files), it is a mixture of Sacramento River rainbow and Klamath River steelhead with a possible contribution by Lahonton cutthroat from a spawning station at June Lake, Mono County, California. Because the 52° F spring water temperature at Goldendale tended to cause early maturation of the spawners, the stock was transferred to the Puyallup Hatchery in 1964 and discontinued at Goldendale Hatchery.

6.2.2 Annual size.

The Goldendale Hatchery total egg take goal is 6,850,000. Approximately 700 4 year fish, 2,400 3 year fish, and 3,000 2 year fish make up the broodstock program.

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

Trout broodstock have come from the hatchery program since inception.

6.2.4 Genetic or ecological differences.

Not applicable, see HGMP section 6.2.1.

6.2.5 Reasons for choosing.

The Goldendale rainbow has been selected for early eggs, large size, high fecundity, and overall color and vigor. Spawn is presently taken from October to February with the majority of eggs available in November and December. The resultant strain of fish have consistently shown good survival in the hatchery and in the waters planted. Spawn is presently taken from October to February with the majority of eggs available in November and December. Females are presently spawned as 3, and 4 year olds and produce approximately 4,800 to 6,800 ggs per female. Males are spawned as three year olds and are held separately.

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.

Not applicable as no listed natural fish are used.

Section 7. Broodstock Collection

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

Goldendale Hatchery rears the life stages needed to create their broodstock program.

7.2 Collection or sampling design

Adults are reared depending on age class and segregated in the broodstock raceways. Collection for broodstock is in 6 fish pools (4 year fish) and 10 fish pools (3 year fish) from the broodstock raceways.

7.3 Identity.

Broodstock on hand.

7.4 Proposed number to be collected:

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

Approximately 700 4 year fish, 2,400 3 year fish, and 3,000 2 year fish make up the broodstock program. Appoximately 1200 – 1300 females and equal number of males are used for the annual egg. Approximately 350,000 green eggs are proportioned for the Mossyrock trout program.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Approximately 700 4 year fish, 2,400 3 year fish, and 3,000 2 year fish make up the broodstock program. After spawning, 4 year females fish are broodstock planted to lakes with a like amount of 3 year females carried over to the next year. 2 year fish are carried to the broodstock numbers needed for males and females.

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

Fish not needed for broodstock or older than 4 years are transported to lakes for recreational opportunities.

7.6 Fish transportation and holding methods.

Fish used for broodstock are held in ponds that are 20' X 100' X 5.5' or in the circular separator tanks if needed. From here they can be transferred from the ponds to the spawning room where they can be checked for ripeness, anesthetized and spawned or returned to a holding pond via a return tube (if not ripe). For hauling adults to the upper basin, 1500, 1000 and 750 gallon tanker trucks are used. Normal transit time is 30-60 minutes.

7.7 Describe fish health maintenance and sanitation procedures applied.

60 fish representing the spawning population are sampled for ovarian fluid and kidney /spleen samples. Samples are tested for viral hemorrhagic septicemia (VHS), infectious pancreatic necrosis virus (IPN) and infectious hematopoietic necrosis (IHN). There has been no history of these viruses at Goldendale Hatchery, but sampling is done to ensure pathogen history in case need arises for transfers of fish out of fish health management zones. This has not been done in recent history and transmission of disease does not occur in egg transfers.

7.8 Disposition of carcasses.

Carcasses are disposed of at the local landfill.

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

Not applicable for listed fish. For the genetic health of the program, broodstock are selected randomly, mated 1:1, pooled with 3 and 4 year fish, and use only 3 year males for milt.

Section 8. Mating

8.1 Selection method.

Adults are randomly selected from the pond.

8.2 Males.

3 year males are used with 4 year old females and collected in 6 fish pools. 3 year males are crossed with 3 year females and collected in 10 fish pools.

8.3 Fertilization.

Milt is pooled before mixing in a receptacle.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

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.

Not applicable to listed fish, but for the genetic health of the program, the pooling and fertilization protocols have produced desirable size, growth, and health characteristics for the broodstock program.

Section 9. Incubation and Rearing.

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

The current egg take goal is 6,850,000. In the future, the amount of eggs taken will vary depending on program production goals. Survival rates from green egg to ponding were 87% in 2004.

9.1.2 Cause for, and disposition of surplus egg takes.

Program adheres to program goal egg take unless an unexpected loss of eggs occurred or other trout broodstock facilities would require eggs.

9.1.3 Loading densities applied during incubation.

Green eggs are loaded at 42,000 eggs per shallow tray basket. From eyed egg to hatching, eggs are reduced to 8,000 eggs per basket.

9.1.4 Incubation conditions.

Incubation conditions at Goldendale and Mossyrock Hatcheries are similar as both are spring fed. Eggs in shallow baskets are treated with salt and hydrogen peroxide drip daily. During eye stage, water flow is 7 gpm. During hatching and swim-up, the flow is increased to 13 gpm. Temperatures are constant within the incubation building and in the outside ponds.

9.1.5 Ponding.

After swimup in the shallow troughs, fish are divided into 100k lots per raceway. Fish are transferred to cement incubation raceways in the incubation room when they reach 250 ffp. After reaching 100 ffp, they are transferred to the outside raceways.

9.1.6 Fish health maintenance and monitoring.

At Mossyrock Hatchery, fish health and condition is monitored daily by staff. Regular fish health specialist visits check for general fish health symptoms. General fish health history has been good due to the water supply and loading criteria for the station.

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.

Not applicable for listed fish. For the broodstock program, incubation conditions are optimum within the incubation building and incubation receptacles.

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 (1990-2001), or for years dependable data are available.

Survival rates from green egg to ponding were 87% in 2004. Loss from ponding in March to Aug 1st of the first year is .502% in 2004. After this time, minus fry plants or size grading, grow out to catch-able stages are typically 95% or better (pers, comm. B. Ault, L. Peterson 2005).

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

At Goldendale and Mossyrock, maximum loading densities for legal grow out and or broodstock holding range from 12 –18 lbs/gpm. These loading vary depending on stage and when trout are removed for plants.

9.2.3 Fish rearing conditions.

Mossyrock Hatchery – Twelve rearing raceways (dimensions – 10' x 90 ' x 1.5') are used. Aerators are used to add oxygen and re-use water to the raceways when needed and provide protection from sunburn problems. Ponds are covered with bird netting. Fish are transported to lakes and streams for plants. Ponds are vacuumed are settled in a 1/8 acre pollution abatement pond.

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.

Rearing Period	Number Fish^	Length (mm)	Weight (fpp)	Growth Rate
Dec	348,000	NA	4,244	NA
Jan – 1st YR	301,175	35	1,630	NA
Feb – 1st YR	299,747	51	430	NA
Mar – 1st YR	297,587	59	200	NA
Apr – 1st YR	296,570	76	92	0.44
May – 1st YR	289,529	86	62	0.32
Jun – 1st YR	287,265	106	33	0.47
Jul – 1st YR	286,354	126	20	0.39
Aug – 1st YR	286,057	139	15	0.25
Sep – 1st YR	198,162	159	10	0.31
Oct – 1st YR	190,162	171	8	0.20
Nov – 1st YR	130,657	179	7	0.14
Dec – 1st YR	115,457	188	6	0.12
Jan – 2nd YR	107,949	200	5	0.13
Feb – 2nd YR	107,770	216	4	0.20
Mar – 2nd YR	54,508	216	4	0.19
Apr – 2nd YR	37,174	237	3	0.02
May – 2nd YR	30,157	237	3	0.15
Jun – 2nd YR	13,425	272	2	0.12
Jul*	NA	299	1.5	0.15
Aug*	NA	343	1.0	
Sep*	0	369	0.8	

^Numbers represent the start of the Mossyrock Hatchery trout program including other mitigation plants besides Skate Creek. After August, numbers remaining are the result of size grading and/or plants.

*Projected growth if fish were programmed to be released at that size (currently not done as in the past). Fish are managed for a size at release of 2.0 – 2. 5.

Note: Length frequency data are approximations adapted from coho length frequency table (Piper et al. 1982).

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

See HGMP section 9.2.4 above.

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*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)
1400-200	Bio Diet Starter #1, #2 and #3	6	3.0-2.5
200 - 95	Silver Cup/S and BD # 2	4-1	2.5-1.75
95 – 35	Silver Cup/S # 2	1	1.75
35 – 1.0	Silver Cup/S # 3	1	1.50

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

Fish Health Monitoring	Policy guidance includes: *Fish Health Policy in the Columbia Basin* and *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995). A fish health specialist stationed at Cowlitz Complex inspects Mossyrock trout programs including Mayfield Lake Net Pens and checks both healthy and if present symptomatic fish. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	In the standard ponds, fish can be treated with Florinicol at 15MG/KG for 10 – 14 days if needed for *Flavobaceriosis* (Bacterial Cold Water Disease). Skin parasites *Ichthyoboda* (costia) can be treated with hydrogen peroxide drips. Fish health and or treatment reports are kept on file.
Sanitation	Mortality is collected and disposed of at a landfill. All equipment (nets, tanks, boots, etc.) is disinfected with iodiphor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

Not applicable to legal trout plants.

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

None for raceway rearing. Some natural conditions of ambient lake temperatures and lake ecosystem conditions exist in the FOC net pen complex.

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

Not applicable as listed fish are not under propagation. Until direct plant into lakes or streams, the trout program at Goldendale and Mossyrock Hatcheries follow fish health and rearing guideline, and facility permitting to maximize trout growth in order to achieve goals.

Section 10. Release

10.1 Proposed fish release levels.

Current releases are held to 15,000 fish.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Catch-able rainbow*	18,750^	2.0 – 3.0	See below*	Skate Creek - 4 sites	See below**	Upper Cowlitz	Lower Columbia

^ Recent plant levels have been held to 15,000 fish.
*Fish are staggered planted from June –September with the first plant timed for the stream opener (June 1st) and the last plant coming prior to the Labor Day weekend.
**Skate Creek plants are made at four bridges: Craig Road (RKm. 1.7), Forest Service Road 47 crossing (RKm. 3.8), Forest Service Road 52 crossing (RKm. 6.9) and at Forest Service Road 52 crossing located at approximately RKm. 12.3. .

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

See HGMP section 10.2 above.

10.4 Actual dates of release and description of release protocols.

Release Year	Catch-able Rainbow Trout		
	No.	Date*	Avg Size (fpp)
1994	22,101	June – Sept 1st	0.8 – 4.7
1995	26,838	June – Sept 1st	0.8 – 4.0
1996	20,758	June – Sept 1st	0.9 – 3.9
1997	19,190	June – Sept 1st	1.0 – 3.8
1998	26,909	June – Sept 1st	0.8 - 5.0
1999	17,007	June – Sept 1st	1.1 – 2.7
2000	17,919	June – Sept 1st	0.9 – 2.7
2001	14,507	June – Sept 1st	2.1 – 2.9
2002	15,036	June – Sept 1st	2.0 – 2.5
2003	14,398	June – Sept 1st	2.0 – 2.6
2004	TL Plants^	June – Sept 1st	Unk

*Plants are staggered through out the season on two week intervals.
^Trout Lodge was contracted for plants in 2004.
Source – WDFW Plants Database

10.5 Fish transportation procedures, if applicable.

Several small tankers with air stones (one 750 gallon, one 1,000 gallon and several 250 gallon tanks) are utilized for moving fish around the facilities or for transporting fry and fingerlings to upper watershed.

10.6 Acclimation procedures (*methods applied and length of time*).

Rainbow trout are reared at Mossyrock Hatchery from eyed egg to catchable trout size for approximately 15 months

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

None.

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

Fish would not be put in streams but used as reservoir plans to Lake Mayfield or Swofford Pond.

10.9 Fish health certification procedures applied pre-release.

Prior to release, population health and condition is established by the Cowlitz Complex Fish Health Specialist. This is commonly done 1-3 weeks pre-release. Prior to this examine, whenever abnormal behavior or mortality is observed, staff also conducts the Cowlitz Facility Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy and IHOT guidelines. See also HGMP Section 9.2.7.

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

In event of system failure, there is an extensive alarm system capable of identifying problems in critical areas of the hatchery. Water system is gravity fed so water is available or could be pumped from Mayfield Lake if needed.

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

The catch-able rainbow strain from Goldendale stock has been used for decades and displays several stock characteristics that provides immediate harvest and reduces long term competition or interactions with listed fish including high growth rates in the hatchery environment and reduced holdover ability as opposed to sub-yearling or jumbo fry plants as fall plants. As fish are reared throughout the life cycle in concentrated numbers in raceways, upon release fish can remain “schooled together” for a time rather than dispersing throughout the system. Legal trout plants have noticeable physical characteristics that can allow anglers to distinguish them from natural salmonids smolts. At 2.0 – 3.0 ffp are significantly larger than wild smolts and fins can be eroded from being reared in concrete ponds. Upon release, fish are of similar size and girth to one another and can be rainbow hue colored as opposed to smolts that would be silvery in appearance. Overall, plants numbers have been reduced from 55,000 to current levels held to 15,000 fish. Where in the past, fish release size was variable (0.8 – 5.0 ffp), fish size at release has been programmed at 2.5 ffp to reduce predation potential on listed salmonids and provide a catch-able trout of similar size at approximately 1/3 lb each and 10 inches in length significantly larger than listed smolts in the area. Plants are staggered to create a fishery throughout the summer months with the first plant talking place after data has shown most steelhead smolts have vacated. If high water conditions exist in early June that would disperse plants and prevent harvest opportunity, the initial plant can be delayed as needed to mid-June.

Section 11. Monitoring and Evaluation of Performance Indicators

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

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

1. Production of catch-able trout – Annual plants records recorded by WDFW hatchery data base. Ongoing program is managed continuously for this indicator.
2. Plant fish at programmed size desirable to anglers and significantly larger than listed smolts - Growth monitored and programmed for this indicator. Plants target size recorded by WDFW hatchery data base.
3. Provide Information about hatchery programs – Hatchery provides outreach to local schools and groups and is recorded by visit by on-station staff.
4. Hatchery operations comply with all state and federal regulations – Water use-age, intake compliance, and effluent discharge are monitored and reported per NPDES and other reporting guidelines.
5. Broodstock program at Goldendale Hatchery produces traits desirable to the program - Protocols including mating pools and fertilization at Goldendale Hatchery are followed to preserve trout characteristics desirable for trout programs. Feeding and pond management are monitored daily by on-station staff.
6. Necropsies of fish performed to assess health, nutritional status and culture conditions – Fish health procedures are performed by WDFW fish health.
7. Estimate hours of angling opportunity – Based on past creel census studies with funding requested for this indicator and others indicators.
8. Estimate catch rate fish/hour- Based on past creel census studies with funding requested for this indicator and others indicators.
9. Distinguish catch-able trout – Explore the marking of trout (fin clipping) based on future consultation and findings with other trout programs in the watershed (Lake Scanewa studies 2005).

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

Current trout production is funded by Tacoma Power although future funding is being discussed. Indicators 1- 6 are inherent in WDFW hatchery operations if the program exists. Indicators 7-9 are dependent on future funding of the resident trout program and on needed evaluation funding for impacts that trout fishing can have on listed fish in tributary stream and reservoirs.

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.

If funding for evaluation is provided, protocols to protect listed fish in any population or status would applied by region staff.

Section 12. Research

12.1 Objective or purpose.

None planned.

12.2 Cooperating and funding agencies.

12.3 Principle investigator or project supervisor and staff.

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

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

12.6 Dates or time periods in which research activity occurs.

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

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

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

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

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.

Section 13. Attachments and Citations

13.1 Attachments and Citations

Crawford, B.A. 1979. The origin and history of the trout brood stocks of the Washington Department of Game. Washington State Game Dep., Fishery Research Report, 76 p. (Available from Washington Dept. of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091.)

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Piper, R. G., McElwain, I. B., Orme, L.E., McCraren, J.P., Fowler, L. P., Leonard, J.R. 1982. Fish Hatchery Managenment. Department of the Interior, U.S. Fish and Wildlife Service. Washington, D.C.

Serl, J., and Morrill, C. 2004. Draft: 2004 Annual Report for the Cowlitz Falls Project. Washington Department of Fish and Wildlife. Olympia.

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Tipping, J.M., and Serl, J. 2000. Lake Scanewa Creel Census for 2000. Washington Department of Fish and Wildlife FPT 00-32. Olympia.

Tipping, J.M., and Buckley, P. 1979. Creel Census on Riffe and Mayfield Reservoirs and Mayfield Migrant Trap Operation. Washington Game Department.

Tacoma Power (TPU). 2004. Impacts of Resident Trout Fisheries on Anadromous Fish Populations. Tacoma Power. June 2004

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

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

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Appendix A. Number of salmonids collected at the Cowlitz Falls Fish Facility and smolts transported to the Stress Relief Ponds in 2004 and total collection by season from 1997-2004. {*error in transport under review*}

2004	Spring Chinook				Steelhead						Coho		Cutthroat		Total	Total
Season	fry	NP[1]	Hatchery[2]	1+	parr	hum	AD	RV+ad	RV smolt	Um smolt	fry	smolts	parr	smolts	Fish	Smolt
Totals:																
Spring-Summer season: Continious operation April 17-August 30, 2004.																
Collected	409	8,383	21,198	20	936	0	2,685	16,029	5,042	11,276	11,489	128,161	110	721	206,464	193,515
Transported	399	8,188	20,500	20			*2,180*	*16,470*	4,972	11,192		127,419		720		192,060
Extended Operation: Twice Weekly Operation Sept 17- October 15, 2004.																
Collected	0	330	4	0	12	0	0	0	3	33	511	14	3	1	911	385
Transported		325	3						2	32		13		1		376
Total season collection by year, 1997-2004																
2004	*409*	*8,383*	*21,198*	*20*	*936*	*0*	*2,685*	*16,029*	*5,042*	*11,276*	*11,489*	*128,161*	*110*	*721*	*206,464*	*193,515*
2003	3,320	7,741	26,982	18	756	0	29	16,434	170	14,740	5,177	173,540	282	1,280	250,479	240,944
2002	1,615	5,595	20,733	0	428	1	590		23,162	5,247	5,423	55,029	126	990	118,939	111,343
2001	762		36,450	25	295	4,659	242		33,491	17,807	4,405	334,718	166	1,077	434,097	428,469
2000	815		32,704		55		89		16,404	17,023	3,174	106,880	140	1,343	178,627	174,409
1999	421		8,878		4,832		31		10,783	10,001	2,269	15,120	78	545	52,892	50,159
1998	31		14,917		0		22		25,921	15,691	656	109,974	42	888	168,193	167,391
1997	18		22,815		0		37		15,621	2,777	558	3,673	103	260	46,016	45,149

1] Unmarked fish in 2004 were assumed to be naturally produced. 2003 and 2002 numbers based on fry marking a portion of fry plant with VIE marks.

2] 2004 numbers based on RV clipped fish captured.