DRAFT

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Clackamas River Spring Chinook
Species or Hatchery Stock:	Clackamas River Spring Chinook (Stock 19)
Agency/Operator:	Oregon Department of Fish and Wildlife
Watershed and Region:	Clackamas River Basin, Willamette River Basin
Date Submitted:	
Date Last Updated:	October 7, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Clackamas River Spring Chinook Program (Stock 19)

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

Clackamas River Spring Chinook (stock 19), *Oncorhynchus tshawytscha*. In March 1999 the Upper Willamette River Spring Chinook ESU was listed as Threatened under the Federal ESA (Federal Register Notice 1999). These fish are also 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, co-operators, or organizations involved:
The National Oceanic and Atmospheric Administration Fisheries service (NOAA Fisheries; through the Mitchell Act), US Army Corps of Engineers (USACOE), Portland General Electric (PGE), and the City of Portland.

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

The total operating budgets, staffing and funding sources for all hatchery facilities involved in the production of spring chinook for the Clackamas River Spring Chinook Program are summarized in Table 1.4.1. These budgetary and staff costs represent the total costs for each facility independent of the specific stocks of salmonids being produced. For Clackamas Hatchery, the annual budget is approximately $732,000 with the majority devoted to the production of spring chinook.

Table 1.4.1) Funding sources, staffing and operational costs for facilities involved in the production of Clackamas River Spring Chinook.

Facility	Funding Source	Staffing	Annual Budget*
Clackamas Hatchery	NOAA Fisheries – 29.6% PGE – 22.0% City of Portland – 18.8% ODFW GF – 29.6%	6.623 FTE	$731,500 for FY2003
Willamette Hatchery	NOAA Fisheries – 83.8% ODFW GF – 16.2%	10 FTE	$850,000 for FY2003
Marion Forks Hatchery	USACOE – 83.8% ODFW GF – 16.2%	5 FTE	$530,000 for FY2003
Oxbow Hatchery	NOAA Fisheries – 100%	4 FTE	$406,000 for FY2003

* Annual Budget is the total operating cost for the hatchery, independent of this specific program.
GF=State General Fund; FTE=Full-Time Equivalent staff

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

Below is a table depicting this hatchery program's facilities and scope. Numbers are for planning purposes and only indicated when an action occurs (e.g., transfer, release). Note that acclimation and release sites in the Clackamas River are all in the lower river and are subject to change to other points between river mile 30 and river mile 0. The second table indicates the location of all facilities.

Table 1.5.1) Program summary.

Adult Collection	Adult Holding Spawning Egg Eyeing	Egg Incubation	Rearing	Acclimation	Release
Clackamas H.	Clackamas H. (1,550,000 green eggs)	Willamette H. (975,000 eyed eggs)	Willamette H.	Clackamette Cove (80,000 @ 9 fpp)	Clackamas R. (80,000 @ 9 fpp)
					Clackamas R. (160,000 @ 9 fpp)
North Fork Dam			Marion Forks H. (650,000 @ 200 fpp) transferred to Clackamas H. (630,000 @ 18 fpp)	Cassidy Pond (50,000 @ 12 fpp)	Clackamas R. (50,000 @ 11 fpp)
					Eagle Creek* (60,000 @ 10 fpp)
					Clackamas R. (520,000 @ 10 fpp)
		Oxbow H. (400,000 eyed eggs)	Clackamas H. (310,000 @ 125 fpp)		Clackamas R. (300,000 @ 20 fpp)
		STEP Classroom Incubators (60,000 eyed eggs)			Clackamas R. Willamette R. Columbia R. Sandy R. Molalla R. (60,000 unfed fry)

* Planned for 2005; direct release is likely, but an acclimation site is being investigated. If this release does not occur, release will be from Clackamas Hatchery.

Table 1.5.2) Facility locations.

Facility	Stream	River Mile	Sub-Basin	Notes
Clackamas H.	Clackamas	22.6	Willamette	within Milo McIver State Park, 5 mi west of Estacada, OR
Willamette H.	Salmon Creek	3.0	Middle Fork Willamette, Willamette	off Hwy 58 near Oakridge, OR
Marion Forks H.	Marion Creek	0.4	North Santiam, Willamette	above Detroit Lake at milepost 66 of Hwy 22
Oxbow H.	Little Herman Creek	0.75	Columbia	east of the town of Cascade Locks, OR on Frontage Road off Interstate 84
North Fork Dam	Clackamas	30	Willamette	PGE owned and operated facility off Hwy 224 near Estacada, OR
Cassidy Pond	Clackamas	17	Willamette	private property, operating through STEP
Clackamette Cove	Clackamas	~0.5	Willamette	net pen location, operating through STEP
Eagle Creek Acclimation	Eagle Creek	to be determined	Clackamas, Willamette	site being investigated
Classrooms	Clackamas	multiple	Willamette	60-120 schools, operating through STEP

1.6) Type of program.

The Clackamas Spring Chinook Program is managed to supplement harvest to compensate for a portion of the sport and commercial salmon fisheries that were impacted when natural salmon production was decreased due to habitat and passage loss or degradation in the Clackamas and Columbia River Basins.

1.7) Purpose (Goal) of program.

Augmentation **–** The primary objective of this program is to augment sport and commercial salmon fisheries in the Clackamas, Willamette, and Columbia Rivers.

Mitigation **–** This program also provides mitigation pursuant to agreements with the Federal Energy Regulatory Commission (FERC) and NOAA Fisheries for loss of habitat quantity and quality as a result of the construction and operation of PGE and USACOE hydropower dams on the Clackamas River and Columbia River, respectively.

Education – A number of eggs are incubated in classrooms in the Portland metropolitan area in order to educate the students about the salmon life cycle and provide a connection to the issues facing salmonids. Fish are released as unfed fry. This effort is conducted under, and coordinated through ODFW's Salmon and Trout Enhancement Program (STEP).

1.8) Justification for the program.

The Clackamas River Spring Chinook Program is managed to supplement regionally important fisheries for spring chinook while minimizing potential risks to wild spring chinook populations. Following is a summary of primary harvest and hatchery management practices, and measures being implemented to minimize potential risks to wild spring chinook.

Harvest

The Clackamas River Spring Chinook Program is managed to supplement harvest in salmon fisheries impacted by the construction and operation of hydropower dams in the Clackamas and Columbia River basins. Specifically, the program is managed to produce spring chinook salmon to sustain ocean fisheries and selective Columbia River and Willamette River terminal sport and commercial fisheries. The Willamette and Clackamas rivers are well-regarded for recreational spring chinook angling. These fisheries receive a great deal of angler effort because of the close proximity to the Portland metropolitan area and generate substantial economic benefits to the region. This hatchery program also contributes significantly to Columbia River sport and commercial spring chinook fisheries, which also provide a high economic value to the region.

Harvest activities are managed to reduce impacts to wild spring chinook populations. Current recreational angling regulations in the Upper Willamette River ESU require that *all* unmarked adult spring chinook be released back to the stream unharmed. Only adult spring chinook with an adipose fin-clip may be retained in sport fisheries. Commercial fisheries are also actively investigating different techniques to enable the safe release of unmarked fish. The Fisheries Management and Evaluation Plan (FMEP) for the Upper Willamette River Spring Chinook in Freshwater Fisheries of the Willamette Basin and Lower Columbia River Mainstem (ODFW 2001) outlines the future management of fisheries (recreational and commercial) potentially affecting listed upper Willamette River spring chinook.

- Hatchery fish are produced in sufficient numbers to meet the harvest objectives for fisheries intended to benefit from the program.
- Hatchery fish are differentially marked (adipose fin clipped) to enable selective harvest fisheries.
- Angling regulations require that all unmarked spring chinook be released unharmed.

Hatchery Practices

The Clackamas River Spring Chinook Program is managed as a segregated hatchery program. The broodstock for this program was developed in 1976 from Willamette River spring chinook stocks. The current program only utilizes hatchery fish returning to Clackamas Hatchery as broodstock to allow for local adaptation of the hatchery population. Returning hatchery adults are segregated from the naturally spawning wild population through sorting operations at the North Fork Dam fish collection facilities. Only wild fish are allowed to pass upstream to the primary spring chinook spawning areas of the Clackamas basin. ODFW evaluations have identified that a majority of natural spawning habitat for spring chinook in the Clackamas basin exists above the North Fork Dam. Wild spring chinook are not incorporated into the hatchery broodstock due to concerns over the number of wild fish in the natural spawning population, the large number of wild fish that would be needed to re-found the hatchery broodstock, and because sorting practices are utilized to segregate the populations thus reducing the need to promote genetic similarity between these populations. Following is a summary of key hatchery practices

and management features in place to minimize the risk of potential impacts to listed spring chinook.

- Broodstock for the Clackamas Spring Chinook Program is obtained from hatchery fish returning to Clackamas Hatchery. No fish are transferred from outside the Clackamas Basin for inclusion in the broodstock.
- Wild spring chinook are not diverted into the hatchery broodstock.
- All portions of the run and all age classes (except precocious males) are incorporated into the broodstock to maintain genetic diversity.
- Smolts are released in a physical condition, and at times and locations that promote rapid outmigration to reduce potential interactions with wild salmonid populations.
- All hatchery fish are fin-marked (adipose clipped) or coded-wire tagged to allow for harvest in selective fisheries and to facilitate sorting of returning adults. Fifty thousand "double index tag" fish (no fin mark, coded wire tagged) are also currently being released to monitor the impacts of selective fisheries on wild fish.
- Returning hatchery adults are selectively excluded from the naturally spawning population above North Fork Dam through sorting practices. The intent is to maintain a spawning population of spring chinook above the dam comprised of 90% or greater of naturally produced fish. While no hatchery fish are intentionally passed, some may reach upper basin spawning areas due to errors in sorting operations. This practice has been in place since 1998 (though returns were not fully marked until about 2001).
- This program complies with ODFW's Fish Health Management Policy and IHOT standards for prevention and treatment of fish diseases.
- This program complies with all other applicable IHOT standards.

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

Legal Mandates:

Performance Standard (1): Contribute to requirements of mitigation agreements between NOAA Fisheries, PGE, and the State of Oregon. **Benefit**

BENEFIT - Indicator (1)(a): Production goals are met. **Benefit**

Performance Standard (2): Program complies with Oregon Native Fish Conservation Policy, the Clackamas River Basin Plan, and the Upper Willamette Chinook Fisheries Management Evaluation Plan (FMEP).

Indicator (2)(a): Reviews identify that hatchery program management decisions and practices are implemented consistent with the policies and plans. **Benefit**

Harvest:

Performance Standard (3): Hatchery spring chinook produced for the Clackamas River sport fishery, Lower Willamette River sport fishery, Lower Columbia River sport fishery, and Lower

Columbia gillnet fishery are produced and released in a manner that enables effective harvest while minimizing harvest-related impacts on wild spring chinook (as described in the Upper Willamette FMEP). **Benefit**

Indicator (3)(a): Number of adult hatchery spring chinook produced, and the number of adult hatchery spring chinook harvested in the Clackamas River sport fishery, Lower Willamette River sport fishery, Lower Columbia River sport fishery, and Lower Columbia gillnet fishery. **Benefit**

Indicator (3)(b): Number of wild spring chinook handled and released during selective fisheries, estimated mortality rates, and estimated impact to the wild spring chinook population. **Risk**

Performance Standard (4): All hatchery release groups are marked to enable selective fisheries and release of wild spring chinook. **Benefit**

Indicator (4)(a): Verify that mark rate at release is 95% to 100% for all release groups. **Benefit**

Indicator (4)(b): Sport fisheries in the Lower Columbia, Willamette, and Clackamas Rivers require all unmarked fish to be released unharmed (as per the Upper Willamette Chinook FMEP). **Risk**

Life History Characteristics:

Performance Standard (5): Adults collected for broodstock are taken throughout the run in proportions approximating the run-timing of the natural spawning population. The hatchery is operated as a segregated program with the Clackamas wild stock. No infusion of wild stocks occurs. **Risk**

Indicator (5)(a): Run timing of hatchery spring chinook returning to Clackamas Hatchery. **Risk**

Indicator (5)(b): Run timing of hatchery spring chinook used in broodstock. **Risk**

Indicator (5)(c): Run timing of wild spring chinook returning to North Fork Dam. **Risk**

Indicator (5)(d): Origin of fish used in broodstock as indicated by fin clips or coded wire tags. **Risk**

Performance Standard (6): Life history characteristics and age composition of hatchery broodstock do not significantly diverge from characteristics of hatchery spring chinook returning to the Clackamas River basin. Broodstock life history characteristics shall match hatchery-reared adult return characteristics. **Risk**

Indicator (6)(a): Run timing, body size (length and weight), sex composition, fecundity (egg number and size), adult:jack ratio, and age distribution. **Risk**

Conservation of Wild Fish Population:

Performance Standard (7): Broodstock collection will be conducted to have minimal adverse impact on the naturally spawning population of wild spring chinook. **Risk**

Indicator (7)(a): Wild fish will not be used for broodstock. **Risk**

Indicator (7)(b): All fish without fin clips or coded-wire tags (CWTs) returning to Clackamas Hatchery will be returned to the river with minimum physical stress. **Risk**

Indicator (7)(c): All fish without fin clips or coded wire tags returning to North Fork Dam will be passed above the adult trap with minimum physical stresses. **Risk**

Performance Standard (8): Juvenile release strategies will minimize impacts to naturally-produced spring chinook populations. **Risk**

Indicator (8)(a): Hatchery spring chinook release locations will be in the lower Clackamas River (below river mile 30; including tributaries). **Risk**

Indicator (8)(b): Hatchery spring chinook juveniles will be released as smolt sized fish to encourage rapid migration and minimize residualism. **Risk**

Indicator (8)(c): Hatchery spring chinook juveniles will be released at times and locations to reduce impacts to local habitat carrying capacity. **Risk**

Performance Standard (9): The proportion of hatchery-reared spring chinook adults in spawning areas in the upper Clackamas River basin will not exceed 10%. ODFW places a high priority on maintaining the upper basin sanctuary above the North Fork Dam. **Risk**

Indicator (9)(a): The proportion of hatchery spring chinook observed on spawning areas above North Fork Dam. **Risk**

Performance Standard (10): Distribution of hatchery adult carcasses, to provide nutrient enrichment benefits in natural salmon spawning streams, will be accomplished in compliance with Oregon Department of Environmental Quality (DEQ) and ODFW guidelines for disease control and water quality. **Benefit**

Indicator 10(a): Number, timing, and spatial distribution of hatchery carcasses placed for nutrient enrichment will mimic that of historic wild fish. **Benefit**

Indicator 10(b): Hatchery carcasses placed for nutrient enrichment will comply with ODFW disease guidelines. **Risk**

Indicator 10(c): All permits required by DEQ will be obtained, and activities will comply with all permit conditions. **Risk**

Operation of Artificial Production Facilities:

Performance Standard (11): Clackamas, Oxbow, Marion Forks, and Willamette Hatcheries will be operated in compliance with all applicable fish health guidelines and facility operation

standards and protocols (i.e., IHOT, PNFHPC, and the ODFW Fish Health Management and Hatchery Management Policies). **Risk**

Indicator (11)(a): Number of broodstock sampled and pathogens observed are within specified guidelines. **Risk**

Indicator (11)(b): Rearing survival rates (egg-to-fry and fry-to-smolt) are within guidelines. **Risk**

Indicator (11)(c): Number of juveniles sampled and pathogens observed during rearing and immediately prior to release are within guidelines. **Risk**

Performance Standard (12): Hatchery water discharges will comply with prescribed NPDES permits required by the Oregon Department of Environmental Quality. **Risk**

Indicator (12)(a): Water sample collection and reporting records. **Risk**

Performance Standard (13): Surface water withdrawals for hatchery operations will be screened to minimize mortality to juvenile salmonids. **Risk**

Indicator (13)(a): Inspections of screens for compliance with ODFW and NOAA fish screen criteria. **Risk**

Performance Standard (14): Weir/trap operation at the North Fork Dam ladder and Clackamas Hatchery will be conducted in a manner that minimizes stress, injury, or mortality to wild spring chinook salmon trapped, handled and released at these locations. **Risk**

Indicator (14)(a): Number of annual injuries and mortalities of wild spring chinook captured in adult collection traps will be tracked. **Risk**

Indicator (14)(b): Number of wild spring chinook captured, dates, and frequency of adult collection trap operations will be tracked. **Risk**

Socio-Economic Effectiveness:

Performance Standard (15): Sport and commercial fishery benefits for which the program is designed are achieved. **Benefit**

Indicator (15)(a): Punch card information, creel surveys, and commercial catch data will be evaluated to determine fishery benefits of the hatchery program. **Benefit**

1.11) Expected size of program.

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

This stock was originally derived from Willamette River spring chinook stocks, but only uses broodstock returning to Clackamas Hatchery. The hatchery program is now segregated and no wild fish are being used for broodstock. A maximum of 600 adult hatchery spring chinook may be collected to meet the production goals stated below.

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

Life Stage	Release Location	Number
Eyed Eggs		
Unfed Fry	Clackamas River (various) Willamette River (various) Columbia River (various) Sandy River (various) Molalla River (various)	60,000 total for all sites
Fry		
Pre-smolts	Clackamas River (Clack Hatch)	300,000
Smolts	Clackamas River (Cassidy Pd.)	50,000
	Clackamas River (Clackamas Cove)	80,000
	Clackamas River (near mouth)	160,000
	Eagle Creek	60,000
	Clackamas River (Clackamas Hatch. and mainstem downstream of river mile 30.)	520,000

NOTE: See table in Section 1.5 for rearing locations. In the Clackamas River, all release locations will remain below river mile 30, but numbers of fish released at different locations in this area may vary. Unfed fry releases in the Willamette, Columbia, Sandy, and Molalla Rivers occur in the mainstem and only in areas with hatchery fish influence. Total numbers released will remain constant.

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

The number of adult spring chinook salmon returning to the Clackamas Hatchery trap since 1990 is presented in Table 1.12.1. Smolt to adult survival rates, based on coded-wire tagged (CWT) fish from this program, are presented in Table 1.12.2. For the five completed brood years from 1988 through 1992 the percentage of CWT recoveries in ocean fisheries declined from 32.3% in the 1988 brood to 10.8% in the 1992 brood (Lewis et al., 1999). Percentage of CWT recoveries in freshwater gillnet fisheries averaged 0.6% and ranged from 0.2% to 1.2% for the 1988 through 1992 brood years (Lewis et al., 1999). Total harvest of spring chinook in freshwater fisheries that this program contributes to are reported in Table 1.12.3

Table 1.12.1) Summary of spring chinook salmon returns to the Clackamas Hatchery trap, and adult spring chinook counted at North Fork Clackamas and Willamette Falls dams since 1990. These numbers represent total fish observed (hatchery and wild), as not all returning hatchery fish were marked in these return years.

Return Year	Adults Captured at Clackamas Hatchery (including jacks) [1]	Adults Counted at North Fork Dam (including jacks) [2]	Adults Counted at Willamette Falls Dam (including jacks) [2]
1990	1,847	3,444	71,273
1991	2,776	4,659	52,516
1992	4,535	3,553	42,004
1993	4,635	3,090	31,966
1994	3,675	2,174	26,102
1995	3,112	1,659	20,592
1996	3,044	903	21,605
1997	2,670	1,270	26,885
1998	4,530	1,435	34,461
1999	4,562	888	40,410
2000	4,214	2,193	39,073
2001	6,155	3,747	53,973
2002	6,241	5,883	83,136

[1] Data taken from ODFW Summary of Anadromous Adult Fish Returns (November 1999).
[2] Data taken from electronic records for SFR Project F-119, Implementation of Willamette Fish Management Plan.

Table 1.12.2) Smolt-to-adult survival rates for Clackamas Hatchery. Data are incomplete for 1996-1998 and were taken from CWT data from the Columbia River DART website (http://www.cbr.washington.edu/dart/dart.html).

Brood Year	Smolt-to-Adult Survival (%)
1988	0.9756
1989	0.3549
1990	0.3424
1991	0.1146
1992	0.2014
1993	0.3016
1994	0.3688
1995	0.3639
1996	0.3576
1997	0.0605
1998	0.0830

Table 1.12.3) Harvest of spring chinook in the target fisheries for this program. The size of the run entering the Clackamas is also given (ODFW unpublished data).

	Sport				Commercial	TOTAL	Run Entering
Year	L Columbia	L Willamette	Clackamas	TOTAL	L Columbia	HARVEST	Clackamas
1990	8,730	22,819	4,522	36,071	15,499	51,570	11,128
1991	3,474	30,224	3,769	37,467	11,183	48,650	11,557
1992	3,092	13,251	2,681	19,024	3,862	22,886	11,354
1993	958	20,162	2,767	23,887	1,045	24,932	10,503
1994	1,266	11,412	1,512	14,190	1,000	15,190	7,417
1995	0	14,446	1,592	16,038	0	16,038	6,437
1996	0	6,056	1,869	7,925	124	8,049	5,918
1997	0	1,886	1,732	3,618	272	3,890	5,819
1998	47	2,818	1,302	4,167	129	4,296	7,364
1999	0	5,507	1,890	7,397	260	7,657	7,444
2000	201	9,011	1,179	10,391	1,124	11,515	7,669
2001	3,828	7,675	854	12,357	3,519	15,876	10,810
2002	5,204	10,845	2,705	18,754	7,397	26,151	14,358
2003	7,190	14,452	1,377	23,019	1,774	24,793	N/A

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

Willamette stock spring chinook (fry, pre-smolts, smolts, and adults) have been released from Eagle Creek National Fish Hatchery (ECNFH) into Eagle Creek, a Clackamas River tributary, and throughout the basin since 1959. All releases of Willamette stock spring chinook from ECNFH were discontinued after 1987.

The Clackamas River spring chinook stock was developed from other Willamette Basin hatchery spring chinook stock smolts released at Dog Creek (site of Clackamas Hatchery) beginning in 1976 (ODFW 1992). Clackamas Hatchery began operation in 1979 and the first releases of spring chinook at Clackamas Hatchery were in November 1979 (1978 brood). The last releases of smolts at Clackamas Hatchery from adults not collected at Clackamas Hatchery was in 1989 (1987 brood). Since 1988, the Clackamas Hatchery spring chinook broodstock has been composed entirely of returns to Clackamas Hatchery.

1.14) Expected duration of program:

The project is ongoing, with no planned end date.

1.15) Watersheds targeted by program:

Targeted watersheds include the lower Clackamas River (below North Fork Dam; smolt release, migration, harvest, adult return), lower Willamette River (migration, harvest), Columbia River (below Sandy River confluence; migration, harvest), and the Pacific Ocean (migration, harvest).

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: Regular integration of naturally produced fish into the program to promote genetic characteristics of the locally adapted population is not occurring.

The Clackamas River spring chinook program is a segregated program using broodstock from returns to the Clackamas system (Clackamas stock). The initial broodstock was derived from Willamette stock spring chinook. The purpose of this program is to provide harvest opportunities and to mitigate for the loss of habitat resulting from hydroelectric development in the watershed. Naturally produced fish are not being regularly integrated into the broodstock due to the relatively low numbers of naturally produced fish returning to the Clackamas each year and the large egg collection needs for the program.

Issue 2: The presence of non-fin marked coded-wire-tag ("double index") fish complicates the ability to easily recognize returning hatchery fish, and may contribute to hatchery fish erroneously being passed into the upper basin wild fish sanctuary.

Currently 50,000 non-fin marked, coded-wire-tagged hatchery smolts are released annually into the Clackamas basin. Upon return to the sorting facility as adults, these unmarked fish could potentially be passed erroneously as wild fish into the designated wild fish sanctuary above the North Fork dam. A fish sorting facility (owned and operated by Portland General Electric) is utilized to segregate returning wild (unmarked) fish from hatchery produced adults. Wild fish are passed upstream of the dam into upper Clackamas River spawning grounds. Hatchery produced fish are either recycled through the lower river fishery, or taken to Clackamas Hatchery for disposition.

Issue 3: Water intake screens at Clackamas Hatchery do not meet current NOAA Fisheries criteria.

Issue 4: Water quality limitations (pathogen problems due to high temperatures) in the Clackamas River affect production at the hatchery and result in a need to rear all of the production for this program at other facilities for a portion of their freshwater rearing cycle.

Issue 5: Acclimating and/or releasing a portion of the Clackamas Hatchery production in Eagle Creek could potentially increase harvest of returning hatchery fish (*NOTE: release into Eagle Creek is planned for 2005*).

Clackamas River anglers believe that spring chinook harvest rates in the Clackamas River declined after smolt releases from Eagle Creek Hatchery were terminated. These anglers also believe that acclimating and/or releasing a portion of the smolts at a location within Eagle Creek would cause returning adults to delay migration in the vicinity of Eagle Creek making them more susceptible to harvest in several popular fishing areas. Information is not available to confirm or refute these perceptions. Fish that migrate into Eagle Creek would also be available for harvest. If successful, this minor program change could potentially improve the contribution of these fish to anglers, and decrease the workload associated with handling surplus hatchery fish at Clackamas Hatchery and the North Fork Dam sorting facility.

1.16.2) Potential Alternatives to the Current Program

The following draft alternatives were identified during public workshops and are not necessarily being endorsed by the managing agency or the authors of this document.

Issue 1; Alternative 1: *Integrate naturally produced fish collected at North Fork Dam into the broodstock.*
Pros & Cons: Over time, this action could potentially assure that the genetic makeup of the hatchery fish is similar to the locally adapted population, and improve the survival and fitness of these fish. However, integrating naturally produced fish at a level that influences the genetic composition of the program could annually require the collection and use of a substantial number of naturally produced adults. Diverting fish from the naturally spawning population could impact the fitness and survival of the wild population. There is no information indicating that annual integration is needed to increase the genetic fitness of this program, that deficiencies exist in the ability of the current broodstock to meet program goals, or that the change is needed to reduce risks to the wild population.

Issue 1; Alternative 2: *Continue the current program at Clackamas Hatchery as a segregated program, but allow unmarked fish returning to the facility to be incorporated into the broodstock.*
Pros & Cons: This action would allow a small number of unmarked fish that return to Clackamas Hatchery to be incorporated into the broodstock to add genetic diversity, but not require that wild fish returning to the North Fork sorting facility be diverted to the hatchery program (Alternative 1). Wild fish returning to the North Fork sorting facility would still be passed into the upper basin wild fish sanctuary. The genetic makeup of the hatchery broodstock may shift from that of the locally adapted population, however, due to the low number of wild fish that would be integrated annually. This action has low cost and would reduce complications and workload at the facility. This alternative is consistent with the purpose of the program and existing mitigation agreements.

Issue 2; Alternative 1: *Discontinue the release of "double-index" (non-fin marked coded-wire-tagged) fish in the Clackamas basin.*
Pros & Cons: Hatchery and wild fish would be sorted efficiently with minimal risk of passing hatchery fish into the wild fish sanctuary. This is a cost effective alternative for eliminating the concern. The effects on the "double index" monitoring program should be minimal since all the required components of the monitoring effort are not in place in this basin anyway.

Issue 2; Alternative 2: *Modify the PGE facility at North Fork Dam to allow additional sorting and sampling of returning fish, purchase CWT detector wands for this facility, and hire additional staff to assist to PGE employees to improve sorting for "double-index" fish.*
Pros & Cons: Hatchery and wild fish could be sorted more effectively with less risk of passing hatchery fish into the wild fish sanctuary, but this alternative would be very expensive and still pose more risk of passing hatchery fish into the wild fish sanctuary than discontinuing the "double index" marking program. Requires a long-term investment in additional staff resources to implement, and a commitment from PGE to agree to modify their facility, and change operations. May require additional handling of listed species.

Issue 3; Alternative 1: *Install new screens at the water intake consistent with current NOAA screening criteria.*
Pros & Cons: Reduces potential mortality of listed and unlisted species, but requires a substantial financial investment. Funding for this investment has not been identified. The project may require additional reconstruction of the water intake due to other existing problems. It is

unknown whether an adequate water supply would be maintained with new screens due to existing flow related problems at the current intake site.

Issue 4; Alternative 1: *Investigate the potential and feasibility for developing alternate water supplies such as wells, or constructing a gravity-feed pipeline from River Mill Reservoir to provide higher quality water (particularly during summer months).*
Pros & Cons: If feasible, the development of an alternate or supplemental water supply system could eliminate the limitations currently created by water quality issues at the facility. This could reduce or eliminate the need to transfer production to other facilities. If a well system is developed, pathology problems associated with high summer temperatures would be eliminated. This action could potentially reduce costs and risks associated with pathology treatment but would have increased pumping costs. If a gravity-feed system is deemed feasible and is constructed, operational costs would be significantly reduced due to savings in pumping costs but pathology problems may continue. Development of a new water supply would require a substantial financial investment for both construction and long-term operation and maintenance. Funding for this investment has not been identified.

Issue 4; Alternative 2: *Investigate whether structural changes could be implemented at the facility to result in reduced pathology problems during summer/fall rearing. Changes could include installation of UV or ozone water treatment systems.*
Pros & Cons: If feasible, structural changes that reduce pathology problems in rearing facilities could eliminate the production limitations currently created by water quality issues. This could also reduce or eliminate the need to transfer production to other facilities. The action could potentially reduce costs and risks associated with pathology treatment. Structural changes would require a financial investment for construction, and long-term operation and maintenance. The cost of this alternative is currently unknown, but is expected to be very significant. Funding for this investment has not been identified.

Issue 5; Alternative 1: *Acclimate and release a portion of the Clackamas spring chinook smolts in Eagle Creek to increase the harvest of returning adults in the vicinity of Eagle Creek and reduce the number of surplus hatchery fish that reach the North Fork Dam sorting facility.*

Issue 5; Alternative 2: *Release a portion of the Clackamas spring chinook smolts directly into Eagle Creek (without acclimation) to increase the harvest of returning adults in the vicinity of Eagle Creek and reduce the number of surplus hatchery fish that reach the North Fork Dam sorting facility.*
Pros & Cons: If successful, these changes would increase the contribution of hatchery fish to the anglers and better meet the goals of the program. This could also reduce the number of surplus hatchery fish handled at Clackamas Hatchery and the North Fork Dam sorting facility. The change would likely restore a small fishery to Eagle Creek, and would be supported by anglers and sports fishing groups. The cost of the change due to acclimation and the alternate release site is expected to be minor, and there should be no appreciable additional risk posed to listed species. It is currently unknown if these changes will create the intended result, however. There will be additional costs to differentially mark smolts acclimated and/or released at Eagle Creek if an evaluation of the change is completed; this would require an additional fin clip (e.g. Ad-LV). The logistics of having a distinct fin clip remain to be finalized. No funds have been identified for the additional fin clip or a monitoring program.

1.16.3) Potential Reforms and Investments

The following draft potential reforms and investments were identified during public workshops, are for discussion purposes, and are not necessarily being endorsed by the managing agency or the authors of this document.

Reform/Investment 1**:** Evaluate structural and flow conditions at the existing water intake and determine the cost and feasibility of installing a new screening system that meets current NOAA screening criteria. Install new screens at the water intake. The cost of the evaluation is currently undetermined. The cost of installing criteria screens will be determined by the evaluation but is estimated to be over $1,000,000. {Issue #3}

Reform/Investment 2**:** Conduct a feasibility study to determine if alternate water supplies are available to eliminate current water quality/quantity problems, and assess the cost of developing alternate water sources. The cost of the study is currently undetermined. The cost of constructing an alternate water supply system would be determined by the study. {Issue #4}

Reform/Investment 3**:** Conduct a feasibility study to determine if structural changes to the facility (particularly rearing ponds) could reduce or eliminate the water temperature problems that currently effect operations. If feasible alternatives are identified, assess the cost of implementing the changes. The cost of the study is currently undetermined. The cost of structural changes to the facility would be determined by the study. {Issue #4}

Reform/Investment 4**:** Evaluate the potential benefits and risks of integrating naturally produced fish into the existing hatchery broodstock. This evaluation should include recommendations for the number of wild fish that must be incorporated annually, the mating procedures that would be implemented, and discrete measures necessary to minimize risks to the wild population from these activities. If feasible, an operational plan would be developed to guide annual integration of naturally produced fish in a manner that minimizes risks to the wild population. The evaluation should include an estimate of costs associated with annual integration. The cost of this evaluation is currently undetermined. {Issue #1}

Reform/Investment 5**:** Reprogram smolt releases to acclimate a portion of the annual releases in Eagle Creek. If this is not feasible, evaluate the potential for alternate acclimation sites or direct releases (without acclimation) into Eagle Creek. Evaluate the Clackamas River fishery in subsequent years to determine if these fish are being harvested at a greater rate in the mid-portion of the fishery area in the general vicinity of Eagle Creek. This evaluation would require that Eagle Creek smolt releases be differentially marked with an additional fin clip. The cost of the program change is unknown but is expected to be relatively low if no differential fin clip or monitoring are required. The feasibility and cost of the fin clipping and monitoring is currently undetermined. {Issue #5}

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

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

- NMFS (National Marine Fisheries Service). 2000. Biological Opinion on the impacts from the collection, rearing, and release of listed and non-listed salmonids associated with artificial propagation programs in the Upper Willamette spring chinook and winter steelhead evolutionarily significant units. Portland, OR.

- Section 7 (Consultation) - 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin.
- Upper Willamette River Chinook FMEP.
- Incidental Take Permits for the operation of North Fork Dam ladder sorting facility.

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

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

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

The Upper Willamette River Chinook ESU. Operation of this program will result in some direct impacts (mostly handling and release) to listed fish in this ESU. However, this is a segregated hatchery program and it is managed and employs risk aversion measures to minimize direct impacts on listed species.

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

All listed species occupying habitats in the lower Clackamas River, the lower Willamette River, and the lower Columbia River migration corridor(s) may be impacted by the presence of Clackamas River (hatchery) spring chinook. It is not definitively known which, if any, of these populations will be affected, but it is believed that incidental impact is minimal, based upon risk aversion measures identified in this HGMP. These listed species include:

- Upper Willamette River Chinook (spring) - The Upper Willamette River Chinook ESU (listed as threatened under the Federal ESA on March 24, 1999), includes all naturally spawned populations of spring-run chinook salmon in the Clackamas River, and upstream of Willamette Falls. Natural populations include spring chinook in the North Santiam, the McKenzie, the Middle Fork Willamette, and the Clackamas Basins. Wild spring chinook are commingled with those released at hatcheries located on the Clackamas, North Fork Santiam, South Fork Santiam, McKenzie, and Middle Fork Willamette rivers. Under the draft hatchery policy, NOAA Fisheries has proposed that these five hatchery stocks be designated as part of the ESU, and thus listed.

Migrating adults enter Clackamas Hatchery from May through October, with spawning occurring in September and October. Run timing is influenced by weather and fall rains. Spring chinook salmon upstream migration at North Fork Dam occurs from May through November, with peaks in July and October (ODFW 1992). Peak spawning in the Clackamas Basin above North Fork Dam occurs from late September to early October, although an August spawning component has been documented (Lindsay et al. 1998). Spawning surveys in 1998 in the lower Clackamas Basin (mouth to River Mill Dam) documented spawning of both spring and fall chinook (Lindsay et al. 1998). Redd density in the lower basin was lower than in the upper basin for the 1998 spawning year (2.1 redds/mi vs. 6.0 redds/mi; Lindsay et al. 1998).

- Lower Columbia River Chinook (fall) - The Lower Columbia River Chinook salmon ESU was listed as threatened under the ESA on March 24, 1999. This ESU includes all naturally spawned chinook populations residing below impassable natural barriers (e.g.,

long-standing, natural waterfalls) from the mouth of the Columbia River to the crest of the Cascade Range just east of the Hood River in Oregon and the White Salmon River in Washington. This ESU excludes populations above Willamette Falls. Within this ESU, there are historic runs of three different chinook salmon populations: spring-run, tule, and late-fall "bright" chinook salmon.

- Columbia River Bull Trout - The Fish and Wildlife Service issued a final rule listing the Columbia River population of bull trout as a threatened species on June 10, 1998. The Willamette River Recovery Unit forms part of the range of the Columbia River population. The Willamette Recovery Unit encompasses the Willamette River Basin, a major tributary to the Columbia River.

- Lower Columbia River Steelhead - The Lower Columbia River steelhead ESU was listed as threatened under the ESA on March 19, 1998. This ESU occupies tributaries to the Columbia River between the Cowlitz and Wind Rivers Washington, inclusive, and the Willamette and Hood Rivers in Oregon, inclusive. Excluded are steelhead in the upper Willamette River Basin above Willamette Falls, and steelhead from the Little and Big White Salmon Rivers in Washington.

- Lower Columbia River Chum - The Lower Columbia River chum salmon were listed as a threatened species on March 25, 1999. The ESU includes all naturally spawning populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon.

- Oregon Chub - The reduction of suitable habitat and the restricted distribution of the Oregon chub resulted in a determination of "endangered" status under the federal Endangered Species Act in 1993. Oregon chub are endemic to the Willamette Valley of western Oregon. Historically, Oregon chub were found throughout the Willamette Basin from Oregon City to Oakridge. The historical records note collections from the Clackamas River, Molalla River, Mill Creek, Luckiamute River, North Santiam River, South Santiam River, Calapooia River, Long Tom River, Muddy Creek, McKenzie River, Coast Fork Willamette River, Middle Fork Willamette River drainages, and the mainstem Willamette River. Current distribution is limited to populations in the Santiam River, Muddy Creek(s), Camus Creek, and the McKenzie and Middle Fork Willamette River drainages.

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 (*see definitions in "Attachment 1").*

Currently, no critical or viable salmonid population thresholds have been established for naturally-produced spring chinook in the Clackamas.

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

Basin-wide data for productivity do not exist for listed spring chinook in the Clackamas basin. Counts at North Fork Dam are provided in Section 1.12.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data. *(Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).*

Adult Clackamas spring chinook are counted at the North Fork Dam by PGE. See Section 1.12 for these data.

All hatchery spring chinook salmon in the Willamette Basin, beginning with the 1997 brood, were marked with adipose fin clips. Although intentions were to mark all hatchery chinook, less than 100% of the returning adults will have an external mark for several reasons. First, a percentage of hatchery releases do not receive a clip because fin-clipping personnel do not clip the adipose fin or clip only a portion of the fin, which then regenerates. For example, about 3% of hatchery fish were released without a clip in a sample of 76 release groups from the 1996–1999 broods. Second, fry and pre-smolts without fin clips have been released in the basin. Finally, some fish are only marked with a CWT for research purposes.

In 2002 (Schroeder et al. 2002), peak spawning generally occurred in late September, with the exception of the South Fork Clackamas River where peak spawning was in mid October. A higher percentage of redds was counted below Cripple Creek in 2002 (58%) than in 1996–1999 (34%), and redd densities were particularly high in the South Fork Clackamas River. A lower percentage of the spring chinook salmon run was accounted for over North Fork Dam in 2002 (36%) than in 1996–1999 (53%). A higher percentage of the spring chinook run in the upper Clackamas River passed North Fork Dam in May–August in 2002 (68%) than in 1996–2001 (51%). In addition, surveyors frequently encountered multiple redds, which subsequently would result in an underestimate of the number of spawners. The Clackamas River below River Mill Dam was surveyed on September 11 and October 16. More redds were counted in the upper reach of this section than in previous years. Scales collected from carcasses that help separate spring chinook salmon from fall chinook salmon have shown that the spring race composes 65% and 28% of the fish above and below Barton, respectively. The tables below indicate spawning surveys for 2002 (with comparisons to 1996-1999) and counts of adult spring chinook at North Fork Dam and the relationship to successful spawners in the Clackamas River basin, respectively. Tables and the information in this paragraph are from Schroeder et al. (2002).

Table 2.2.2.1) Clackamas Basin spawning survey results for spring chinook salmon from Schroeder et al. (2002).

Survey section	Length (mi)	Carcasses	Redds	Redds/mi 2002	1999	1998	1997	1996
Clackamas River:								
Sisi Crk-Forest Rd 4650	9.1	6.0	49.0	5.4	3.2	9.6	7.5	3.2
Forest Rd 4650-Collawash R	8.0	2.0	38.0	4.8	4.1	7.0	5.9	4.1
Collawash R-Cripple Crk	8.5	19.0	61.0	7.2	4.2	11.4	7.3	6.1
Cripple Crk-S Fk	14.5	26.0	148.0	10.2	4.3	5.2	7.4	3.2
S Fk-Reservoir	1.0	0.0	15.0	15.0	1.0	7.0	17.0	
South Fork Clackamas:								
Falls–mouth	0.6	44.0	42.0	70.0	16.7	5.0	11.7	
Collawash River:								
Hot Springs Fk-mouth	6.5	4.0	7.0	1.1	0.8	5.7	6.4	1.6
Fish Creek:								
Forest Rd 5430-mouth	4.5	0.0	2.0	0.4		1.7	2.6	1.1
Roaring River:								
Falls–mouth	2.0	0.0	5.0	2.5		1.5	3.0	3.0
North Fork Clackamas:								
Mouth area	0.2	0.0	3.0	15.0		0.0	0.0	0.0
Below Faraday Dam:								
Free-flowing stretch	1.5	6.0	0.0	0.0				
Below River Mill Dam:								
McIver–Barton	9.5	62.0	62.0	6.5	3.9	3.4		
Barton–mouth	13.5	18.0	4.0	0.3	0.3	1.2		

Table 2.2.2.2) North Fork Dam counts and averages of spawning survey results from Schroeder et al. (2002).

Year	Counts N Fk Dam[a]	Total Redds	Spawners[b]	Fish/Redd[c]
1996	824	182	364	4.53
1997	1,261	376	752	3.35
1998	1,382	380	760	3.64
1999	818	212[d]	424	3.86
2002	2,154	370	740	5.82

[a] Total from video counts (1996–1998) or fishway trap counts (1999, 2002) up to one week prior to last spawning survey.

[b] Estimated from redds using 1:1 sex ratio and two fish per redd.

[c] From dam count minus harvest divided by redds.

[d] Expanded by 5% to account for areas not surveyed. 95% of all redds in 1996–1998 were counted in the 1999 surveyed area. 22 redds were added to account for spawning of live fish that were counted on the last survey.

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

A twelve year estimate of the annual proportions of hatchery and wild fish on spawning grounds is not available.

Current practices are designed to minimize the presence of hatchery-origin fish on natural spawning grounds. Hatchery-origin returning adults (identified by fin-clip or the presence of a coded-wire tag) are not intentionally passed above North Fork Dam. Only unmarked fish are allowed to migrate upstream of the North Fork Dam to the primary spring chinook spawning grounds in the Clackamas basin. However, there is a potential that some unmarked hatchery fish could be unintentionally passed upstream. Unmarked hatchery fish can exist due to errors in the fin clipping process, or as unmarked coded-wire tagged fish (double index tag). If mis-marked smolts are released, survive to return as adults, and stray past Clackamas Hatchery they could potentially be passed into the upstream spawning area. Unmarked coded-wire tagged fish could also be passed upstream as a result of errors in the tag detection (wanding) process. The frequency of these occurrences is currently not well known.

No quantified data exist for the percent of hatchery fish spawning naturally below North Fork Dam, though ODFW has observed that it does occur and the percentage of hatchery-origin fish is relatively high. ODFW does not believe that significant natural spring chinook production originates from this lower portion of the basin.

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

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

Broodstock collection and handling at Clackamas Hatchery and the North Fork Dam trap/sort facility are the only hatchery activities that might lead to take of listed fish. Brood are primarily collected at Clackamas Hatchery (swim-in trap), although there is the potential (in an emergency during poor return years) to also collect brood at North Fork Dam (ladder trap). Few wild (unmarked) fish swim into the Clackamas Hatchery trap, so there is only a low probability of listed-fish take. Wild fish that swim into the trap are transported back to the mainstem Clackamas River and released.

The trap at the North Fork Dam is owned and operated by PGE under the supervision of ODFW and serves multiple functions: sorting hatchery-origin fish from upstream migrants, monitoring of the wild population, collection of hatchery fish for brood, and downstream recycling of hatchery-origin fish. Thus, the purpose of this trap is independent from the hatchery program and trap operations would be conducted independent of any emergency brood collection of hatchery fish for this hatchery program. All trapping and handling devices and transport could potentially lead to injury to listed fish.

See attached take estimate table (Attachment 4).

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

- Clackamas Hatchery - Total number of fish that swam into the hatchery trap. All wild/unclipped fish were returned to the river. Note that 2002 was the first year that all

returning hatchery adults were marked. Also, fish from North Fork Dam have not been used for brood to date; they were just transferred to Clackamas Hatchery in 2003.

Table 2.2.3.1) Spring chinook adult collections at Clackamas hatchery.

Return Year	Adults Collected			Mortality
	Hatchery	From North Fork	Wild/ Unclipped	Wild/ Unclipped
1998	4,439	0	unknown	NA
1999	3,600	0	unknown	NA
2000	4,158	0	unknown	NA
2001	6,049	0	unknown	NA
2002	5,914	0	269	0
2003	2,880	1,644	93	0

• North Fork Dam - Counts include both adults and jacks. No mortalities of wild/unclipped fish were reported. No wild/unclipped (or hatchery) fish were taken to Clackamas Hatchery for broodstock. Note that 2002 was the first year that all returning hatchery adults were marked. Thus, the wild/unclipped counts in prior years include unclipped hatchery fish. Marked (fin clipped or coded-wire tagged) fish have not been passed above North Fork Dam since 1998.

Table 2.2.3.2) Spring chinook adult collections at North Fork Dam.

Return Year	Total	Wild/Unclipped
1998	1,435	1,431
1999	888	881
2000	2,193	1,989
2001	3,747	2,421
2002	5,883	2,280
2003	9,983	3,647

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

See Attachment 4. Note that at the North Fork Dam, take will occur independent of this hatchery program in order to maintain the wild fish management area above the Dam. Hatchery fish are sorted and recycled downstream or provided to Clackamas Hatchery as brood.

- 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.

ODFW will consult with the NOAA Fisheries if projected take levels may be exceeded. However, given the brood collection locations, there are limited options with respect to take. If wild fish show up at the Clackamas Hatchery, they should still be returned to the river. In addition, trap operations at the North Fork Dam are integral to maintaining a

wild fish sanctuary above the dam, so this operation would also likely not cease. If the trapping did cease, further impacts by hatchery fish on wild fish would result. Overall take in the basin might also be reduced by eliminating research projects with identified take.

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.

- *Biological Opinion On the Impacts From the Collection, Rearing, and Release of Salmonids Associated with Artificial Propagation Programs in the Upper Willamette Spring Chinook and Winter Steelhead Evolutionary Significant Units* (NMFS 2000).

This Biological Opinion (BO) was written pursuant to Section 7 of the Endangered Species Act, and it covers all the hatchery programs in the Willamette Valley. The BO concludes that the proposed hatchery programs will not likely jeopardize the continued existence of the wild spring chinook if a Reasonable and Prudent Alternative (RPA) outlined in the document is implemented.

- *Fisheries Management and Evaluation Plan-Upper Willamette River Spring Chinook in Freshwater Fisheries of the Willamette Basin and Lower Columbia River Mainstem* (ODFW 2001).

This document outlines the plans for selective fisheries for hatchery chinook in the Willamette and lower Columbia rivers, and plans for evaluation of the effectiveness of the fishery regulations in protecting natural spawning populations. The Fishery Management and Evaluation Plan (FMEP) calls for a comprehensive monitoring and evaluation program assessing the catch of wild fish, the abundance of wild and hatchery fish, and angler compliance throughout the basin. The results of the monitoring program are to be assessed annually. Review of the FMEP will occur in 2004 after three years of the selective fishery (which began in 2002), and every five years thereafter.

- *Willamette Basin Fish Management Plan- Spring Chinook Chapters* (ODFW 1998)

This document provides direction for the management of spring chinook populations to protect and enhance naturally spawning populations of spring chinook in each of the sub-basins of the Willamette River Basin by identifying and addressing factors that impact those populations. The plan also restricts fisheries on spring chinook adults in ways consistent with rebuilding wild populations. The measures outlined in the plan are designed to maintain viable populations of spring chinook in the Willamette River.

- *Native Fish Conservation Policy* (OAR 635-007-0502 through -0509) and
- *Fish Hatchery Management Policy* (OAR 635-007-0542 though 0548)

These policies further refine the objectives of conservation of native fish stocks and limiting the impacts of hatchery produced fish on those native stocks. The Native Fish Conservation Policy (NFCP) defines ODFW's principle obligation for fish management as the conservation of naturally produced native fish in the geographic areas to which they are indigenous. The policy is based on the concept that locally adapted populations provide the best foundation for maintaining and restoring sustainable naturally-produced fish. The NFCP requires a conservation plan for each native stock within a given Species Management Unit (SMU). Generally, an SMU is

equivalent to an ESU. The NFCP conservation plans will contain an assessment of the status of each native stock, and a description of the desired biological status relative to measurable biological attributes, a description of short and long term management strategies to address the primary limiting factors, short and long term monitoring and research needs and a description of measurable "trigger" criteria which would indicate a change in status or a need to modify or expand recovery efforts.

The Fish Hatchery Management Policy (FHMP) compliments the NFCP in providing direction for the application of hatcheries as a fisheries management tool. The FHMP promotes the use of best management practices to ensure conservation of both naturally-produced native fish and hatchery-produced fish in Oregon. The policy requires a hatchery management plan for each program, and requires effective coordination planning be done cooperatively with other state, federal and tribal management partners, university programs, and the public. The policy also provides general fish culture and facility guidelines and measures to maintain the genetic resources of native fish populations spawned or reared in captivity.

• *Fish Health Management Policy* (OAR 635-007-0960 to 635-007-1000)
This was developed to "minimize the impact of fish diseases on the state's fish resources." The policy applies to all forms of fish hatchery operations, including Salmon and Trout Enhancement (STEP) projects, and to all importation, transportation, release and rearing of non-aquaria species within the state of Oregon. The goal is to inspect and detect disease agents in order to contain and treat them and thus curtail potential impacts on existing fish populations.

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

- Clackamas River Subbasin Plan (1992)
- Willamette Basin Fish Management Plan (1998)
- Fisheries Management and Evaluation Plan-Upper Willamette River Spring Chinook in Freshwater Fisheries of the Willamette Basin and Lower Columbia River Mainstem
- US vs. Canada Treaty
- Native Fish Conservation Policy
- Fish Hatchery Management Policy
- Fish Health Management Policy
- Biological Opinion: Impacts From the Collection, Rearing, and Release of Salmonids Associated with Artificial Propagation Programs in the Upper Willamette Spring Chinook and Winter Steelhead Evolutionary Significant Units (NMFS 2000)
- Biological Opinion: Artificial Propagation in the Columbia River Basin -- Incidental Take of Listed Salmon and Steelhead from Federal and Non-Federal Hatchery Programs that Collect, Rear and Release Unlisted Fish Species (NMFS 1999)
- The Mitchell Act
- Hydro Re-Licensing Agreements with PGE (FERC)
- Mitigation Agreement with City of Portland (FERC)

3.3) Relationship to harvest objectives.

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.

The Clackamas River spring chinook stocks are part of the basin-wide hatchery release program in the Columbia River. These stocks support sport and/or commercial fisheries in the lower Clackamas River, lower Willamette River, and lower Columbia River.

Spring chinook fisheries occur during the spring and summer in the lower mainstem Columbia and in the mainstem Willamette. See Section 1.12 for information on harvest levels for this program. The Fisheries Management and Evaluation Plan (FMEP) for the Upper Willamette River Spring Chinook in Freshwater Fisheries of the Willamette Basin and Lower Columbia River Mainstem (ODFW 2001) provides guidance for the management of the fisheries (recreational and commercial) to minimize harmful effects upon the survival and recovery of listed spring chinook salmon in the Upper Willamette River Evolutionarily Significant Unit (ESU). To that end, beginning in 2002, angling regulations require the release of all unmarked spring chinook. Only adipose fin-clipped hatchery fish may be harvested. In addition, hatchery releases are reduced to sites where straying into areas of natural production is minimized and opportunities for harvest are maximized.

In-season regulation of the fishery is based on pre-season estimates of abundance. The goal is to limit fishery impacts on wild fish to levels which ensure the survival and rebuilding of these populations. The FMEP estimates that under the current regulation strategy, a 15% exploitation rate will achieve this goal even under the most pessimistic assumptions.

3.4) Relationship to habitat protection and recovery strategies.

Policies defined in the *Clackamas River Subbasin Plan* describe the position of ODFW on habitat protection and recovery strategies and priorities:

Policy 1. The Oregon Department of Fish and Wildlife shall actively pursue and promote habitat protection and improvement necessary to achieve the objectives for management of the Subbasin's fish resources.

Policy 2. ODFW shall coordinate with and advise agencies that manage the land and water resources of the Willamette basin.

Policy 3. Habitat protection shall be emphasized over habitat rehabilitation and enhancement.

Policy 4. Potential losses of fish production from habitat alteration shall be prevented or reduced to the extent possible.

Refer to the Clackamas River Subbasin Plan (ODFW 1992) for details regarding these policies as they apply to state, federal and local agencies, dams and hydropower projects, and diversion and water withdrawals from the hatchery. Fishery managers recognize that habitat degradation and

loss is a serious threat to the maintenance of healthy fish populations. Enforcing local, state, and federal laws protecting fish habitat is essential to sustaining a vital habitat base. Consequently, ODFW promotes the protection and proper management of fish habitat through coordination with local, state, and federal agencies regarding their habitat protection and management programs. ODFW also provides technical advice regarding regulatory agencies' permits, recommends actions to minimize impacts from various land and water uses that may conflict with fishery interests, and works with agencies and private landowners to complete on-the-ground habitat improvement projects.

3.5) Ecological interactions.

Hatchery fish from this program may overlap in space and time with other species of fish when they are juveniles, smolts, and adults. Other fish primarily include coho, steelhead, and chinook. Management efforts are taken to reduce the negative ecological interaction of hatchery fish on wild fish. Potential negative interactions which may occur are (a) genetic introgression, (b) competition, (c) disease transmission, and (d) predation. For this program specifically, these interactions have not been measured. Although risks associated with this fish propagation program are not completely known, a brief summary of the potential risks, and the activities taken to avoid, minimize or monitor such risk are described below.

(a) Genetic Introgression - Genetic introgression may occur if hatchery adults spawn in the wild. This impact is minimized through the following actions:

- With few exceptions, all hatchery fish are marked and returning hatchery adults with visible fin clips or coded-wire tags are sorted and removed from the upstream migrant population by PGE at the North Fork Dam on the Clackamas River under the direction of ODFW. Hatchery adults are recycled downstream back through the Clackamas River sport fishery, or delivered to Clackamas Hatchery for disposition. Marked hatchery fish are not intentionally allowed to pass into the upper basin to spawn with wild fish.

- Hatchery brood were originated from broodstock returning to Clackamas Hatchery, but originating from Willamette River spring chinook stocks. Brood are currently taken across the hatchery adult return period in proportion to returns in order to limit selection for specific run timing. These measures should help limit the impacts of any hatchery fish which may spawn in the wild.

- Operation of the North Fork Dam trap is such that delayed migration resulting in fallback and downstream spawning by wild fish, in less suitable areas where hatchery fish may also spawn, is minimized. The trap is checked, and fish are sorted and released frequently during the peak of adult migration. Also, special care is used when handling all adult fish to ensure that fish are released unharmed and to limit stress, which may inadvertently affect spawning success.

(b) Competition - Carrying capacity is a function of both a population and its environ, and can be defined as the “upper limit of the steady-state population size that an environ can support” (Brannon et al. 1999). If freshwater carrying capacity is limited, it is possible that hatchery spring chinook could competitively displace wild fish from their natural rearing habitats. For example, wild juveniles could be displaced as a result of residing hatchery fish. This could result in the wild fish experiencing premature

emigration, competition for food and space, or increased vulnerability to predators if they are displaced from preferred habitats to less desirable, more exposed areas. Although there are little data to substantiate whether competitive interactions are occurring in the Clackamas basin, there is a risk that it may occur in lower river reaches, below River Mill Dam. The following are several strategies ODFW uses to avoid (or minimize) risks associated with hatchery and wild spring chinook competitive interactions and carrying capacity concerns:

- Spring chinook smolts are released at a size (~10 fish/lb) indicative of swift emigration and little residualization. This should minimize spatial and temporal overlap, thereby reducing competition with wild juveniles for food and cover and minimizing any density-dependent effects.

- All smolts are released from Clackamas Hatchery or in lower basin locations downstream of the hatchery. These releases occur downstream of the primary wild fish production and rearing areas above North Fork Dam.

- The number of hatchery spring chinook released from this program is considered “moderate in magnitude relative to other Columbia River production programs and is not expected to cause serious density dependent effects in the Clackamas Basin or lower Columbia River reaches" (NMFS 1999).

- All hatchery adult fish are removed from the upstream migrating population at North Fork Dam. Thus, hatchery fish will not compete with wild fish during spawning in the upper basin where the majority of spring chinook spawning habitat exists in the Clackamas. Adult hatchery fish and wild fish may compete in the lower basin.

(c) Disease Transmission - Disease transmission results from multiple environmental factors and interacting causes. Establishing definitive cause and effect relationships for transmission between fish groups is difficult (McIvar 1997). However, because hatchery spring chinook are reared, acclimated, released and return to the Clackamas River basin, they are potentially a source of pathogen and disease transmission to wild fish populations. ODFW recognizes the importance and magnitude of fish disease and health, and hatchery spring chinook are managed to minimize disease transmission to wild populations.

Fish health goals are meant to maximize survival at all life stages using disease control and disease prevention techniques. To prevent introduction, spread or amplification of fish pathogens, all activities are conducted in accordance with guidelines developed under the Pacific Northwest Fish Health Protection Committee and according to protocols outlined by the Integrated Hatchery Operations Team (IHOT 1996). Further, ODFW Fish Pathologists, along with hatchery staff, regularly monitor fish health and conduct fish disease examinations. Monitoring efforts include virus sampling, abnormal fish loss investigations, and pre-transfer and pre-liberation inspections.

(d) Predation - Hatchery spring chinook released into nursery habitats may residualize within the subbasin and directly prey on naturally producing salmon and steelhead fry. Due to their location, size and time of emergence, newly emerged chinook salmon fry and fingerling are likely to be the most vulnerable to predation by hatchery released fish

(NMFS 1999). Salmonids are believed to prey on fish less than or equal to 1/3 their body length. However, direct predation by hatchery fish on naturally produced fish in migration corridors is believed to be low (NMFS 1999). In addition to direct predation, large groups of hatchery fish may attract alternate predators in rearing habitats and migration corridors, such as pinnepeds, birds, and other fish species. Indirect mortality resulting from the presence of hatchery fish has not been quantitatively demonstrated to-date. This impact on wild fish is minimized through many of the efforts listed above under "(b) Competition".

The above risk management practices and strategies may further diverge the wild population from the hatchery population. All are conscious management decisions, intended to both reduce risks to the wild population and optimize sport fishery opportunities, which is the primary purpose of the program. Direct benefits of the hatchery program to wild fish include adding nutrients to the system through placement of hatchery carcasses.

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.

NOTE: A portion of the rearing for this program occurs at Marion Forks and Oxbow Hatcheries. However, fish are not released from either of these hatcheries. For the sake of brevity, only hatcheries from which fish are released for this program will be described. A general description of Marion Forks and Oxbow Hatcheries may be found in other HGMPs (Marion Forks: North Santiam Spring Chinook; Oxbow: Lower Columbia/Bonneville Coho).

Clackamas Hatchery

- Chinook are incubated and reared in 52^{o}F well-water or with Clackamas River water that is treated with ultraviolet light (UV). Either water source may be chilled during early incubation to even-up stages of egg development. After all groups of eggs are at equal developmental stages, fish are reared in natural-temperature river water.

- River water intake is 100% screened with 3/16” mesh. Fish screens have been inspected (October 18, 2000) and were deemed non-compliant to NOAA Fisheries fish screening criteria (post-1995).

- River water withdrawal is covered under Oregon water permit number S49433 and S42105. Well water is withdrawn under permit number G8257.

- Discharge water is currently covered under NPDES individual permit number 102663.

- Clackamas River water is limited by water quality (pathogens) during summer months. This means that exposing eggs, fry, and fingerlings to untreated river water may be a disease transmission concern. To avoid these problems, eyed-eggs are shipped to Willamette and Oxbow Hatcheries for final incubation and early rearing. Most fingerlings from Willamette are then transferred to Marion Forks Hatchery for further rearing. All fish from Marion Forks and Oxbow Hatcheries are then returned to Clackamas Hatchery for rearing to smolt size and release.

Table 4.1.1) Summary of water temperature and water usage (averages):

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GPM	5,550	3,750	450	1,400	3,200	4,100	9,200	4,100	4,100	9,350	5,550	5,550
Temp.	36	37	38	40	46	50	55	56	52	44	40	38

- Other characteristics of Clackamas Hatchery include:

  - The water source is pumped.
  - The water source is accessible to anadromous fish.
  - Water is from the natal stream for the cultured stock.
  - The water used results in natural water temperature profiles that provide optimum maturation and gamete development.
  - The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for temperature.
  - The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc
  - The water supply is protected by flow alarms at the intake(s).
  - The water supply is protected by flow alarms at the head box.
  - The water supply is protected by flow and/or pond level alarms at the holding pond(s).
  - The water supply is protected by back-up power generation.

Willamette Hatchery

- Willamette Hatchery has two sources of water. The first and main water supply is surface water from Salmon Creek. This water is gravity flow and the facility has water rights for up to 82.5 cfs. The second source of water is a well. This water is only used in the hatch house. It is used for otolith marking. In times of high, muddy water, incubators and starter troughs can be switched over to this well source.

- During the winter, Salmon Creek's water fluctuates in water quality and temperature. Water temperature fluctuates between 36^{o}F and 45^{o}F. During the summer, Salmon Creek's water temperature fluctuates from 45^{o}F to 65^{o}F. The well water is a constant 52^{o}F.

- All Hatchery effluent is monitored and reported quarterly under the 0300J permit. All conditions of the permit are administered with ODFW and regulated by DEQ.

- Other characteristics of Willamette Hatchery include:

  - The water source is gravity flow.
  - The water source is accessible to anadromous fish.
  - Water is from the natal stream for the cultured stock.
  - The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for temperature.
  - The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc.
  - The water supply is protected by flow alarms at the intake(s).
  - The water supply is protected by flow alarms at the head box.

- The water supply is protected by flow and/or pond level alarms at the holding pond(s).

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.

Clackamas Hatchery - The river intake system is 100% screened with 3/16th-inch wire mesh, rotating screens. The intake was inspected on 10-18-00 and was considered non-compliant to pre-1995 NOAA Fisheries fish screening criteria. Funding will be sought from mitigation partners to upgrade screens to current NOAA Fisheries standards. Effluent is discharged through the pollution abatement pond during pond cleaning, to settle-out solid wastes prior to discharging into the Clackamas.

Willamette Hatchery - At this time the hatchery fish screening at the intake do not meet NOAA Fisheries fish screening criteria. The facility operates within the limitations established in its National Pollution Discharge Elimination System (NPDES) permit and does not have a discharge permit.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Clackamas Hatchery and the North Fork Dam Ladder are utilized to trap spring chinook. At Clackamas Hatchery, adults that swim up Dog Creek are trapped in a 60' x 10' x 3.5' adult trap. From here all adults are anesthetized and individually handled, with a portion of them being held for broodstock. The remainder (excess hatchery fish) are distributed as outlined in the hatchery management policy. Refer to Section 7 for additional broodstock collection methods and protocols.

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

- Egg Transportation - Eyed eggs are transported to Willamette Hatchery, Oxbow Hatchery and to STEP facilities in nylon bags covered with burlap.

- Smolt Transportation - Smolts and fingerlings are transported between all involved hatcheries and eventually to Clackamas Hatchery for acclimation in 1000, 2000, or 3000 gallon insulated and oxygenated liberation trucks.

- Adult Transportation - Adult spring chinook returning to Clackamas Hatchery are trapped and used for broodstock at the hatchery. Adult spring chinook trapped at North Fork Dam are transported via a 2000 gallon insulated fish liberation truck equipped with oxygen and aeration to Clackamas Hatchery.

5.3) Broodstock holding and spawning facilities.

All spring chinook broodstock are held at Clackamas Hatchery in two 10'x 60' concrete holding ponds with an average depth of 51". All adults are kept separate from other stocks and are spawned under a covered platform.

5.4) Incubation facilities.

Clackamas Hatchery - Eggs are incubated in vertical, Heath-style, incubator trays. There are 182 trays allowing for the incubation of 1.82 million Clackamas stock spring chinook eggs. Water is pumped to a head tank, then distributed through the incubation trays via gravity flow.

Willamette Hatchery - Eggs are incubated in vertical, Heath-style, incubator trays. There are 67 stacks of incubators allowing incubation of 8 million eggs. Two water sources are available to each stack of incubators, Salmon Creek and well water. Flow is set at 5 gallon a minute. All incubators are equipped with alarms.

STEP Classroom Incubators - Up to 60,000 eggs total are incubated in small aquaria in classrooms throughout the Greater Portland Metropolitan area. Each classroom aquarium is supplied with 500-1,000 eggs. Fish are held only to the unfed fry stage and then released. These fish are not intended for production purposes, though ownership and responsibility by students is fostered to assure they receive adequate care and to provide awareness of watershed needs for these fish.

5.5) Rearing facilities.

Clackamas Hatchery - All fish coming back from Marion Forks are reared in two 100' x 300' asphalt rearing ponds supplied with 4,500 gpm of river water.

Willamette Hatchery - Willamette Hatchery has 40 – 20' x 80' x 3' raceways, 10 – 20' x 100' x 6' raceways, 4 – 20' circulars, 13 Canadian-style starter troughs and 2 show ponds.

5.6) Acclimation/release facilities

Spring chinook are released directly from Clackamas Hatchery. Others are released from acclimation sites in the lower river, including Cassidy Pond and net-pens located in the Clackamette Cove. Acclimation is one tool used to reduce straying and increase the possibility that these fish will home to downstream locations and be caught in the lower Clackamas River fishery. Additional acclimation sites are being explored. A final group of fish is released directly into the lower Clackamas River without acclimation.

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

Clackamas Hatchery has not had any significant fish loss in the last several years. However, since the hatchery cannot meet the FDA label requirements for formalin treatments for Ich during the summer months, 300,000 fish are released as pre-smolts at 20 fish /lb. The hatchery also experiences bird predation from October through March.

Willamette Hatchery has not had any significant fish loss in the last several years. However, fish are treated for external parasites. High losses are not associated with this problem.

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.

Clackamas Hatchery

- The hatchery is using well water and/or water filtration along with UV treatment to maintain proper fish health standards during incubation.

- Hatchery staff are on-call 24 hrs/day to address emergency (or unexpected) events. All ponds and head tanks are alarmed to notify hatchery staff if an equipment failure occurs.

- Both water sources are hooked-up to back-up generators.

- River water is treated with UV light during incubation and to minimize disease transmission to hatchery reared fish.

- Monthly fish health monitoring is conducted by a fish health specialist to detect disease early and provide prevention and control measures.

- Eyed eggs are transferred to Willamette and Oxbow Hatcheries prior the summer months to avoid exposure to pathogens and viruses present in the Clackamas River.

- The adult holding pond is locked off at night and protected by a property guard to minimize disturbance to broodfish.

Willamette Hatchery

- The hatchery is staffed full time 24 hours per day to address emergency's or unexpected events.

- The intake, stacks incubators, head box, and starter troughs have an alarm system.

- The 10 – 20' x 100' ponds all have low water alarms, but the 40 – 20' x 80' raceways do not.

- A back-up well exists that can be used in the hatch house for the incubators or starter troughs.

- The back-up well is hooked up to a back-up generator.

- Fish health monitoring and disease prevention standards consistent with IHOT protocols.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

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

6.1) Source.

The Clackamas River spring chinook stock was developed beginning in 1976 from other Willamette Basin hatchery spring chinook stock fish released at Dog Creek (site of Clackamas Hatchery; ODFW 1992). Clackamas Hatchery began operation in 1979 and the first releases of spring chinook at Clackamas Hatchery were in November 1979 (1978 brood). The last releases of smolts at Clackamas Hatchery from adults not collected at Clackamas Hatchery was in 1989 (1987 brood). Since 1988, the Clackamas Hatchery spring chinook broodstock has been composed entirely of returns to Clackamas Hatchery. All unmarked fish are tested for CWTs. If

no CWT is present in unmarked fish, then the fish are returned to the river at the upper boat ramp in McIver State Park.

6.2) Supporting information.

6.2.1) History.

Willamette stock spring chinook (fry, pre-smolts, smolts, and adults) have been released from Eagle Creek National Fish Hatchery (ECNFH) into Eagle Creek, a Clackamas River tributary, and throughout the basin since 1959. All releases of Willamette stock spring chinook from ECNFH were discontinued after 1989.

The Clackamas River spring chinook stock was developed from other Willamette Basin hatchery spring chinook stock smolts released at Dog Creek (site of Clackamas Hatchery) beginning in 1976 (ODFW 1992). Clackamas Hatchery began operation in 1979 and the first releases of spring chinook at Clackamas Hatchery were in November 1979 (1978 brood). The last releases of smolts at Clackamas Hatchery from adults not collected at Clackamas Hatchery was in 1989 (1987 brood). Since 1988, the Clackamas Hatchery spring chinook broodstock has been composed entirely of returns to Clackamas Hatchery (and North Fork Dam to a much smaller extent).

6.2.2) Annual size.

The annual brood stock goal is 520 adults, which is comprised of 345 females and 175 males. The total broodstock is made up from hatchery adults that swim into the trap at Clackamas Hatchery or are trapped at North Fork Dam. No wild fish are used in the broodstock.

6.2.3) Past and proposed level of natural fish in broodstock

There is no proposal to incorporate wild (i.e., naturally produced) fish into the broodstock. During development of this stock it is difficult to determine whether wild or hatchery fish were used, given that hatchery fish were not all marked until releases from the 1997 brood. However, since the 2002 return year all fish used in the broodstock have been of hatchery origin.

6.2.4) Genetic or ecological differences.

The broodstock was originally founded with a mix of fish from non-local, but within the ESU, populations (Willamette stock). In recent years the program has been managed to allow for local adaptation of the broodstock. The current broodstock displays morphological and life history traits similar to the natural population. Data defining specific genotypic and phenotypic characteristics between naturally produced and hatchery reared fish are not available. Based on genetic simulations, Cramer et al. (1996) concluded that the genetic composition of historic spring chinook stocks in the Willamette Basin have been compromised over time by hatchery operations to the point where currently there is little genetic difference between naturally spawning fish and hatchery stock. Chilcote (2003) proposes population productivity is negatively affected by increasing the proportion of hatchery steelhead on spawning grounds, suggesting some sort of behavioral difference between these hatchery and wild fish. It is unknown if the same situation applies to spring chinook.

6.2.5) Reasons for choosing.

The current broodstock is achieving the production goals for this hatchery program. In addition, the presence of a sorting facility at the North Fork Dam provides a unique opportunity to isolate wild and hatchery-origin spawning populations to minimize risks to the native population. This hatchery program is similarly managed to isolate (segregate) the hatchery program from the local wild spring chinook population. ODFW has chosen not to attempt to convert this program to an

integrated hatchery program for several reasons: (1) integration to a level that influences the genetic composition of this broodstock would likely require the annual diversion of a significant proportion of returning wild adults to the hatchery program thus creating a potential risk to the fitness of the wild population, (2) risks to wild populations from interbreeding with hatchery-origin fish are addressed through sorting and selective passage to spawning areas reducing the need to promote genetic similarity between these populations, (3) there is currently no evidence to suggest that integration is needed to improve the genetic fitness of the hatchery population, (4) there are no plans or demonstrated need to use hatchery-origin fish to bolster the wild population, and (5) there is no evidence to suggest that integration is needed to improve the ability of this broodstock to achieve program objectives.

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.

See Section 3.5.

SECTION 7. BROODSTOCK COLLECTION

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

Only adults will be collected and used for broodstock.

7.2) Collection or sampling design.

The estimated goal for full program is to have a spawner brood population of 520 adults. This broodstock goal accounts for pre-spawn mortalities. All brood will be collected from adult fish that swim into the trap at Clackamas Hatchery or, in an emergency, from fish collected at North Fork Dam. Adults will be collected at a 1:2 male to female ratio throughout the entire run.

7.3) Identity.

Naturally produced fish are identified by the presence of a fully developed adipose fin. Fish with an adipose fin are tested for CWTs. If no CWT is present then the fish are assumed to be wild and returned to the river at the upper boat ramp in McIver State Park. However, due to marking error, up to 3% of un-marked fish may be hatchery fish that were poorly marked.

7.4) Proposed number to be collected:

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

The estimated goal for full program is to have a spawner brood population of 520 adults. This broodstock goal accounts for pre-spawn mortalities. All brood will be collected from adult fish that swim into the trap at Clackamas Hatchery or are collected at North Fork Dam. Adults will be collected at a 1:2 male to female ratio throughout the entire run.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1995-02), or for most recent years available:

Table 7.4.2) Clackamas Hatchery spring chinook broodstock collections.

Year	Females	Males	Jacks	Eggs	Juveniles*
1990	560	324	3	2,492,850	
1991	486	274	7	2,178,003	
1992	525	302	11	2,296,758	
1993	508	373	15	2,232,004	
1994	546	320	6	2,375,256	
1995	478	290	10	2,580,188	
1996	554	342	3	2,556,202	
1997	500	303	3	2,514,261	
1998	486	242	3	2,355,000	
1999	497	280	5	2,259,000	
2000	493	252	4	2,555,007	
2001	526	267	1	2,516,954	
2002	353	186	0	1,613,238	

* juveniles distributed to different hatcheries.
Data source: Clackamas Hatchery records.

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

Disposition of excess adult fish will be carried out according to the mandates under the ODFW Fish Hatchery Management Policy. This includes but is not limited to supplying fish for tribal ceremonial and substance use, recycling adults downstream to provide additional fishing opportunity, sell to provide revenues to support hatchery programs, give to charitable food share programs, and placement of carcasses in natural spawning and rearing areas.

7.6) Fish transportation and holding methods.

The adult fish kept for brood are held in two 10' x 60' x 51" holding ponds at Clackamas Hatchery. Adult spring chinook trapped at North Fork Dam are transported via a 1000 gallon fish liberation truck equipped with oxygen and aeration to Clackamas Hatchery. Live fish transported by Clackamas Hatchery personnel for recycling downstream to expand fishing opportunities will be hauled in a 2000 gal oxygenated and insulated liberation truck.

7.7) Describe fish health maintenance and sanitation procedures applied.

- Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), and ODFW's Fish Health Management Policy are followed.

- Adult chinook salmon are treated with 1:3,500 hydrogen peroxide solution, three to five times a week, to control and minimize fungus.

- Adults are injected with erythromycin and oxytetracycline prior to holding.

- If mortality is present, it is removed daily.

- Necropsies are performed on pre-spawner mortalities to determine the cause of death.

- All equipment is disinfected with Iodophore between uses. Fish transport tanks are disinfected between the hauling of different fish lots.

- High water quality is maintained.

7.8) Disposition of carcasses.

All spawned carcasses will be rendered or used for stream enrichment purposes. All pre-spawn mortality with be sent to a 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.

The risk of disease will be limited by the measures described in this section above, in Section 3.5, in other parts of this document, in the FMEP, and in other relevant policies.

SECTION 8. MATING

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

8.1) Selection method.

Chinook are selected throughout the run and are spawned at a 1:2 (male-to-female) spawning ratio. Chinook will be selected at random from the pooled brood population. Refer to section 7.2 for details regarding broodstock collection procedures.

8.2) Males.

All males are spawned at a 1:2 ratio with females. This ratio is used because of the size of the gene pool in the hatchery population, and due to space limitations in adult holding facilities. Precocious males are not used in the broodstock. Back-up males are not used in the spawning protocol. All salmon are killed prior to spawning. Milt is placed into a cup prior to egg fertilization.

8.3) Fertilization.

Eggs and sperm are fertilized according to a 1 x 2 spawning matrix. Gametes are pooled prior to fertilization. IHOT, PNFHPC, and state guidelines are followed. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning.

8.4) Cryopreserved gametes.

Not applicable to this program.

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

- A factorial-mating scheme (as described in Section 8.3) is used to reduce the risk of loss of within-population genetic diversity.

- Fish are selected and spawned randomly (while maintaining a 1:2 male-to-female spawning ratio) from the broodstock population.

- All females are sampled for BKD during spawning. Eggs from females that test positive will be destroyed. Ovarian fluid and tissues from 60 females are sampled for IHN, with additional sub-sampling of ovarian fluids done if determined necessary by ODFW Pathology. If there is no IHN present, continued rearing is authorized. If IHN is detected, eggs and fingerlings will be monitored to see if they contract the virus.

- Green eggs are water-hardened in Iodophore. Shipped eyed eggs are disinfected at the receiving station.

SECTION 9. INCUBATION AND REARING -

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

9.1) Incubation:

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

Table 9.1.1 indicates the number of eggs taken, eyed eggs inventoried, and percent survival for different stages from 1992-2002. Green to eyed survival is for Clackamas Hatchery, while the other two survival columns are for Willamette Hatchery.

Table 9.1.1) Clackamas hatchery spring chinook egg takes and survival.

Year	Egg Take	Eyed Inventory	Green-Eyed % Survival	Eyed-Ponding % Survival	Fry-Fngrlng. % Survival
1992	2,296,758	1,040,050**	92.1		
1993	2,232,004	966,300**	95.7	97.7	96.6
1994	2,375,256	2,203,050	92.8	95.9	97.7
1995	2,580,188	1,781,750	92.0	98.4	95.1
1996	2,556,202	2,490,250	97.4	96.1	97.3
1997	2,514,261	2,243,500	97.0	98	98.1
1998	2,355,000	2,252,000	95.7	98	97.7
1999	2,259,000	2,118,000	96.9	96.8	97.8
2000	2,555,007	2,381,878	95.9	97.8	98
2001	2,516,954	2,358,396	93.7	95.7	
2002	1,613,238	1,547,750	95.9		

** - A portion of eggs were shipped green.
- (1992-2000) Eyed Inventory numbers do not reflect BKD culling or excess to program destroyed.
- Green-Eyed % Survival represents shock loss.

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

- Measures are taken to only collect the number of eggs necessary to attain annual egg take goals. If additional eggs are taken, it is anticipated that this would not exceed 10% more than the total needed for production (IHOT 1996). ODFW will consult with NOAA Fisheries if this occurs.

- Extra eggs are taken to compensate for the potential loss attributed to BKD culling. Excess eggs are frozen and disposed of in the landfill.

- Eggs are not culled randomly over all segments of egg-take.

- Eggs are culled at Clackamas Hatchery once for BKD and a second time if numbers exceed program goals.

- Eggs are culled based on a positive reading for BKD using ELISA.

- Juveniles are normally not culled.

- Families are not culled to minimize family size variation.

- Families are initially incubated individually at Clackamas Hatchery to allow for BKD culling. After eye-up and shocking, eggs are mixed together for shipment to other hatcheries.

- No culling occurs at Oxbow Hatchery.

- At Willamette Hatchery, it is likely that culling would include only a portion of the latest egg take.

- If culling occurs for program overage at Marion Forks Hatchery, culling is random.

9.1.3) Loading densities applied during incubation.

- Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows and incubator capacities.

- Eggs are incubated under conditions that result in generally equal survival of all segments of the population to ponding. Survival is equal because the incubation equipment and methods are the same for all segments.

Hatchery	Egg Size (#/oz)	Loading (#/Tray)	Standard Incubator Flows (gpm/stack)
Clackamas	~97-116	8-10,000	5
Willamette		8,000	5

9.1.4) Incubation conditions.

Clackamas Hatchery

- Water temperatures are recorded daily. Well water averages 52^{o}F. River water ranges from 45-56^{o}F. Temperatures may be reduced by 8^{o}F to even-up separate lots of eggs, during early incubation.

- DO is monitored weekly, and generally falls within 9-10 ppm.

Willamette Hatchery

- Water to the incubator trays is monitored for temperature with the use of a seven-day thermograph. River water varies from 37-65 ^{o}F. Well water is 54^{o}F.

- Dissolved oxygen levels are not routinely monitored.

9.1.5) Ponding.

Willamette Hatchery

- Fry are removed from incubation units when 80-90% of observed fry have yolk-sac material that is 80-90% utilized and contained within the body cavity ("button-up").

- Fry are ponded based on visual inspection of the amount of yolk remaining.

- Fry are typically ponded in late December at about 1,600 T.U., with an average size at ponding of 1,400 fish/lb.

- Fry are not allowed to volitionally pond but are forcibly ponded.

9.1.6) Fish health maintenance and monitoring.

Clackamas Hatchery - Eggs are treated with formalin (to prevent fungus) from green egg through eyed-egg development. Treatments are administered every other day at 1,666 ppm, for 15 minutes. After eye development (~550 T.U.), eggs are “shocked”, picked, and enumerated. Eyed eggs shipped to Willamette and Oxbow Hatcheries are disinfected upon arrival.

Willamette Hatchery - Fish health is monitored daily by the crew and monthly by one of our fish health specialists. If any problems arise, appropriate actions, including drug or chemical treatments, are applied.

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.

- ODFW hatcheries are operated in compliance with ODFW’s Fish Health Management Policy and the Integrated Hatchery Operations Team (IHOT) fish health guidelines.

- Eggs are incubated on well water or treated river water to prevent exposure to disease.

- Eggs are kept isolated by family group.

- Water supplies and the power supply are alarmed to notify hatchery personnel if a failure occurs. Water supplies are hooked to a back-up generator, in case of a power failure.

- Hatchery staff are available 24 hr/day.

9.2) Rearing:

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

See Table 9.1.1.

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

Willamette Hatchery

- Density and loading levels differ by size of fish, size of pond, and time of year (water temperature).

- Fingerling loading criteria are generally below 2.5 lbs/gpm in a 20' x 80' raceway. Smolt loading criteria can go up to 4.4 lbs/gpm. Actual loading rarely reaches these levels.

- The juvenile rearing density and loading guidelines used at the facility are based on standardized agency guidelines, life-stage specific survival studies conducted at other facilities, and staff experience (e.g. trial and error).

- IHOT standards are followed for water quality , predator control measures, loading, and density.

Clackamas Hatchery

- Pond loading targets for fingerlings do not exceed 12 lbs/gpm. Smolt loading and densities at the time of release have been:

Year	lbs/gpm		lbs/ft^3	
	Spring Release	Fall Release	Spring Release	Fall Release
1998	4.6	6.9	0.32	0.49
1999	8.7	6.1	0.61	0.43
2000	6.8	6.1	0.48	0.43
2001	5.6	5.3	0.39	0.37
2002	6.0	3.5	0.42	0.24

9.2.3) Fish rearing conditions

- Water quality is monitored and recorded regularly.

- Rearing ponds are maintained in a clean and healthy condition. Settleable solids, unused feed, feces, and mortalities are removed regularly to ensure proper cleanliness of rearing containers.

- IHOT standards are followed.

Clackamas Hatchery - Fingerlings returned from Oxbow are reared from 125 fish/lb to 20 fish/lb. All 300,000 are reared on river water with temperatures ranging between 45-65^{o}F. Fingerlings returned from Marion Forks Hatchery are reared from 18 fish/lb to 10 fish/lb. All fish are reared on river water with temperatures ranging from 36-50^{o}F. During highest fish rearing densities, DO levels are monitored weekly and maintained at 6 ppm or greater. Fish are reared in 100' x 300' asphalt rearing ponds with 4,500 gpm average flow.

Willamette Hatchery - Pond monitoring is done daily. Staff watch for signs of stress, disease, water quality and general fish health and behavior. Pond mortalities are picked and recorded daily. Water quality is monitored under the prescribed 300J general NPDES permit. April through September water temperatures are usually in the mid-40's to mid-60's; October through March water temperatures are usually in the mid-30's to mid-40's. Ponds are cleaned weekly.

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

Clackamas Hatchery - Fish size is measured monthly as fish per pound. Data are recorded onto monthly ponded fish reports and entered into the ODFW HMIS (Hatchery Management Information System) database. Fish feed schedules are based upon fish size data. Length frequency data are only collected at the time of release. Typical fish growth is as follows:

Table 9.2.4.1) Clackamas Hatchery spring chinook typical juvenile growth pattern.

Month	fish/lb		Life Stage
	Spring Release	Fall Release	
May		54.2	Fingerling
June		25.0	Fingerling
July		16.6	Fingerling/Smolt
October	17.7		Fingerling/Smolt
November	14.1		Smolt
December	12.9		Smolt
January	11.2		Smolt
February	10.5		Smolt
March	9.8		Smolt

Willamette Hatchery - Fish size is measured monthly as fish per pound. Data are recorded onto monthly ponded fish reports and entered into the ODFW HMIS database. Fish feed schedules are based upon fish size data. Length frequency data are only collected at the time of release. Typical fish growth is as follows:

Table 9.2.4.2) Willamette Hatchery spring chinook typical juvenile growth pattern.

Month	fish/lb (Spring Release)	Life Stage
January	1,275	Fry
February	900	Fry
March	500	Fry
April	250	Fry
May	100	Fry
June	75	Fingerling
July	40	Fingerling
August	20	Fingerling/Smolt
September	14	Smolt
October	11.5	Smolt
November	10.5	Smolt
December	10	Smolt
January	9.5	Smolt
February	9	Smolt
March	9	Smolt

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

See Tables 9.2.4.1 and 9.2.4.2 in Section 9.2.4.

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*).

Clackamas Hatchery - All fish are fed Bio Oregon Moist feed 3 to 4 times daily on a demand basis.

Food Type (mm)	Range for Use (fish/lb)
Bio Moist Grower 1.3	125-100
Bio Moist Feed 2.5	100-50
Bio Moist Feed 3.0	50-10

Willamette Hatchery - All fish are started on Moore-Clark dry feed and are fed on a demand basis 6 to 10 times a day. At 500 fish/lb, they are put on a schedule and fed an asset amount per day. Fish are fed daily and potentially multiple times per day if needed to get their daily amount.

Food Type	Range for Use (fish/lb)
#0 Nutra Starter	Ponding-500
#1 Nutra Starter	500-300
#2 Nutra Starter	300-150
1.2 mm Nutra Starter	150-30
2.0 mm Clarks fry	30-11
2.5 mm Clarks fry	11-Release

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

Fish health is monitored daily by hatchery staff and monthly by a fish health specialist. If any problems arise appropriate actions, including drug or chemical treatments, are applied. ODFW's Fish Health Management Policy and IHOT fish health guidelines are followed to prevent transmission between lots of fish on site or transmission or amplification to or within the watershed.

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

The migratory state of the release population is determined by size, behavior , physical appearance, and other criteria. Weight samples of the fish are taken monthly to ensure proper growth rate. Prior to release, length frequencies are taken. Refer to Section 9.2.4 for growth data.

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

Fish are reared at ODFW hatcheries. "Natural" rearing is mimicked through water temperature, and release timing at all or some of the facilities utilized for this program.

Smolts are acclimated and released volitionally from Cassidy Pond for 2-3 weeks. Acclimated release (versus direct release of large groups of fish) is believed to reduce the impact of density-dependent effects - fish leave voluntarily while experiencing on-site environmental cues and conditions such as, flow, temperature, light, and weather conditions. In addition, these basin specific environmental cues, along with pre-migration imprinting are believed to encourage adult homing to release areas. Fish are forced out of the pond at the end of the acclimation period.

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.

Risk aversion measures are described in this section above, in Section 3.5, in other parts of this document, in the FMEP, and in other relevant policies. ODFW's Fish Health Management Policy, PNFHCP, and IHOT fish health guidelines are followed to prevent transmission between lots of fish on site or transmission or amplification to or within the watershed.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

See also Table 1.5.2 in Section 1.5.

Table 10.1) Proposed releases of Clackamas hatchery spring chinook.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry	60,000	≥900	Dec-Jan	Clackamas River Willamette River Columbia River Sandy River Molalla River
Fry				
Pre smolts	300,000	~20	July-Oct	Clackamas River
Smolts	860,000	9-11	March	Clackamas River

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

In the Clackamas River, all release locations will remain between river mile 30 and 0. Numbers of fish released at different locations in this area may vary. Below are listed the historic release sites, though others may be incorporated for management purposes. Unfed fry releases in the Willamette, Columbia, Sandy, and Molalla Rivers occur in the main stem portions of these rivers only. These locations all have hatchery influence and individual sites are dictated by the teacher for each classroom, most likely based upon proximity to the school and ease of access.

Stream, river, or watercourse: Clackamas River (waterbody code = 0300200000)
Release point: RM 22.6 (Clackamas Hatchery)
Major watershed: Clackamas
Basin or Region: Willamette

Stream, river, or watercourse: Clackamas River (waterbody code = 0300200000)
Release point: RM 17 (Cassidy Pond)
Major watershed: Clackamas
Basin or Region: Willamette

Stream, river, or watercourse: Clackamas River (waterbody code = 0300200000)
Release point: RM 0.5 (Clackamette Cove)
Major watershed: Clackamas
Basin or Region: Willamette

Stream, river, or watercourse: Eagle Creek (waterbody code = 0200700000)
Release point: RM to be determined
Major watershed: Clackamas
Basin or Region: Willamette

Stream, river, or watercourse:	Clackamas River (waterbody code = 0300200000)
Release point:	Any Mainstem Site below RM 30
Major watershed:	Clackamas
Basin or Region:	Willamette
Stream, river, or watercourse:	Willamette River (waterbody code = 0300120000)
Release point:	Any Mainstem Site (STEP Classrooms)
Major watershed:	Willamette
Basin or Region:	Columbia
Stream, river, or watercourse:	Columbia River (waterbody code = 0300000000)
Release point:	Any Mainstem Site (STEP Classrooms)
Major watershed:	Columbia
Basin or Region:	Columbia
Stream, river, or watercourse:	Sandy River (waterbody code = 0300300000)
Release point:	Any Mainstem Site below RM 30 (STEP Classrooms)
Major watershed:	Sandy
Basin or Region:	Columbia
Stream, river, or watercourse:	Molalla River (waterbody code = 0200700000)
Release point:	Any Mainstem Site (STEP Classrooms)
Major watershed:	Molalla
Basin or Region:	Willamette

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

Table 10.3.1) Actual releases of Clackamas hatchery spring chinook juveniles for release years 1988 through 2003.

Release Date	Brood Year	Release Location	Number Released	Fish per Pound
3/12/90	1988	Clackamas Hatchery	272,542	10.4
3/12/90	1988	Clackamas Hatchery	290,926	11.2
8/13/90	1989	Clackamas Hatchery	28,685	12.8
8/13/90	1989	Clackamas Hatchery	28,815	11.3
8/13/90	1989	Clackamas Hatchery	27,276	12.0
8/14/90	1989	Clackamas Hatchery	230,208	10.9
9/14/90	1989	Clackamas Hatchery	26,206	8.5
9/14/90	1989	Clackamas Hatchery	26,192	8.0
9/14/90	1989	Clackamas Hatchery	265,776	8.4
3/18/91	1989	Clackamas Hatchery	315,698	11.5
3/28/91	1989	Clackamas Hatchery	180,830	9.8
8/5/91	1990	Clackamas Hatchery	308,340	13.5
9/3/91	1990	Clackamas Hatchery	315,000	9.0
3/14/92	1990	Clackamette Cove Net Pens	50,148	8.3
3/16/92	1990	Clackamas Hatchery	324,582	9.4
3/16/92	1990	Clackamas Hatchery	87,692	8.8
8/24/92	1991	Clackamas Hatchery	302,092	14.0
8/24/92	1991	Clackamas Hatchery	282,079	11.8

Release Date	Brood Year	Release Location	Number Released	Fish per Pound
3/16/93	1991	Clackamas Hatchery	161,680	12.1
3/20/93	1991	Clackamette Cove Net Pens	49,877	8.1
3/29/93	1991	Clackamas Hatchery	285,707	14.6
8/13/93	1992	Clackamas Hatchery	300,960	11.4
9/13/93	1992	Clackamas Hatchery	297,488	8.7
3/21/94	1992	Clackamas Hatchery	134,575	13.7
3/26/94	1992	Clackamette Cove Net Pens	49,883	10.3
4/4/94	1992	Clackamas Hatchery	239,161	17.8
4/8/94	1992	Hublou Harbor Net Pens	19,777	10.9
8/8/94	1993	Clackamas Hatchery	317,468	11.1
8/11/94	1993	Clackamas Hatchery	335,055	14.1
3/15/95	1993	Clackamas Hatchery	88,331	9.3
3/18/95	1993	Clackamette Cove Net Pens	12,640	10.5
3/18/95	1993	Clackamette Cove Net Pens	12,468	10.5
3/18/95	1993	Clackamette Cove Net Pens	12,518	10.5
3/18/95	1993	Clackamette Cove Net Pens	12,455	10.5
3/22/95	1993	Hublou Harbor Net Pens	29,784	10.5
4/3/95	1993	Clackamas Hatchery	361,702	14.2
8/7/95	1994	Clackamas Hatchery	345,103	15.6
8/7/95	1994	Clackamas Hatchery	267,690	15.0
3/13/96	1994	Clackamas Hatchery	113,411	9.6
3/15/96	1994	Clackamette Cove	18,234	7.7
3/15/96	1994	Clackamette Cove	18,230	7.8
3/15/96	1994	Clackamette Cove	20,021	7.7
3/15/96	1994	Clackamette Cove Net Pens	20,968	7.5
3/15/96	1994	Clackamette Cove Net Pens	21,110	7.5
3/15/96	1994	Clackamette Cove Net Pens	17,450	7.5
3/15/96	1994	Clackamette Cove Net Pens	20,790	7.5
3/19/96	1994	Clackamas Hatchery	265,729	11.9
4/3/96	1994	Cassidy Pond	25,210	9.0
8/14/96	1995	Clackamas Hatchery	300,944	10.4
8/14/96	1995	Clackamas Hatchery	314,636	10.5
3/14/97	1995	Cassidy Pond	52,164	12.6
3/19/97	1995	Barton Park	20,058	11.3
3/19/97	1995	Barton Park	29,960	10.7
3/20/97	1995	Clackamas Hatchery	51,624	10.3
3/31/97	1995	Clackamas Hatchery	288,469	13.6
8/12/97	1996	Clackamas Hatchery	358,253	11.4
8/12/97	1996	Clackamas Hatchery	324,868	11.5
3/18/98	1996	Clackamas Hatchery	289,890	13.9
3/19/98	1996	Clackamas Hatchery	197,444	9.8
8/3/98	1997	Clackamas Hatchery	334,645	15.5
8/3/98	1997	Clackamas Hatchery	341,819	14.7
3/10/99	1997	Cassidy Pond	50,140	10.9
3/17/99	1997	Clackamas Hatchery	374,429	9.5
8/16/99	1998	Clackamas Hatchery	279,700	10.1
10/7/99	1998	Clackamas Hatchery	199,670	7.6
10/7/99	1998	Clackamas Hatchery	231,243	8.5

Release Date	Brood Year	Release Location	Number Released	Fish per Pound
3/9/00	1998	Cassidy Pond	50,036	11.3
3/13/00	1998	Clackamas Hatchery	290,032	9.4
3/15/00	1998	Clackamas Hatchery	97,854	9.8
8/8/00	1999	Clackamas Hatchery	313,072	13.0
8/30/00	1999	Clackamas Hatchery	260,466	15.6
3/7/01	1999	Clackamette Cove Net Pens	37,935	10.6
3/7/01	1999	Clackamette Cove Net Pens	41,195	11.0
3/8/01	1999	Cassidy Pond	50,124	12.2
3/14/01	1999	Clackamas Hatchery	279,926	11.0
3/14/01	1999	Clackamas Hatchery	83,720	11.2
7/16/01	2000	Clackamas Hatchery	319,868	20.0
7/18/01	2000	Clackamas Hatchery	264,776	21.6
8/21/01	2000	Clackamas Hatchery	2,687	10.5
8/21/01	2000	Clackamas Hatchery	2,664	10.5
3/13/02	2000	Cassidy Pond	50,178	12.4
3/19/02	2000	Clackamas Hatchery	81,296	11.9
3/27/02	2000	Clackamette Cove	14,608	8.8
3/27/02	2000	Clackamette Cove	17,424	8.8
3/27/02	2000	Clackamette Cove	24,640	8.8
3/27/02	2000	Clackamette Cove	17,072	8.8
3/27/02	2000	Clackamette Cove Net Pens	79,572	9.2
3/28/02	2000	Clackamette Cove	25,200	9.0
3/28/02	2000	Clackamette Cove	16,830	9.0
3/29/02	2000	Clackamette Cove	16,641	9.0
3/29/02	2000	Clackamette Cove	17,775	9.0
3/29/02	2000	Clackamette Cove	18,810	9.0
4/1/02	2000	Clackamas Hatchery	308,081	11.4
7/25/02	2001	Clackamas Hatchery	324,352	16.9
7/25/02	2001	Clackamas Hatchery	321,096	16.4
3/12/03	2001	Cassidy Pond	50,244	10.5
3/18/03	2001	Clackamas Hatchery	81,564	9.7
3/18/03	2001	Clackamette Cove	7,200	9.0
3/18/03	2001	Clackamette Cove	20,700	9.0
3/18/03	2001	Clackamette Cove	20,970	9.0
3/18/03	2001	Clackamette Cove	21,150	9.0
3/19/03	2001	Clackamette Cove	13,140	9.0
3/19/03	2001	Clackamette Cove	21,780	9.0
3/19/03	2001	Clackamette Cove	20,250	9.0
3/19/03	2001	Clackamette Cove	18,900	9.0
3/21/03	2001	Clackamas Hatchery	309,636	10.1
7/16/03	2002	Clackamas Hatchery	143,128	16.9
7/16/03	2002	Clackamas Hatchery	143,870	17.0

NOTE: Data from 2003 are not complete. Also, McKenzie River spring chinook stock were released into the Clackamas from 1997-2000 as part of experimental releases, and these are not included in this table.

Tables Table 10.3.2 and 10.3.3 report releases of spring chinook unfed fry in the Clackamas and lower Willamette Basins from 1990 through 1999 (1989 - 1998 brood years). Note that non-mainstem releases were allowed during this time, but are not any longer.

Table 10.3.2) Actual releases of hatchery spring chinook unfed fry in the Clackamas Basin from 1990 through 1999.

Brood Year	Clear Creek	Little Clear Creek	Deep Creek	Clackamas River	Total
1989	5,000	5,923		23,000	33,923
1990	24,393	9,558	444		34,395
1991				39,682	39,682
1992		5,564		11,897	17,461
1993		7,444		5,400	12,844
1994				9,200	9,200
1995		9,848		491	10,339
1996	488	9,627		2,974	13,089
1997				4,728	4,728
1998	3,500			15,824	19,324

Table 10.3.3) Actual releases of hatchery spring chinook unfed fry in the Willamette Basin from 1990 through 1999.

Brood Year	Newell Creek (Abernathy Cr)	Abernathy Cr. (Willamette R)	Crystal Springs Cr. (Johnson Cr)	Johnson Cr. (Willamette R)	Mt. Scott Cr. (Kellogg Cr.)	Kellogg Cr. (Willamette R)	Willamette R.
1989							
1990			51				
1991							
1992	829		462				
1993							
1994		481					913
1995	497	500				858	495
1996	420	1,396	469	1,464		1,921	
1997	477	901		484	121	1,717	459
1998		1,994				2,800	2,972

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

Exact release dates vary based on fish status (primarily weight), river flow conditions, onset of water quality problems (pre-smolt summer release), transfer scheduling, and logistical constraints for rearing other stocks. However, releases occur in the months indicated in the Table 10.1. Refer to Table 10.3.1 for actual dates of release.

Hatchery smolts and pre-smolts are normally forcibly released (crowded out) into the Clackamas River from Clackamas Hatchery via Dog Creek (the hatchery outlet). Smolt releases from the Cassidy Pond acclimation facility are volitional. Releases from the Clackamette Cove net pens are forced after acclimation. Releases from STEP classroom incubators and Willamette hatchery are directly into the river after transport.

10.5) Fish transportation procedures, if applicable.

IHOT guidelines for transportation are followed. All smolts are transported in 1000, 2000, or 3000 gallon liberation trucks complete with insulation, aeration, and additional oxygen.

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

A three week acclimation is currently conducted at Cassidy Pond (50,000 fish from Clackamas Hatchery) and at Clackamette Cove net pens (80,000 fish from Willamette Hatchery). Additional acclimation sites are under review. Fish are held for 3 weeks and then released in March. Hatchery smolts are volitionally released into the Clackamas River from Cassidy Pond.

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

All spring chinook smolts are fin marked to differentiate between natural and hatchery fish. Clackamas River spring chinook are fin marked with an adipose fin clip (AD). A group of 50,000 "double index" fish are released with CWTs but no fin clip. Groups of 50,000 fish from both the spring (smolts) and fall (pre-smolts) releases are also marked with CWTs, in addition to the adipose clip. Additional fin clips may be used periodically for specific monitoring and evaluation projects. All fish released have been adipose clipped (except for the double index fish) since the 1999 release year (1997 brood).

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

Although the Department does not plan to rear smolts excess to production goals, if surplus exist, the Department will consult with the NOAA Fisheries to determine the most appropriate release strategies.

Broodstock collection and egg-take protocols will be reviewed each year to evaluate consistency with proposed smolt release numbers.

10.9) Fish health certification procedures applied pre-release.

ODFW Fish Pathology staff perform fish health inspections prior to smolt release. Results are reported on the ODFW fish health forms. All groups of fish are sampled to examine for the presence of “reportable pathogens” as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release. Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines. Fish are also inspected prior to each transfer from one facility to the next.

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

Contingency plans are in place to deal with chemical spills or water system failures. In the event of a complete water system failure, fish programmed for release in the same basin as the hatchery would be released into the river after Regional or Manager approval. Any fish not programmed for release into the hatchery's basin would be transported to another facility if feasible or allowed to die in the ponds. In the event of a partial water system failure or a chemical spill upstream, fish would be saved according to the following priorities:

1. Broodstock
2. Eggs and fry
3. Fingerlings
4. Smolts

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.

- Most fish are acclimated for a three-week period to promote adult homing to the lower Clackamas River and to Clackamas Hatchery.

- Smolts are released at Clackamas Hatchery and the lower Clackamas Basin in the spring to promote swift outmigration, which reduces the retention time during emigration and minimizes potential ecological interactions that may occur between native wild and hatchery reared fish.

- Smolts are released at sizes larger than natural fish, but at the same life history stage. This is to decrease the amount of time the hatchery fish spend in the river. Willamette Basin survival studies have shown smaller fish tend to spend more time in the river before passing Willamette Falls on their way to the ocean, increasing the potential for interactions with wild fish.

- The fall release of pre-smolts ensures that one age class of fish will not be lost due to an unexpected catastrophic failure or natural event.

- All smolts are released downstream of the wild fish sanctuary area (above North Fork Dam) and not allowed to enter this area upon return as adults.

- Mark quality checks are performed (to identify the percentage of unmarked smolts released) prior to smolt acclimation and release.

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.

ODFW Hatchery staff will collect and record data concerning all aspects of the fish propagation program, including water quality, hatchery returns, spawners, eggs, rearing, and release. Data pertaining to fish numbers will be entered into ODFW's HMIS database. Water quality information will be reported to DEQ and kept on hand. Information about hatchery practices will also be collected and kept on hand. ODFW hatchery staff and Pathology Section staff will test, treat if needed, and record information related to fish disease. Indicators which will be covered under these on-going and standard ODFW practices are:

- *Indicator (1)(a):* Production goals are met.
- *Indicator (4)(a)*: Verify that mark rate at release is 95% to 100% for all release groups.
- *Indicator (5)(a):* Run timing of hatchery spring chinook returning to Clackamas Hatchery.
- *Indicator (5)(b):* Run timing of hatchery spring chinook used in broodstock.
- *Indicator (5)(d):* Origin of fish used in broodstock as indicated by fin clips or coded-wire tags.
- *Indicator (6)(a)*: Run timing, body size (length and weight), sex composition, fecundity (egg number and egg size), adult:jack ratio, and age distribution.
- *Indicator (7)(a)*: Wild fish will not be used for broodstock.

- *Indicator (7)(b)*: All fish without fin clips or coded-wire tags (CWTs) returning to Clackamas Hatchery will be returned to the river with minimum physical stress.
- *Indicator (8)(b)*: Hatchery spring chinook juveniles will be released as smolt sized fish to encourage rapid migration and minimize residualism.
- *Indicator (11)(a)*: Number of broodstock sampled and pathogens observed are within specified guidelines.
- *Indicator (11)(b)*: Rearing survival rates (egg-to-fry and fry-to-smolt) are within guidelines.
- *Indicator (11)(c)*: Number of juveniles sampled and pathogens observed during rearing and immediately prior to release are within guidelines.
- *Indicator (12)(a)*: Water sample collection and reporting records.
- *Indicator (14)(a)*: Number of annual injuries and mortalities of wild spring chinook captured in adult collection traps will be tracked.
- *Indicator (14)(b)*: Number of wild spring chinook captured, dates, and frequency of adult collection trap operations will be tracked.

ODFW North Willamette Fish District and ODFW Fish Division staff will ensure that the program details and direction are consistent with pertinent policies and native fish objectives. Indicators which will be covered under these on-going and standard ODFW efforts are:

- *Indicator (2)(a)*: Reviews identify that hatchery program management decisions and practices are implemented consistent with the policies and plans.
- *Indicator (4)(b)*: Sport fisheries in the Lower Columbia, Willamette, and Clackamas Rivers require all unmarked fish to be released unharmed (as per the Upper Willamette Chinook FMEP).
- *Indicator (8)(a)*: Hatchery spring chinook release locations will be in the lower Clackamas River (below river mile 30; including tributaries).
- *Indicator (8)(c)*: Hatchery spring chinook juveniles will be released at times and locations to reduce impacts to local habitat carrying capacity.
- *Indicator 9(a)*: The proportion of hatchery spring chinook observed on spawning areas above North Fork Dam.
- *Indicator (13)(a)*: Inspections of screens for compliance with ODFW and NOAA fish screen criteria.

ODFW North Willamette Fish District and/or ODFW Columbia River Management Program staff will conduct harvest management studies (i.e., creel studies) and complete carcass placement (stream nutrient enrichment) projects. Specific creel studies currently exist for the Lower Willamette and Clackamas Rivers (overseen by the North Willamette Fish District), as well as for Columbia River sport and commercial fisheries (overseen by the Columbia River Management Program). The Columbia River Management Program also analyzes CWT returns. The North Willamette Fish District also coordinates and reports on carcass placement projects in the Clackamas Basin. Indicators which will be covered under these on-going and standard ODFW efforts are:

- *Indicator (3)(a)*: Number of adult hatchery spring chinook produced, and the number of adult hatchery spring chinook harvested in the Clackamas River sport fishery, Lower Willamette River sport fishery, Lower Columbia River sport fishery, and Lower Columbia gillnet fishery.

- *Indicator (3)(b)*: Number of wild spring chinook handled and released during selective fisheries, estimated mortality rates, and estimated impact to the wild spring chinook population.
- *Indicator (4)(b)*: Sport fisheries in the Lower Columbia, Willamette, and Clackamas Rivers require all unmarked fish to be released unharmed (as per the Upper Willamette Chinook FMEP).
- *Indicator 10(a)*: Number, timing, and spatial distribution of hatchery carcasses placed for nutrient enrichment will mimic that of historic wild fish.
- *Indicator 10(b)*: Hatchery carcasses placed for nutrient enrichment will comply with ODFW disease guidelines.
- *Indicator 10(c)*: All permits required by DEQ will be obtained, and activities will comply with all permit conditions.
- *Indicator (15)(a)*: Punch card information, creel surveys, and commercial catch data will be evaluated to determine fishery benefits of the hatchery program.

PGE maintains the fish ladder and adult collection facilities on the North Fork Dam. This structure allows the upper Clackamas River basin to be managed with an emphasis on wild fish production. ODFW and PGE coordinate on ladder and collection facility operation. Indicators which will be covered under these on-going and standard ODFW and PGE efforts are:

- *Indicator 5(c)*: Run timing of wild spring chinook returning to North Fork Dam.
- *Indicator (7)(c)*: All fish without fin clips or coded-wire tags returning to North Fork Dam will be passed above the adult trap with minimum physical stresses.
- *Indicator 9(a)*: The proportion of hatchery spring chinook observed on spawning areas above North Fork Dam.
- *Indicator (14)(a)*: Number of annual injuries and mortalities of wild spring chinook captured in adult collection traps will be tracked.
- *Indicator (14)(b)*: Number of wild spring chinook captured, dates, and frequency of adult collection trap operations will be tracked.

Finally, other on-going monitoring of fish populations occurs through ODFW's Corvallis Research Lab (Environmental Monitoring and Assessment Program [E-MAP], spawning surveys, habitat surveys, focused research such as Firman et.al. 2002 and Lindsay et.al. 2002), PGE (smolt emigration at North Fork Dam, focused research), the USFS (juvenile surveys, smolt trapping), and other entities. These monitoring efforts do not address any specific indicator, but information collected by these activities will be used by ODFW to evaluate and guide the overall hatchery program.

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

Currently, funding and logistics are in place for all of the indicators. This funding is in the form of base budgets, project-specific grants, agreements with other entities, or direct work conducted by other entities. All of this funding, through the various sources, is subject to change or not be renewed. Continuation of the hatchery program and monitoring depends on the continued commitment and support of co-managers, funding entities, and state budget decision-makers.

Additionally, the Department has identified monitoring and evaluation projects that would be conducted if funding and staff were available. Projects are listed in priority order. Also see Sections 1.16.2 and 1.16.3.

- Assess incidental impacts to wild spring chinook during lower Clackamas River sport fishery.

- Enumerate adult escapement of wild spring chinook in habitats overlapping sport fishery areas.

- Compare genetic composition of naturally-produced adults to hatchery adults over time.

- Compare age composition of broodstock collected and natural spawners.

- Quantify stray rates to out-of-basin areas.

- Evaluate annual release numbers from all programs in the basin and sub-basin, including size and life-stage at release, and length or acclimation by program and relate to carrying capacity (i.e., smolt production potential) and spring chinook production areas within the Clackamas River drainage.

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.

There are no additional risk aversion measures, beyond those identified earlier in this document, applied specifically because of monitoring activities.

SECTION 12. RESEARCH

No research is being conducted in direct association with the Clackamas River spring chinook hatchery stock.

12.1) Objective or purpose. N/A

12.2) Cooperating and funding agencies. N/A

12.3) Principle investigator or project supervisor and staff. N/A

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

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

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

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

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

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). N/A

12.10) Alternative methods to achieve project objectives. N/A

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

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. N/A

SECTION 13. ATTACHMENTS AND CITATIONS

Attachment 1 - Citations

Attachment 2 - Legal considerations binding the Clackamas River Subbasin Plan

Attachment 3 - Five year disease history (1996-2000) by fish stock at Clackamas Hatchery

Attachment 4 - Estimated listed salmonid take levels by hatchery activity

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 of Applicant: Jeff Boechler
Title: Watershed District Manager

Signature: _____ Date:_____

Certified by_____ Date:_____

Attachment 1 - Citations

Chilcote, M.W. 2003. Relationship between natural productivity and the frequency of wild fish in mixed spawning populations of wild and hatchery steelhead (*Oncorhynchus mykiss*). Can. J. Fish. Aquat. Sci. 60: 1057-1067.

Cramer, S.P., C.F. Willis, D. Cramer, M. Smith, T. Downey and R. Montagne. 1996. Status of Willamette River spring Chinook salmon in regards to the federal Endangered Species Act, Part 2. Report of S.P. Cramer and Associates submitted to National Marine Fisheries Service on behalf of Portland General Electric Company and Eugene Water and Electric Board.

Federal Register Notice. 1999. Endangered and Threatened Species; Threatened status for three chinook salmon Evolutionarily Significant Units (ESUs) in Washington and Oregon, and Endangered status for one chinook salmon ESU in Washington. Vol. 64, No 56, pp 14308-14328.

Firman, J.C., R.K. Schroeder, K.R. Kenaston and R.B. Lindsay. 2002. Work Completed for Compliance with the Biological Opinion for Hatchery Programs in the Willamette Basin, USACE funding: 2002. Task Order: NWP-OP-FH-02-01. ODFW, Corvallis, OR.

IHOT (Integrated Hatchery Operations Team). 1996. Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin. Volume II-Oregon. Annual Report 1995. Portland, OR. Project Number 92-043, Contract Number DE-BJ79-91BP60629.

IHOT (Integrated Hatchery Operations Team). 1997. Hatchery evaluation report. Willamette Hatchery – Spring Chinook (Willamette stock). An independent audit based on Integrated Hatchery Operation Team (IHOT) performance measures. Portland, OR. Project Number 95-2, Contract Number 95AC49468.

Lewis, M., C. Mallette, W.M. Murrary, J. Thoming, and S. Brzycki. 1999. Annual coded wire tag program, Oregon missing production groups. 1998 Annual Report. Oregon Department of Fish and Wildlife, Project number 89-069, Contract Number DE-BI79-89BP01610, Portland, OR.

Lewis, M.A., C. Mallette, W.M. Murrary, and J. Thoming. 2003. Annual stock assessment – coded wire tag program (ODFW). 2002 Annual Report. Project Number: 82-013-02. Portland, OR.

Lindsay, R.B., Schroeder, R.K., Kenaston, K.R. 1998. Spring Chinook in the Willamette and Sandy Rivers. Annual Progress Report. Oregon Department of Fish and Wildlife. Project Number F-163-R-03. Portland, Oregon.

Linsday, R.B., R.K. Schroeder, K.R. Kenaston, R. Toman, and M.A. Buckman. In press. Hooking Mortality by Anatomical Location and its Use in Estimating Mortality of Spring Chinook Salmon Caught and Released in a River Sport Fishery. North American Journal of Fisheries Management.

NMFS (National Marine Fisheries Service). 1999. Biological Opinion on artificial propagation in the Columbia River Basin: incidental take of listed salmon and steelhead from Federal and Non-Federal hatchery programs that collect, rear and release unlisted fish species. Portland, OR.

NMFS (National Marine Fisheries Service). 2000. Biological Opinion on the impacts from the collection, rearing, and release of listed and non-listed salmonids associated with artificial

propagation programs in the Upper Willamette spring Chinook and winter steelhead evolutionarily significant units. Portland, OR.

ODFW (Oregon Department of Fish and Wildlife). 1992. Clackamas River Subbasin Fish Management Plan. Portland, OR.

ODFW (Oregon Department of Fish and Wildlife). 1998. Spring Chinook Chapters, Willamette Basin Fish Management Plan. Oregon Department of Fish and Wildlife, Portland, OR.

ODFW (Oregon Department of Fish and Wildlife). 2001. Fisheries Management and Evaluation Plan - Upper Willamette Spring Chinook in Freshwater Fisheries of the Willamette Basin and the Lower Columbia Mainstem. Oregon Department of Fish and Wildlife, Salem, Oregon.

ODFW (Oregon Department of Fish and Wildlife). 1999. Coastal salmonid and Willamette trout hatchery program review, Appendix C, cost-benefit analysis. Portland, Oregon.

Oregon Administrative Rules (OAR 635-007-0542 through -0548). 2003. Fish Hatchery Management Policy. Oregon Department of Fish and Wildlife, Salem, OR.

Oregon Administrative Rules (OAR 635-007-0960 through -1000). 2003. Fish Health Management Policy. Oregon Department of Fish and Wildlife, Salem, OR.

Oregon Administrative Rules (OAR 635-007-0502 through -0509). 2002. Native Fish Conservation Policy. Oregon Department of Fish and Wildlife, Salem, OR.

Schroeder, R.K., K.R. Kenaston, and R.B. Lindsay. 2002. Spring Chinook Salmon in the Willamette and Sandy Rivers. Annual Progress Report. Oregon Department of Fish and Wildlife. Project Number F-163-R-07. Portland, OR.

Attachment 2 - Legal considerations binding the Clackamas River Subbasin Plan

Federal Laws

Conservation Programs on Public Land Act of 1960: Federal and state agencies cooperatively plan, develop, and maintain programs designed to conserve, rehabilitate, and protect fish, wildlife, and threatened and endangered species.

Endangered Species Act of 1973 – P. L. 93-205, reauthorized 1988: Provides protection for habitat of endangered and threatened species and provides for status review of candidates for listing. Currently, the bull trout (*Salvelinus confluentus*) is listed as a candidate (Category 2) species. More information is needed on its distribution before it can be classified as either rare or endangered. Based on recent research conducted by Oregon State University, the Oregon chub (*Oregonichthys crameri*) may be nominated for consideration for threatened or endangered species status.

Federal Aid in Wildlife Restoration Act of 1937: Provides funding for wildlife programs such as land acquisition, habitat improvement, research and education.

Federal Aid in Sport Fish Restoration Act of 1950, expanded in 1984 (Wallop-Breaux Act) and amended in 1988: Provides funding for sport fish restoration and fish programs such as land acquisition, habitat improvement, research and education.

Federal Land Policy and Management Act of 1976 – P. L. 94-579: Allows Congress to withdraw or designate federal lands for specified purposes.

Federal Water Pollution Control Act, amended by the Clean Water Act of 1977: Establishes as an objective the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. Sections of the act provide authorization for regulations regarding the discharge of pollutants (Section 402) and the disposal of dredged or fill material (Section 404).

Fish and Wildlife Coordination Act of 1934: States that fish and wildlife conservation shall receive equal consideration with water resources development programs.

Flood Control Act of 1936: Legislative mandate authorizing the Corps to study, plan, and construct major flood control works.

Floodplain Management, 1977 – Executive Order 11988: Designed to avoid adverse impacts associated with destruction or modification of floodplains and to mitigate impacts when avoidance cannot be achieved.

Flood Security Act of 1985: Designed to reduce erosion and sedimentation in watersheds.

Forest and Rangeland Renewable Resources Planning Act of 1974: Directs management planning process for units of the National Forest System.

Land and Water Conservation Fund Act of 1965 – P. L. 88-578: Provides federal assistance to states for planning, acquisition and development of land and water recreation resources.

Magnuson Fishery Conservation and Management Act: Establishes forum for recommendations to the Pacific Fishery Management Council for establishing harvest rates and for conservation, restoration, and enhancement of habitat of anadromous salmonids.

Mitchell Act of 1938, amended in 1946: Authorized the establishment of hatcheries and fishways for anadromous fish in the Columbia River watershed of Idaho, Washington, and Oregon and annually provides operation and maintenance funding.

Multiple Use – Sustained Yield Act: Authorizes and directs the administration and development of the renewable surface resources of the national forests.

National Environmental Policy Act of 1969: Requires that any federal agency proposing an action that significantly affects the human environment must prepare an environmental impact statement.

National Forest Management Act of 1976: Provides for multiple use and sustained yield of the products and services of National Forest System land; includes legislation for protection of riparian vegetation.

Northwest Power Act of 1980: Creates an interstate policy making and planning body for electrical power and fish and wildlife in the Columbia River Basin.

Oregon & California Railroad Act: Principle legal mandate for BLM and USFS management of O&C lands.

Rivers and Harbors Act of 1899: Authorizes the U.S. Army Corps of Engineers to issue permits form any types of activities in navigable waters of the Untied States.

Sikes Act: Provides for state and federal cooperative management of fisheries resources.

United States – Canada Reciprocal Fisheries Agreement: Governs the harvest of fish stocks of mutual concern.

Water Bank Act of 1970 – P. L. 91-559: Authorizes the Secretary of Agriculture, after coordination with the Secretary of the Interior, to enter into 10-year contracts with landowners to preserve wetlands and retire adjoining agricultural lands. Annual payments to landowners and sharing in the costs of conservation measures are included.

Water Pollution Control Act of 1972 – P. L. 92-500: Precursor to the Clean Water act. Authorized issuance of permit to discharge fill or dredged material into navigable waters at specified disposal sites.

Water Resources planning Act of 1965 – P. L. 89-80: Established the Water Resources council, which issues the "Principles and Standards and Procedures for Federal Participation in Water and Related Land Resources Planning and Development". The act also authorized establishment of State-Federal River Basin Commissions.

Water Use Act of 1940: Provides domestic, mining, milling and irrigation uses of waters within national forests.

Watershed Protection and Flood Prevention Act of 1954: Assures cooperation of the federal government with state and local agencies in preventing damage from floodwater, erosion and sediments.

Wild and Scenic Rivers Act of 1968, revised 1988: Designates selected rivers for protection under the National Wild and Scenic Rivers System, which preserves scenic, recreational and fish and wildlife characteristics.

Wilderness Act of 1964: Preserves selected units of land for their wilderness characteristics.

State Laws

The Oregon Forest Practices Act (Forest Practices Act) (ORS 527.610 to 527.730) was adopted in 1972. Commercial timber operations on state and private land are regulated by the act, which is administered by the Oregon Department of Forestry. The Forest Practices Act contains provisions for protection of aquatic habitat. Forest management activities on U.S. Forest Service and BLM land are designed to comply with Forest Practices Act rules and state water quality standards. The Forest Practices Act does not apply within the urban growth boundary of towns and cities. Cities and towns may or may not have regulations for stream protection.

The Oregon Fill-and-Removal Law (ORS 541.605-541.990) requires a permit for the removal or filling of 50 cubic yards or more of material in rural waterways. The Division of State Lands oversees the program, reviews applications and issues permits, and enforces the law. ODFW has the opportunity to comment on permit requests.

Attachment 3 - Five year disease history (1996-2000) of spring chinook at Clackamas Hatchery

Disease/Organism	Species/Stock (ChS 19)
IHNV	no
CAD	no
Fl. Psychrophilum	no
Fl. Columnare	yes
Aeromonas salmonicida	yes
Aeromonas/Pseudomonas	yes
Yersinia ruckeri	no
R. salmoninarum	yes
Internal mycosis	no
External mycosis	yes
Ichthyobodo	no
Gyrodactylus	no
Ichthyophthirius	yes
Gill Amoeba	no
Trichodinids	yes
Proliferative Kidney Disease	yes

"Yes" indicates detection of the pathogen, but in many cases no disease or fish loss was associated with presence of the pathogen.
"No" indicates the pathogen has not been detected in that stock.

Treatments for disease at Clackamas Hatchery include: green eggs are routinely water hardened in diluted buffered iodophor; flush treatments of 1:600 formalin for 15 minutes given three to five times per week for fungi prevention on eggs; treating juvenile fish for external parasites using formalin 1:6,000 to 1:40,000 depending on species treated and water temperature. *Ichthyophthirius* may be treated with a prolonged formalin drip, 1:25,000 for 8 hours). On rare occasions it is necessary to treat a group of fish for bacterial pathogens and medicated food containing oxytetracycline or Romet is used. The spring chinook adults are given antibiotic injections of erythromycin and oxytetracycline under a veterinary prescription to prevent bacterial infections such as furunculosis and bacterial kidney disease. They are also treated with formalin flush treatments at 1:4,000-1:8,000 for one hour three to five times per week as needed for external fungi infections.

ODFW's 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). Some specifics include:

- All fish health monitoring will be conducted by a qualified fish health specialist.
- 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.

Attachment 4 - Estimated listed salmonid take levels by hatchery activity

Listed species affected: Spring Chinook Salmon ESU/Population: Upper Willamette Activity: Hatchery Trap				
Location of hatchery activity: Clackamas River mile 22.6 Dates of activity: May - October Hatchery program operator: ODFW				
	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)			350	
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			1	
Other Take (specify) h)				

Listed species affected: Spring Chinook Salmon ESU/Population: Upper Willamette Activity: North Fork Dam Trap				
Location of hatchery activity: Clackamas River mile 30 Dates of activity: May - October Hatchery program operator: PGE				
	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)			3,000	
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)			3	
Other Take (specify) h)				

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

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