2004 DRAFT

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Umatilla River Summer Steelhead
Species or Hatchery Stock:	Umatilla River Summer Steelhead stock 091
Agency/Operator:	Oregon Dept. of Fish & Wildlife/CTUIR
Watershed and Region:	Umatilla/Columbia/Oregon
Date Submitted:	2004
Date Last Updated:	May 13, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program. Umatilla River Summer Steelhead Program

1.2) Species and population (or stock) under propagation, and ESA status.
Endemic Umatilla River Summer Steelhead (Oncorhynchus mykiss) (stock 091). Listed as "Threatened" under the federal ESA.

1.3) Responsible organization and individuals

Name (and title): Scott Patterson – Hatchery Coordinator
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 107 Twentieth Street, La Grande, OR 97850
Telephone: 541-963-2138
Fax: 541-963-6670
Email: Scott.D.Patterson@state.or.us

Name (and title): Gary James – Fisheries Program Manager
Agency or Tribe: Confederated Tribes of the Umatilla Indian Reservation
Address: P.O. Box 638, Pendleton, OR 97801
Telephone: 541-276-4109
Fax: 541-276-4348
Email: garyjames@ctuir.com

Name (and title): Tim Bailey – District Fish Biologist
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 73471 Mytinger Lane, Pendleton, OR 97801
Telephone: 541-276-2344
Fax: 541-276-4414
Email: umatfish@oregontrail.net

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

Confederated Tribes of the Umatilla Indian Reservation – Co-managers – Operators of acclimation and adult collection facilities.

Bonneville Power Administration – Funding for– Hatchery, acclimation, adult collection and monitoring and evaluation.

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

Umatilla Hatchery is 100% funded by the Bonneville Power Administration. Oregon Department of Fish & Wildlife operates the facility, and staff consists of one F&W Manager 1, one F&W Technician 2, four F&W Technician 1's, one Trades/Maintenance Worker 2, one

half-time F&W Technician 1, and one Trades/Maintenance Worker 1. Fiscal Year 2004 Umatilla Hatchery operations budget is $817,305

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

Adult Collection-- Summer steelhead broodstock are collected at the Three Mile Falls Dam adult trapping facility located approximately 4 miles upstream from the mouth of the Umatilla River, near the town of Umatilla, in Umatilla County, Oregon. The regional mark processing center site code for Three Mile Falls Dam is 5F33427 H27 24.

Holding and Spawning-- Summer steelhead broodstock are transferred to Minthorn Springs (Minthorn) for holding and spawning. Minthorn is located approximately 4 miles east of Mission in Umatilla County, Oregon. The facility is located on Minthorn Springs Creek. The creek is approximately one mile long with the facility located near the mouth at approximately Umatilla RM 64. The regional mark processing center site code for this facility is 5F33414 H14 22.

Incubation and rearing (from green egg to smolt-- Green eggs are transferred to Umatilla Hatchery for incubation and rearing. Umatilla Hatchery is located along the Columbia River approximately two miles west of Irrigon in Morrow County, Oregon. The regional mark processing center site code for Umatilla Hatchery is 5F33449 H49 21.

Acclimation to release--Juvenile summer steelhead are transferred to the Minthorn and Pendleton acclimation facilities for acclimation and release. Minthorn is discussed under "Holding and Spawning". The Pendleton facility is located on the Umatilla River at RM 56 in Umatilla County, Oregon.

1.6) Type of program.

Integrated Harvest Program-- The Umatilla River Summer Steelhead Program integrates supplementation and harvest augmentation. Endemic broodstock is used for the hatchery program.

1.7) Purpose (Goal) of program.

The goals of the Umatilla River Summer Steelhead Program are threefold: 1) Enhance production through supplementation of naturally producing populations; 2) Provide sustainable tribal and non-tribal harvest opportunities (augmentation); and 3) Maintain the genetic character of the natural population (CTUIR and ODFW, 1989).

1.8) Justification for the program.

The Umatilla River hatchery summer steelhead program is intended to both augment and supplement the natural population. The hatchery program uses endemic broodstock, all hatchery releases are adipose fin clipped and juvenile releases are made in natural production areas and at the upper fishery boundary. The intent is to provide additional fish

for harvest and to increase production of the natural population, while maintaining the genetic character of the natural population.

1.9) List of program "Performance Standards"

The Performance Standards for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed.

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

The performance indicators are currently under revision in the Sub-Basin planning process and will be submitted when the process is completed.

1.10.1) "Performance Indicators" addressing benefits.

1.10.2) "Performance Indicators" addressing risks.

1.11) Expected size of program.

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

Annual broodstock collection includes 100 wild adults (50 pairs), and 20 hatchery adults (10 pairs).

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		0
Unfed Fry		0
Fry		0
Fingerling		0
Yearling	Minthorn (RM 62)	50,000
	Pendleton (RM56)	50,000
	Boston Canyon Creek (RM2)	50,000

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

- Estimated smolt-to-adult survival: Master Plan goal is 2.7%. The average smolt-to-adult survival from brood years1991-97 is 0.422%. (Table 1)

- Total adult production: Subbasin Summary goal is 4,000 naturally produced and 1,500 hatchery adult returns to Three Mile Dam. Since 1988, hatchery adult returns to Three Mile Dam have ranged from 166 to 1,860, and naturally produced adult returns have ranged from 725 to 3,659 (Table 2).

- Adult escapement to natural production areas: Since 1988, hatchery adult escapement to natural production areas have ranged from 102 to 1,301 and naturally produced adults have ranged from 623 to 2144 (Table 3).

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

The current summer steelhead program (100% rearing at Umatilla Hatchery) began in 1991 with smolt releases in 1992. However, hatchery steelhead smolts have been released into the Umatilla River Basin since 1967 (Table 4).

1.14) Expected duration of program.

This is an on-going program.

1.16) **Watersheds targeted by program.**

The Umatilla Summer Steelhead Program targets
hatchery releases in the mainstem of the Umatilla River and Meacham Creek..

1.16)1. **Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.**

No formal alternative actions have been developed by co-managers for this program, however possible alternatives include.

Because of water shortages at Umatilla Hatchery the original production plan has been revised to reflect available water. The original production goals have also been modified to reflect additional information gained on adult fish return success, habitat utilization and harvest. The steelhead production goal has been reduced from the adult return target of 9,670 to 5,500 (4,000 natural and 1,500 hatchery).

- Develop a water supply system at Umatilla Hatchery to provide 15,000 gpm of water needed to meet production goals. This would allow the hatchery to produce the original goal of 210,000 steelhead smolts.
- Develop additional acclimation sites lower in basin to provide terminal homing sites allowing for potential increased harvest of hatchery produced steelhead.
- Modify Umatilla Hatchery to convert Oregon ponds to Michigan ponds.
- Modify Bonifer pond to allow for better release of steelhead smolts after acclimation. Acclimation at the site has been discontinued due to the inability to effectively release all of

the fish from the pond. Fish are currently being direct stream released at the site.

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

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

4d rule research permit applications have been submitted to NMFS for the following:

- Outmigration and Survival Study

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.

Adult age class structure: See Table 5
Sex ratio: See Table 3
Size range:
Migrational timing: See Table 6
Spawning range:
Spawn timing: See Table 6
Juvenile life history strategy, including smolt emigration timing: See Table 6

- **Identify the ESA-listed population(s) that will be directly affected by the program.**
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- Umatilla River Summer Steelhead (stock 091) – included as part of the Mid-Columbia ESU - listed as "Threatened" under the federal ESA.

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

- Umatilla River bull trout are included as part of the Columbia distinct population segment listed as Threatened under the federal ESA.

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.**

Chilcote (Unpublished draft) identifies the wild Umatilla summer steelhead critical population threshold at 110, and the viable population threshold at 333. Since 1988, wild adults available

for spawning have exceeded 600 (Table 2&3).

The U.S Fish and Wildlife Service bull trout recovery plan for the Umatilla/Walla Walla Recovery Unit (2002) list recovery criteria for the Umatilla River. Recovery criteria for the Umatilla River core area are to maintain 500 to 1,000 spawning adults annually for at least two generations(i.e.,10 to 14 years) The redd count average for the last four years(1999-2002)in the North Fork Umatilla River equates to a population estimate of 281 spawning adults.

- **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.**

The progeny to parent ratio for natural spawning hatchery and natural steelhead compared to Umatilla hatchery steelhead from 1990 through 1999 is presented in Table 1. The progeny to parent ratio of natural spawning hatchery and natural steelhead has been below replacement in eight of the last ten years. In contrast, hatchery progeny to parent ratio was above one for all of the last ten years.

Adult returns to Three Mile Dam and smolt outmigrant estimates of naturally produced steelhead are the primary measurement of productivity used (Table 2). Other measures of productivity (monitoring and enumeration of redd counts, and juvenile abundance est imates) have been examined without acceptable results.

- 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.

The number and percent of adult steelhead available to spawn of wild and hatchery origin since 1988 is presented in Table 3. Total natural adult return numbers to Three Falls Mile Dam have ranged from 725 in 1990-91 to 3,659 in 2001-02 (Table 2).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

The percent of adults available to spawn that were of hatchery origin has ranged from 6.9% of the total run in 1988, to a high of 58.9% in 1997 with a mean of 27.2% (1988-1998; Table 7).

2.2.3) <u>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</u>

- **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**.

- The Umatilla Summer Steelhead program currently collects 100 unmarked steelhead to provide the egg needs for the hatchery program .

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

Tables 13 and 14 provide the numbers of Umatilla summer steelhead collected and spawned for broodstock needs for the program.

- 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).
- 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.

- Outmigration and Survival Study - As per the 4d rule research application, we will reduce numbers collected by adjusting the sample times and avoid sampling when large numbers of natural steelhead are passing through the sampling facility. To reduce the number of mortalities from fish jumping out of the sample tank or from other areas, we will apply covers and screens to prevent escape and monitor the facility closely. Monitoring information is mostly obtained through remote interrogation of tags, without any handling.

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.

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

1) CTUIR. 1994. Wildlife Mitigation Plan (Draft) May 1996, Columbia Basin Salmon Policy. 1995 pg 9-10, and Water Assessment Report;
2) NMFS - Salmon & Steelhead Enhancement Plan for the Washington and Columbia River Conservation areas.Vol 1. chpt 4, 37pgs;
3) Reeve, R. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Plan;
4)CTUIR/ODFW. 1990. Umatilla Hatchery Master Plan;
5) OWRD. 1988. Umatilla Basin Report;
6) BOR. 1988. Umatilla basin Project Planning Report,
7) Umatilla County - Comprehensive Plan. 1983, chpt 8;
8) USNF - Umatilla National Forest Land & Resource Management Plan. 1990, chpt 2, pg 13.

and Final EIS. 1990, chpt III, pgs 59-62;
9) CTUIR/ODFW. 1990. Umatilla River Subbasin Salmon and Steelhead Production Plan; 10) Boyce, R. 1986. A Comprehensive Plan for Rehabilitation of Anadromous Fish Stocks in the Umatilla River Basin; 11)USFWS & NMFS. 1982. Umatilla R. Planning Aid Report.
11) USBR and BPA. 1989. Umatilla Basin Project. Initial project workplan presented to the NWPPC, May 1989.

This HGMP is consistent with these plans and commitments.

3.3) Relationship to harvest objectives.

Steelhead harvest guidelines were developed by state and tribal comanagers as part of the Umatilla Hatchery Master Plan (CTUIR and ODFW, 1989). This plan identified hatchery broodstock, spawning escapement, and tag collection for evaluation as priorities, and specified numbers of fish allocated to these uses at varying run sizes. The plan was designed to allow harvest of fish returning in excess of these needs. However, this plan is no longer current as a result of several adaptations in program management. Broodstock and evaluation needs are only about half what was originally projected, and non-tribal sport fishing regulations have changed to exclude the harvest of natural steelhead. No formal harvest plan was drafted since then because the shift in fishing regulations was expected to adequately protect natural fish, and provide sport fisheries and additional spawners from hatchery fish. Reliable run prediction models have been developed for Umatilla River steelhead, and in the event of low projected returns, formal management processes are in place to modify collections and harvest prior to their entry into the Umatilla River.

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..

A fishery for wild and hatchery summer steelhead existed prior to the implementation of the Master Plan. Beginning in 1992, only hatchery (adipose clipped) summer steelhead can be harvested with a two fish per day limit. For the return years of 192-93 through 2000-01, the average number of hatchery summer steelhead harvested in the Umatilla River non-tribal fishery was 89 fish per year. For the same return years the number of natural summer steelhead caught and released ranged from 37 in 1993-94 to 733 in 2000-01 (Table 12)
Tribal members are allowed to harvest both natural and hatchery summer steelhead in the Umatilla River. The average number of natural summer steelhead harvested in the tribal fishery per return year from 1992-2001 is 3.8. The average number of hatchery summer steelhead harvested in the tribal fishery per year from 1992-2001 is 43.6.
Umatilla hatchery produced summer steelhead contributed to out -of -basin tribal and non-tribal fisheries. The average number of steelhead caught in the combined commercial and subsistence tribal fisheries was 43 fish from brood years 1991-1997 . The average harvest in the Columbia River sport fishery was 46 for brood years 1991-97.

Information available on the incidental catch and harvest of juvenile steelhead during Umatilla River steelhead, spring Chinook, and trout fisheries is given in Table 11. (See also Tables 8-10)

3.4) Relationship to habitat protection and recovery strategies.

The Umatilla Summer Steelhead Program is a part of an overall Umatilla Basin Salmon and Steelhead Restoration Program. In addition to on-going passage and hatchery operations, restoration efforts include ongoing projects that enhance stream and riparian habitat as well as monitor and evaluate the hatchery and natural components of the restoration program. Factors limiting the natural production of steelhead in the Umatilla River Basin include channelization, low or no summer flows, warm water temperatures, sediment, and poor habitat diversity caused by urban and rural development/land management practices. Ocean conditions and the mortalities and stress from the operation of hydropower projects on the mainstem Columbia River are important factors outside the basin. There continues to be degradation to fish habitat in these areas that hampers improvement efforts.

3.5) Ecological interactions.

- Interactions with species that could negatively impact program: a) bird predation during peak smolt migration periods each Spring; and b) Northern Pikeminnow and smallmouth bass - predation during smolt migration periods.

- Interactions with species that could be negatively impacted by program: Hatchery steelhead smolts that residualize and become resident fish have been documented in Boston Canyon Creek, lower Meacham Creek, and the middle and lower mainstem Umatilla River. These hatchery smolts are much larger than wild juvenile *O mykiss* of the same age, and compete with wild juvenile *O mykiss*, bull trout, Pacific lamprey, coho and Chinook salmon, Margined Sculpin, Mountain whitefish and other non-game fish for limited summer and winter rearing habitat.

- Interactions with species that could positively impact program: Carcasses from salmon and hatchery steelhead kelts or pre-spawn mortalities add to the Umatilla River subbasin's nutrient recharge cycle. Increased angler effort in the coho and fall Chinook salmon fisheries increases awareness of the Umatilla steelhead program which could potentially lead to increased harvest of hatchery steelhead.

- Interactions with species that could be positively impacted by program: Hatchery steelhead smolts could add to the food base for bull trout.

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.

Umatilla Hatchery--The water source for the Umatilla Hatchery comes from the Columbia River through a Ranney well system. The system was initially designed and constructed to

produce a maximum of 15,000 gpm of water. However, actual water capacity is 5,500 gpm, and several wells have been subject to failure (Jack Hurst, ODFW, Umatilla Hatchery) Water from the well system averages 12.2°C (54°F). Water quality exceeds BPA requirements (BPA 1987) for all hatchery uses. Water is withdrawn under certificate #72181, permit G 10870, and, certificate #72182, permit #G 11210. Water discharged is monitored under the general NPDES 0300 J permits.

Three Mile Falls Dam--The water source for the Three Mile Falls Dam adult facility is pumped directly from the Umatilla River. The Denil steep-pass utilizes 2,900 gpm and the holding pond uses 1,450 gpm. Both the steep-pass and holding pond pumps run continuously. The fish lock system uses 630 gpm, but is used only during handling operations (approximately two hours per day). The water source is the same as used by the natural population. Water temperatures at Three Mile Falls Dam range from approximately 0°C (32°F) in winter to over 21°C (70°F) during the summer. Sediment loads vary dramatically during the return season (late August through early June) and during the migration season (March – July). High sediment loads are experienced annually during high flow conditions.

Minthorn Juvenile Acclimation and Adult Holding Facility -- Minthorn receives its water from Minthorn Springs Creek, which is formed from the inflow of several springs located immediately south of the Umatilla River. Water through the brood holding area is supplied by gravity and ranges from approximately 500 to 2,100 gpm. The water supply to the raceways is pumped from the creek with a single-pass pass water-pumping rate of approximately 800 gpm per each of two raceways. During the summer steelhead adult holding period (mid-September to late May), average monthly water temperatures range from approximately 7 to 13°C (45 to 55°F). During the juvenile acclimation period (April), temperatures range from 6.5 to 14°C (44 to 57°F), with an average of 9°C (48^{o}F). High sediment loads are experienced in some years during high flow conditions.

Pendleton Acclimation Facility-- Water for the Pendleton juvenile acclimation and release facility is pumped directly from the Umatilla River. Water flow is approximately 1,600 gpm per pond. During the juvenile acclimation period (April), daily temperatures range from approximately 4.5 to 13.0^{o}C (40.0 to 55^{o}C). High sediment loads are experienced in some years during high flow conditions.

Natural Production-- Natural spawners use the water available in the streams of the Umatilla River Basin. Water quality is relatively high in the headwater streams where steelhead spawn and rear. The spawning streams contrast greatly to the lower Umatilla River and lower tributaries where sediment loads are high in the spring and summer water temperatures are often lethal to Salmonids (Contor et al. 1998). Water quality in this desert basin contrasts to the hatchery, as there are often large daily fluctuations in water temperature. During the winter and spring, rain-on-snow events interspersed with cold periods often produce large fluctuations in stream flow. During spawning and incubation, the streams are often high and turbid.

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.

Minthorn/Pendleton Acclimation--Acclimation facility intake screens conform to NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.

Umatilla Hatchery—Rearing water source is 100% well water and operating under NPDES general permit # 300 J. .

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods)

Three Mile Falls Dam--Broodstock collection is conducted solely at the Three Mile Falls Dam east bank adult trapping facility. The facility consists of a vertical slot fish ladder, Denil steeppass, adult holding pond (raceway), and fish handling and sorting complex. The construction and operation of the facility has no effect on the critical habitat for summer steelhead. The dimensions of the holding pond are 14' wide by 36' long by 3.5' deep (approximately 1,800 cubic feet). The holding pond has a jump screen located at the upper end and jumpout panels located at both upper corners to prevent adults from jumping out of the pond. The holding pond is located above the 100 year flood level. The water supply for the holding pond is pumped directly from the Umatilla River at a rate of 1,450 gpm. A low water discharge alarm is located on the pond supply line to signal any loss of flow to the holding pond. No backup pumps or emergency generator system are located at the site. In case of water loss to the pond, two options are available to on-site personnel. During power outages or other short term losses of flow, the outlet gate from the pond can be closed to maintain water depth. For pump failures or other long term losses of water supply, adults can be dipnetted out of the pond and returned to the river.

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

Adults collected are anesthetized with CO2, prior to handling. Broodstock are transported in a 370-gallon fish transport tank, which is mounted on a dual axle trailer and is pulled by a pick-up truck. The trailer is equipped with compressed oxygen aeration and a re-circulation system.

5.3) Broodstock holding and spawning facilities.

Minthorn Acclimation/Adult Holding--Since 1988, all summer steelhead spawning has occurred at Minthorn. The facility includes a concrete channel that functions as a fish ladder/trap, inlet/outlet water control structure, and summer steelhead broodstock holding area. The brood holding area is approximately 25 feet long by 8 feet wide. Water through the pond is supplied by gravity from Minthorn Springs Creek. Depth is controlled by dam boards and is usually held at 4 feet. The pond has vertical bar screens with 1 ½ inch

spacing at both the influent and effluent ends and is surrounded by a chain link fence topped with barbed wire. The fence provides security and prevents fish from jumping out or escaping due to flood events. Floating covers are placed over approximately one third of the pond to help alleviate disturbances to the fish and to help prevent fish from jumping. The top of the concrete walls and bottom of the chain link fence are overlapped with rubber matting so that if the fish do jump, injuries will be minimized. The fence has three gates for accessing the pond for unloading adults and spawning. Adjacent to the pond is a concrete slab used during the spawning operation. The entire facility is covered with a roof to provide protection for fish, eggs and personnel. In an extreme emergency, the fish can be released into Minthorn Springs Creek by pulling the effluent screen and dam boards and letting the fish swim out volitionally.

Beginning in early February and continuing through the end of the spawning season, the fish are treated five days per week with hydrogen peroxide to help control prespawning losses due to fungus. A one-hour flow through treatment at approximately 100 ppm active ingredient is used. ODFW pathology personnel are available to address disease concerns.

The location of the facility blocks approximately one mile of habitat that might be utilized for spawning and rearing. This habitat is limited; however, as flows are as low as 500 gpm and temperatures often exceed 20^{o} C (68^{o}F) during the period from June to September.

5.4) Incubation facilities.

***Umatilla Hatchery*--**Fertilized eggs are transported from Minthorn to Umatilla Hatchery in five-gallon buckets with chilled water. Umatilla hatchery incubation equipment consists of four separate units of Marisource incubators (Heath tray type). Water can be used directly from wells or mixed with chilled water. Three units can be supplied with well water at 12.2^{o}C (54^{o}F) or mixed with chilled water 7.2^{o}C (45^{o} F) for any combination of temperatures from 7.2-12.2^{o}C (45-54^{o} F) provided that 300 gpm of chilled water is not exceeded. The fourth unit can be mixed with water chilled to 3.3^{o}C (38^{o} F) to achieve any combination of temperatures from 3.3-12.2^{o}C (38–54^{o} F) provided that 60 gpm of chilled water is not exceeded. Numerous systems continually monitor temperature, mechanical systems, electrical systems, and flow. Alarms sound if any system fails or is out of criteria. Continual monitoring of systems and preventative maintenance is used to prevent system failure. An emergency gas powered pump installed in the aeration tower structure supplies water for incubation in the event of aeration lift pump failure. In the event of total system failure resulting in total loss of water, eggs may be transported to Irrigon hatchery (if they are still operational and have necessary space).

Pathogen free water is used for incubation at Umatilla Hatchery for all programs. This is a direct preventive measure at minimizing the risk of introducing pathogens into the hatchery program, thus minimizing the risks to fish in the natural environment after these fish are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor.

5.5) Rearing facilities.

***Umatilla Hatchery*--**Umatilla Hatchery has three different types of rearing units. There are eight 21' Canadian style early rearing tanks located in the main building adjacent to incubation. Water is pumped to the aeration tower and gravity fed to the tanks. Steelhead are started in these tanks in early July. The fish are moved outside to Oregon ponds when densities reach approximately 80 pounds in each tank. Umatilla Hatchery has 10 Oregon ponds. Rearing dimensions are 91'X18.75'X3.67'. These ponds are designed for serial reuse in-groups of 2 ponds, upper and lower. They also can be supplied with fresh water individually, if necessary. Steelhead are reared in these ponds until fish are equally divided, (un-graded) into three Michigan ponds in late October, at 50,000 each. Umatilla Hatchery has 24 Michigan style ponds, with rearing dimensions of 91'X9'X2.75'. Water is supplied to these ponds in reuse groups of three ponds each. Each pond has a submersible pump that supplies 950 gpm of water to oxygen contact columns, located at the head of each pond. Oxygen is introduced and unwanted saturated gas is removed from incoming water at this point. Each pond has its own oxygen supply line. Supplemental oxygen is either delivered from oxygen generators, (pressure swing absorption units) or from a bulk liquid tank on site. Steelhead are reared at enhanced densities to utilize well available water efficiently. Two groups (50K ea.) are transferred in the spring to acclimation ponds on the Umatilla River, at Pendleton and Minthorn. One group of 50,000 fish is direct stream released at Bonifer Springs, on Meacham Creek Rm-2, at the time of acclimation releases. All ponds have a high-low water level alarm, and for Michigan ponds, pump failure and oxygen flow alarms. In the event of total system failure, fish could be moved to nearby Irrigon Hatchery if pond space is available and all logistics were in place prior to the time of failure. Monitoring and maintenance of the water supply system, and forecasting for contingencies, are the best means for dealing with the possibility of rearing pond system failure.

Pathogen free water is used for rearing the fish at the Umatilla Hatchery for all production. This is a direct preventive measure at minimizing the risk of introducing pathogens into hatchery phase of this program, thus minimizing the risks to fish in the natural environment after these fish are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor. In addition, a fish health program is in place to monitor and evaluate the health status of summer steelhead juveniles reared at Umatilla Hatchery.

5.6) Acclimation/release facilities.

Minthorn acclimation/release Facilities -- The Minthorn acclimation/release facilities include two-10 hp pumps, standby generator, two raceways (each 120 x 12 x 4 feet), and outlet pipe for releasing fish. The pumps and generator are located in the upper level of an enclosed pump house well above the 100-year flood levels. Water is pumped from the creek to each of the raceways. The outlets of the ponds have both vertical bar screens with one-quarter inch spacing and woven wire screens with one quarter inch openings to keep fish from escaping. The ponds are covered with netting to prevent bird predation. In case of power failure, a standby generator provides emergency power to the pump(s). In addition, there is a backup pump and both ponds are equipped with high-level and low-level float alarms. In the event of a power or pump failure or pond level alarm, an audio message is sent to a security company who then notifies specified individuals of an alarm

condition at the facility. Fish are released from the facility by pulling the dam boards, lowering the pond and crowding out the fish. The fish then exit the pond through an underground pipe to Minthorn Springs Creek. In an extreme emergency, the fish can be released in this way. The ponds are thoroughly cleaned and disinfected prior to fish being placed into them, and ODFW pathology personnel are available to address disease concerns.

The location of the Minthorn facility blocks approximately one mile of habitat that might be utilized for spawning and rearing. This habitat is limited; however, as flows are as low as 500 gpm and temperatures often exceed 20^{o} C (68^{o}F) during the period June to September.

The Pendleton Acclimation Facility -- Facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water head box/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each; one of which is used for acclimating summer steelhead), settling pond for pond cleaning, and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where is pumped into the head distribution box. Water is then supplied by gravity from the head distribution box to the individual ponds. Water flow is approximately 1,600 gpm per pond. The operation of the facility has no effect on the critical habitat for summer steelhead.

Direct Stream releases--One third of production (50K**)**, are direct stream released. @ Bonifer Rm-2 Meacham Creek.

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

Umatilla Hatchery-- There have been no operational difficulties or disasters at Umatilla that have led to significant fish mortality.

Minthorn Acclimation Facility-- Theft has been a problem in some years, but added security facilities (mostly screening) have been added and this problem seems to have been eliminated. The last two years we have experienced high mortality presumably due to the use of hydrogen peroxide instead of formalin resulting in more fungus. We have stepped up our treatment regime to hopefully alleviate this problem. We have gone from three treatments per week to five. So far, it seems to be helping.

Pendleton Acclimation Facility-- There have been no operational difficulties or disasters at that have led to significant fish mortality.

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.

These items are covered in Sections 5.3 through 5.6.

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.

Releases of summer steelhead since 1981 have been from endemic Umatilla River stock . Endemic Umatilla River summer steelhead was also released in 1975. From 1967 through 1970, Skamania and Oxbow stocks of summer steelhead were released in the Umatilla River Basin. (See section 10.3)

6.2) Supporting information.

6.2.1) History.

Summer steelhead releases of Skamania and Oxbow stocks were made in the Umatilla River basin from 1967 through 1970 (section 10.3). In 1975, one release of Umatilla stock steelhead occurred and fish releases every year since 1981 have been from endemic Umatilla stock.

Since 1982-83, all broodstock for the program have been trapped at Three Mile Falls Dam. Brood were collected at the west bank ladder from 1982-83 to 1986-87 and at the east bank ladder from 1987-88 to the present.

From 1982-83 to 1989-90, only unmarked adults were collected for broodstock. Beginning in 1990-91, first generation hatchery adults have also been incorporated into the broodstock to ensure meeting broodstock goals. Unmarked adults collected are assumed to be endemic Umatilla stock, but could include wild strays from other basins. Hatchery adults collected for brood are assumed to be first generation Umatilla stock. Only hatchery steelhead with coded wire tags indicating Umatilla origin are used for spawning.

6.2.2) Annual size.

The number of summer steelhead broodstock collected for holding/spawning since 1982-1983 has varied from 52 during the 1983-84 run year to 225 during the 1991-92 run year (Table 13, 14). Historically, the ratio of males to females has varied. The collection goal for the 2003-04 run year is 120 adults (50 pairs of unmarked adults), and an additional 10 pairs of coded-wire tagged hatchery fish. The collection goal in following years is anticipated to be similar.

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

From 1982 to 1990, only unmarked summer steelhead were collected for broodstock (Table 14). Beginning in 1990, first generation hatchery fish were also collected to ensure meeting broodstock goals. The proportion of hatchery fish collected has ranged from 2.3% of the total number collected in 1992-93 to 51.0% in 1990-91. The collection goal for the 2003-04 run

year is 120 adults (50 pairs of unmarked adults), and an additional 10 pairs of coded-wire tagged hatchery fish. The collection goal in following years is anticipated to be similar.

6.2.4) Genetic or ecological differences.

The broodstock for this program is collected entirely from the Umatilla River. Broodstock consists of both natural steelhead (50 pairs), and 10 pairs of hatchery steelhead verified to be of Umatilla River origin.

6.2.5) Reasons for choosing.

The endemic stock was selected because of their sufficient abundance and based on the tenet that they would have the best local adaptations and highest likelihood of natural production success in the Umatilla Basin. Umatilla Basin natural steelhead survived more than 100 years of human impact in a desert system including dams, dewatering of migration corridors, roads, logging, grazing, and urban agricultural development.

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

The risk of among population genetic diversity loss will be reduced by selecting the indigenous summer steelhead population for use as broodstock in this program. Twenty hatchery steelhead (10 pairs) containing coded-wire-tags (cwt) are also selected for broodstock in the event there is a shortage of natural fish. The cwt's are read prior spawning to ensure only program fish are used.

SECTION 7. BROODSTOCK COLLECTION

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

All fish collected for broodstock purposes are adults.

7.2) **Collection or sampling design.**

The broodstock collection goals are to: 1) Collect healthy, naturally produced, endemic, Umatilla River, summer steelhead; however, hatchery fish are also collected to ensure meeting program goals; 2) Collect a cross section of the run based on arrival time at the Three Mile Falls Dam collection facility; 3) Collect males and females at a one to one ratio, and 4) Collect one-salt and two-salt adults at the same ratio as observed in the run.

Over the last decade, all adults that returned to the Umatilla River have been trapped at Three Mile Falls Dam. All brood have been collected at the east bank adult facility and are collected from September through early May. Beginning in December 1999, adults returning to Three Mile Dam have been trapped one week and allowed to volitionally migrate one

week. Brood are collected by selecting 10% of the unmarked return by week in order to collect a representative cross-section of the total run as brood. When adults are trapped on alternate weeks, the 10% rate will still be followed. See BZ or PB. The percent of one salt and two salt adult returns is monitored continuously throughout the season and a similar proportion of one salt and two salt adults are selected for brood. Determinations of one salt and two salt adults are based on a fork length of less than or greater than 26 inches. The male: female ratio in the brood is not necessarily representative of the ratio in the total return. Fifty percent of the unmarked brood are of each sex, whereas females have comprised between 65-70%, but up to 75???% of the total run in recent years.

Adults returning to Three Mile Dam ascend a vertical slot fish way ladder, but are precluded from swimming upstream by use of a barrier gate at the top of the ladder. Adults then ascend a Denil steep-pass and fall into an adult holding pond where they are trapped. Disposition of the fish trapped generally occurs daily in order to minimize upstream passage delays. During periods when few adults are being trapped, adults may be held up to 72 hours. During handling operations, all adults are anesthetized with CO_2 to minimize stress. Mortality of listed steelhead can occur during the holding and handling operations at Three Mile Dam. Over the last eight years, average annual mortality at the facility has been 0.22% with a range of 0.00%-0.62%.

7.3) Identity.

There is one population of summer steelhead in the Umatilla Basin above Three Mile Dam. All unmarked adults that enter the trap at Three Mile Falls Dam are assumed to be of Umatilla origin (but could include unmarked strays), and may be selected for broodstock. Twenty CWT hatchery fish (10 pairs) are also selected for broodstock to ensure the broodstock goals are met. Coded wire tags are read prior to spawning in order to preclude the use of any stray hatchery fish.

7.4) Proposed number to be collected:

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

The broodstock goal is to collect 120 adults. 50 wild and 10 hatchery females, and 50 wild, and 50 hatchery origin males.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available: (See Tables 13, 14)

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

All hatchery fish returning to Three Mile Dam in excess of the 20 CWT fish needed for broodstock and those needed for CWT recovery (an additional 100 fish) are released upstream. These fish are available for both harvest and natural production. If the 20 CWT fish collected for broodstock are not used, they are sacrificed for CWT recovery.

7.6) Fish transportation and holding methods.

Umatilla steelhead brood stock are collected at the Three Mile Dam adult collection facility, they then are transported to the Minthorn holding facility for holding and spawning. Adults collected are anesthetized with CO2, prior to handling. Broodstock are transported in a 370-gallon fish transport tank, which is mounted on a dual axle trailer and is pulled by a pick-up truck. The trailer is equipped with compressed oxygen aeration and a re-circulation system. Transit time is approximately one hour. Water temperatures are monitored in the tank and at the release site to ensure there is less than a 10-degree water temperature difference at release.

Since 1988, all summer steelhead holding/spawning has occurred at Minthorn. Adults are held in a concrete pond with a total volume of 800 cubic feet (see section 5.2 for more details). Historically, holding densities have ranged from approximately 3.6 to 7.3 cubic feet per adult and flows have varied from approximately 2.2 to 19.0 gpm per adult. The broodstock goal for FY2004 is 120 adults, which will result in a maximum density of approximately 6.7 cubic feet per adult and a flow of 4.2 to 17.5 gpm per adult. The variation is a result of lower flows in Minthorn Springs Creek in the fall and late spring and because 1,600 gpm is diverted into the acclimation ponds during April when juveniles are being acclimated.

Total mortality of fish held at Minthorn has ranged from 1.5 to 45.0% and has averaged 19.3%. Mortality of unmarked fish has ranged from 0.9 to 41.4% and has averaged 18.3%. In some years, however, a portion of the males were live spawned and held through the end of the spawning season. Had these fish been killed at the time of spawning, mortality numbers would have been lower. Prespawn mortalities are built into the broodstock collection goals. At the end of the spawning season all remaining hatchery fish are sacrificed for coded wire tag recovery and all unmarked fish are released back into the Umatilla River.

7.7) Describe fish health maintenance and sanitation procedures applied.

Minthorn Adult Holding--At Minthorn adult facility, hydrogen peroxide is dripped into the inflowing water to achieve a maximum concentration of 100 ppm. The treatment is applied for one hour to control fungus and parasites five times per week.

Progeny-- Eggs are water hardened in 75ppm iodophor solution for up to 60 minutes to control vertical transmission of pathogens including IHNV.

7.8) Disposition of carcasses.

All summer steelhead broodstock carcasses are placed in a tribal landfill and buried.

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.

Use of Endemic Brood--All broodstock are collected from fish returning to the Umatilla River at Three Mile Dam. 85% of the brood are unmarked natural adults. 15% are adipose fin clipped hatchery adults. Of the hatchery fish collected all are CWT so that origin of fish can be determined. Hatchery fish from out-of-basin are not used. These broodstock collection criteria should minimize domestication and associated deleterious genetic effects.

Broodstock are collected from a representative cross section of the run in order to mimic the natural population.

SECTION 8. MATING

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

8.1) Selection method.

Minthorn Holding--From early April to late May, broodstock are sorted weekly for maturation. Fish are anesthetized with MS-222 and ripe fish are held in live totes until all fish have been sorted. Beginning in 2004, hatchery females have also been collected for broodstock to ensure meeting the program goals. All ripe females (marked and unmarked) will be spawned on any given spawn day. Marked and unmarked males (of natural origin), at a proposed rate of one male for every ripe female, are selected randomly throughout the broodstock population. Only hatchery reared fish with coded wire tags indicating Umatilla stock are used.

8.2) Males.

The goal is not to re-use males, but historically, this has sometimes been unavoidable. Obtaining adequate quantity and quality of milt from the males is often difficult, and in a limited number of instances, re-use of .mature males has been necessary. Before any hatchery males are spawned, coded wire tags are recovered and read on the spot to ensure the fish is of Umatilla River origin. If it is not from Umatilla Hatchery, the fish is discarded and another fish is selected. Backup males have not been used, primarily because matrix schemes are utilized (see section 8.3 for details).

8.3) Fertilization.

Minthorn-- A 3 x 3 spawning matrix is utilized whenever possible and matings are random, except hatchery fish are not crossed with hatchery fish. All crosses are either wild x wild or wild by hatchery. When only two females are available, a 2 x 2 matrix is used and when only one female is available, the eggs have been fertilized with the milt from a single male. Each 1 x 1, 2 x 2 or 3 x 3 cross is considered a single-family group.

Females are killed and bled by severing the caudal peduncle. The undersides of the fish are cleansed with a solution of Argentyne and are then wiped with a clean towel. The eggs from each female are stripped into a colander to remove excess ovarian fluid. When a 3 x 3 matrix is used, the eggs from each female are mixed and divided equally into three cups. If a 2 x 2 matrix is used, the eggs are mixed and divided equally into two cups. Males are generally killed for spawning, cleansed with Argentyne, and the milt is stripped into individual cups. When a 3 x 3 matrix is used, the milt from a single male is used to fertilize one third of the eggs from each female. If a 2 x 2 matrix is used, the milt from each male is used to fertilize one half the eggs from each female. After the milt is added, well water from Umatilla Hatchery is added and the eggs and sperm are mixed and allowed to stand for approximately one minute or longer. The fertilized eggs from each cup (one family group) are then poured into a colander and combined. The eggs are then poured into a bucket with Umatilla Hatchery well water, rinsed, poured back into the colander, and then are placed into a solution of Argentyne and allowed to water harden for one hour. At the end of the hour, the eggs are again poured into a colander and then into a bucket of fresh well water with a watertight lid for transport to Umatilla Hatchery. Colanders, spawning knives and other equipment are disinfected with Argentyne between each family group.

The cwt from all hatchery fish is read before fertilization to ensure they are of Umatilla river origin. If they are not, the fish is discarded and another fish is spawned in its place.

At the time the males and females are stripped, milt and ovarian fluid samples are taken to test for replicating viral agents. After spawning, pyloric caeca, kidney and spleen samples are also taken to test for bacterial kidney disease and other culturable pathogens. Samples of the lower intestine are examined for *Ceratomyxa Shasta*.

Fish health procedures used for disease prevention include: 1) Draining ovarian fluid from eggs by use of colander; 2) Water hardening in Iodophor @ 75ppm for one hour and then for 15 minutes at the hatchery upon arrival to the facility; and 3) Annual fish health monitoring of Umatilla summer steelhead brood stock to detect any virus or replicating agents or bacterial pathogens that could place the listed fish at risk. For results from this monitoring see BPA annual reports 1992-1997 (Fish Health Monitoring & Evaluation, Keefe, Hayes, Focher & Groberg, et al.)

8.4) Cryopreserved gametes.

There has been no cryopreservation of Umatilla River summer steelhead gametes.

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.

This is covered in Section 8.3.

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.

The number of eggs taken since 1983 has varied from a low of 100,000 eggs in 1984 to a high of 602,000 in 1991 (Table 16). During those years, smolt production goals for the Umatilla River varied significantly. Since 1993, eggs takes have been between 181,000 to 255,000 eggs. The production goal for FY2004 is 201,000 green eggs, which will produce 150,000 smolts. The survival objective from green egg to ponding is 75% (Table 16).

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

The Umatilla Summer Steelhead Program does not collect eggs in excess of program needs.

9.1.3) Loading densities applied during incubation.

Umatilla Hatchery --Incubation consists of four isolated units or sections of Marisource (Heath tray type) incubators as described in section 5.4. Loading densities are 7,800 eggs/tray.

9.1.4) Incubation conditions.

Umatilla Hatchery --Oxygen saturation levels average 10 ppm influent and 9 ppm effluent. Water flows are regulated to a minimum of 4 gal. /min, with individual egg take temperatures ranging from 38^0F to 54^0F.

9.1.5) Ponding.

Umatilla Hatchery --Steelhead are ponded the first week of July at 950 temperature units, 3,500 fish/pound, and 100% button-up.

9.1.6) Fish health maintenance and monitoring.

Umatilla Hatchery --Eggs brought to Umatilla Hatchery are disinfected in 75 ppm iodophor for 15 minutes. Fungus is controlled with formalin treatments at a concentration of 1,667 ppm (1:600). Treatments are scheduled seven times per week for 15 minutes. Little mortality has been attributed to yolk-sac malformation. After eyeing, dead eggs are hand picked.

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.

Umatilla Hatchery --Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.

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 (1991-02), or for years dependable data are available..

Umatilla Hatchery --The fry to smolt survival objective is 94%. A total of 158,000 fry are ponded to produce 150,000 smolts. Grading of fish was suspended in BY 2002, therefore no pre-smolts are programmed, and 100% reared are released as smolts. Table 16 shows egg take and survival of summer steelhead brood years 1992-2003.

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

Umatilla Hatchery --Swim-up fry are transferred from heath incubators to Canadian troughs in July at approximately 3,500/lb. They are ponded in one Oregon raceway in August at approximately 450 fish/lb. They are equally split into three Michigan raceways in the fall. Density and loading for Michigan and Oregon raceways (1991-1997 brood years) are presented in (Table 17).

9.2.3) Fish rearing conditions

Umatilla Hatchery --The maximum and minimum dissolved oxygen concentrations in Michigan and Oregon raceway's influent and effluent were 14.5 and 5.7, and 10.6 and 5.7 PPM, respectively. (Table 15).

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.

Umatilla Hatchery average growth for Summer Steelhead (Brood year 2001)

Month	Fish/lb	Conversion

July	737	1.2
August	143	1.0
September	57	1.4
October	29	1.3
November	17	1.05
December	10.0	1.0
January	6.8	1.18
February	5.7	1.26
March	4.9	1.46
April	5.0	1.0

Length, weight, and condition factor are evaluated during monthly, pre-release, and release monitoring (Table 18).

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

No energy reserve parameters are monitored or evaluated. Growth rates were determined *Umatilla Hatchery* --from monthly length-weight monitoring. Mean growth rates for recent broods (1995-98 broods) were 0.70 mm/d (SD=0.06) for length and 0.51 g/d (SD=0.08) for weight.

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*).

Bio-Oregon moist diet is fed exclusively. Approximately 36,000 pounds are fed annually, at a conversion rate of 1.39.

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

Monthly monitoring follows specific protocols in the Umatilla Fish Health Monitoring and Evaluation work statement. All raceways of each species and stock at Umatilla Hatchery are monitored monthly for pathogens and parasites. Five moribund or dead fish per raceway are tested for systemic and gill bacteria.

Other Infections - Juvenile fish are treated for bacterial infections if necessary with

oxytetracycline under an Investigational New Animal Drug Permit (INAD).
Sanitation procedures - Statewide fish health management policy (September 12, 2003) provides guidelines for preventative and therapeutic fish health strategies that will be followed in this program.

Table 9.2.7 Disease history (1999-2003) of Umatilla River summer steelhead adults spawned at Minthorn adult facility and juveniles[a] reared at Umatilla Hatchery.

Disease or Organism	Adults	Juveniles
IHN Virus	Yes	No
EIBS Virus	No	No
Aeromonas salmonicida	No	No
Aeromonas/Pseudomonas	Yes	Yes
Flavobacterium psychrophilum	No	Yes
Fl. columnare	No	No
Renibacterium salmoninarum	No	No
Yersinia ruckeri	Yes	Yes
Carnobacterium sp.	No	No
Ichthyobodo	No	No
Gyrodactylus	No	No
Ichthyophthirius multifilis	No	No
Epistylis	No	No
Scyphidia	No	No
Trichodinids	No	No
Gill Copepods	Yes	No
Coagulated Yolk Disease	No	Yes
External Fungi	Yes[b]	Yes
Internal Fungi	No	Yes
Myxobolus cerebralis	No	No
Ceratomyxa shasta	Yes	No

[a] "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.
[b]There have been more pre-spawning mortality problems since the elimination of formalin use for fungus control.

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

Umatilla Hatchery --Visual estimates of smoltification (parr, intermediate smolt, smolt) in combination with condition factor (see Section 9.2.4) are used to evaluate smolt readiness. Data from previous evaluations are presented in Table 19. Descaling and smoltification observations are presented in Table 19.

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

None are used.

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. (

Fish will be reared to a size, and released at a time, to encourage out-migration, and eliminating residualiztion. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	0			
Unfed Fry	0			
Fry	0			
Fingerling	0			
Yearling	50,000 and 50,000 50,000	4.5/LB 4.5/LB	Late April Late May	Minthorn & Pendleton Bonifer (Direct Stream)

10.2) Specific location(s) of proposed release(s). This information is included in Section 1.5.

Stream, river, or watercourse: Umatilla River
Release point: Minthorn Springs (RM 63.8)
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

Stream, river, or watercourse: Meacham Creek
Release point: (RM 2) – Direct Stream
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

Stream, river, or watercourse: Umatilla River
Release point: Pendleton Acclimation (RM 56.0)
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

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

Release year	Hatchery	Number Released	Age at Release	Release Location	Date of Release	Type of Release	Number per Pound	Stock
1967	Gnat Creek	109,805				Direct	75.0	Skamania
1967	Oak Springs	238,020				Direct	117.0	Idaho (Oxbow)
1967	Wallowa	142,240				Direct	240.0	Idaho (Oxbow)
1968	Gnat Creek	23,100				Direct	66.0	Skamania
1968	Gnat Creek	150,000	Eggs			Direct	Eggs	Skamania
1969	Oak Springs	174,341				Direct	145.0	Skamania
1970	Carson	39,489				Direct	8.0-9.0	Skamania
1975	Wizard Falls	11,094				Direct	9.0	Umatilla River
1981	Oak Springs	17,558	Yearling	Upper Uma. R.		Direct	6.0-9.0	Umatilla River
1981	Oak Springs	9,400	Subyearling	Upper Uma. R.		Direct	145.0	Umatilla River
1982	Oak Springs	59,494	Yearling	Upper Uma. R.		Direct	7.0-8.0	Umatilla River
1982	Oak Springs	67,940	Subyearling	Upper Uma. R.		Direct	124.0	Umatilla River
1983	Oak Springs	60,500	Yearling	Upper Uma. R.		Direct	11.0	Umatilla River
1983	Oak Springs	52,700	Subyearling	Upper Uma. R.		Direct	62.0	Umatilla River
1984	Oak Springs	57,939	Yearling	Bonifer	May	Forced	6.5	Umatilla River
1985	Oak Springs	22,000	Yearling /b	Bonifer	Spring	Forced	135.0	Umatilla River
1985	Oak Springs	53,850	Yearling	Bonifer	May	Forced	7.0	Umatilla River
1986	Oak Springs	39,134	Yearling /b	Bonifer	Spring	Forced	150.0	Umatilla River
1986	Oak Springs	54,137	Yearling	Bonifer	May	Forced/Vol.	8.4	Umatilla River
1987	Oak Springs	1,485	Yearling	Meacham Cr. (RM 11)	May	Direct	5.5	Umatilla River
1988	Oak Springs	30,549	Yearling	Minthorn	April	Forced	7.4	Umatilla River
1988	Oak Springs	30,757	Yearling	Nr. Minthorn	April	Direct	6.5	Umatilla River
1988	Oak Springs	33,984	Yearling	Umatilla RM 23	May	Direct	10.3	Umatilla River

Release year	Hatchery	Number Released	Age at Release	Release Location	Date of Release	Type of Release	Number per Pound	Stock
1988	Oak Springs	10,033	Subyearling	Umatilla RM 89	December	Direct	57.5	Umatilla River
1988	Irrigon	24,618	Unfed fry	S. F. Uma. R.	June	Direct	3200.0	Umatilla River
1989	Oak Springs	29,852	Yearling	Minthorn	May	Forced	6.6	Umatilla River
1989	Oak Springs	29,586	Yearling	Nr. Minthorn	May	Direct	5.6	Umatilla River
1989	Oak Springs	22,274	Yearling	Bonifer	April/May	Forced	5.5	Umatilla River
1990	Oak Springs	59,747	Yearling	Bonifer	May	Forced	5.9-7.7	Umatilla River
1990	Oak Springs	29,446	Yearling	Nr. Bonifer	May	Direct	5.5	Umatilla River
1991	Oak Springs	42,610	Yearling	Bonifer	May	Forced	6.2-7.5	Umatilla River
1991	Oak Springs	29,325	Yearling	Nr. Bonifer	May	Direct	8.7	Umatilla River
1991	Oak Springs	3,998	Yearling	Umatilla RM 3	April	Direct	12.5	Umatilla River
1992	Umatilla	19,977	Yearling	Bonifer	March	Forced	5.8	Umatilla River
1992	Umatilla	47,458	Yearling	Minthorn	March	Forced	5.8	Umatilla River
1992	Umatilla	64,550	Yearling	Meacham Cr. (RM 0.5)	April	Direct	5.0	Umatilla River
1992	Umatilla	67,419	Yearling	Meacham Cr. (RM 0.5)	April/May	Direct	5.5	Umatilla River
1992	Umatilla	5,443	Yearling	Umatilla RM 3	April	Direct	5.8	Umatilla River
1993	Umatilla	44,824	Yearling	Bonifer	April	Forced	4.5	Umatilla River
1993	Umatilla	47,979	Yearling	Minthorn	April	Forced	5.6	Umatilla River
1993	Umatilla	65,465	Yearling	Bonifer	May	Forced	6.1	Umatilla River
1994	Umatilla	51,403	Yearling	Bonifer	April	Forced	4.9	Umatilla River
1994	Umatilla	49,598	Yearling	Minthorn	April	Forced	5.1	Umatilla River
1994	Umatilla	52,097	Yearling	Bonifer	May	Forced	5.2	Umatilla River
1994	Umatilla	1,732	Yearling	Umatilla RM 27.3	April	Direct	5.7	Umatilla River

Release year	Hatchery	Number Released	Age at Release	Release Location	Date of Release	Type of Release	Number per Pound	Stock
1995	Umatilla	48,539	Yearling	Bonifer	April	Forced	5.6	Umatilla River
1995	Umatilla	49,983	Yearling	Minthorn	April	Forced	4.7	Umatilla River
1995	Umatilla	47,941	Yearling	Bonifer	May	Forced	5.5	Umatilla River
1996	Umatilla	47,543	Yearling	Minthorn	April	Forced	5.1	Umatilla River
1996	Umatilla	49,377	Yearling	Bonifer	April	Forced	5.3	Umatilla River
1996	Umatilla	49,783	Yearling	Thornhollow	May	Forced	5.1	Umatilla River
1997	Umatilla	46,788	Yearling	Minthorn	April	Volitional	4.6	Umatilla River
1997	Umatilla	41,555	Yearling	Bonifer	April	Volitional	5.4	Umatilla River
1997	Umatilla	48,944	Yearling	Bonifer	May	Volitional	4.9	Umatilla River
1998	Umatilla	49,084	Yearling	Minthorn	April	Volitional	4.7	Umatilla River
1998	Umatilla	41,088	Yearling	Bonifer	April	Volitional	5.9	Umatilla River
1998	Umatilla	47,313	Yearling	Bonifer	Apr/May	Volitional	5.5	Umatilla River
1999	Umatilla	41,843	Yearling	Minthorn	April	Volitional	4.9	Umatilla River
1999	Umatilla	44,226	Yearling	Bonifer	April	Volitional	5.5	Umatilla River
1999	Umatilla	35,564	Yearling	Bonifer	April/May	Volitional	5.9	Umatilla River
1999	Umatilla	9,878	Subyearling	Umatilla RM 2.8	November	Direct	43.9	Umatilla River
2000	Umatilla	51,659	Yearling	Minthorn	March/April	Volitional	4.8	Umatilla River
2000	Umatilla	52,736	Yearling	Minthorn	April	Volitional	4.7	Umatilla River
2000	Umatilla	49,343	Yearling	Bonifer	April	Volitional	6.4	Umatilla River
2001	Umatilla	50,829	Yearling	Minthorn	March/April	Volitional	4.8	Umatilla River
2001	Umatilla	48,291	Yearling	Bonifer	March/April	Volitional	5.4	Umatilla River
2001	Umatilla	41,403	Yearling	Minthorn	April	Volitional	4.7	Umatilla River
2002	Umatilla	54,917	Yearling	Bonifer	April	Volitional	5.1	Umatilla River

Release year	Hatchery	Number Released	Age at Release	Release Location	Date of Release	Type of Release	Number per Pound	Stock
2002	Umatilla	47,521	Yearling	Minthorn	April	Volitional	4.5	Umatilla River
2002	Umatilla	54,366	Yearling	Pendleton	April	Volitional	4.2	Umatilla River
2002	Umatilla	608	Yearling	Pendleton	April	Direct	3.6	Umatilla River
2002	Umatilla	1,218	Yearling	Minthorn	April	Direct	4.2	Umatilla River
2003	Umatilla	41,369	Yearling	Bonifer	April	Volitional	4.8	Umatilla River
2003	Umatilla	42,805	Yearling	Minthorn	April	Volitional	4.0	Umatilla River
2003	Umatilla	42,783	Yearling	Pendleton	April	Volitional	4.4	Umatilla River

10.4) Actual dates of release and description of release protocols. Table (section 10.3 - above) details historical hatchery steelhead releases in the Umatilla River. Since 1984, all releases have been in the spring (March to early June), other than a small release of Subyearlings in December, 1988 & 1999. Since 1993, all yearling steelhead have been acclimated prior to release, other than a small group of fish released directly into the Umatilla River in 1991 and 1992 as part of a passage evaluation study, and from 1998 – 2000 as part of reach-specific survival tests. Acclimated fish were force released from 1993 to 1996, while all releases since 1997 have been volitional beginning the last week of holding. After one week of volitional release, the remaining fish were forced out. Future releases will also be volitional whenever possible. (Table 20)

10.5) Fish transportation procedures, if applicable. .

Juvenile summer steelhead are transported to Pendleton/Minthorn, using 2,000 and 5,000 gallon fish transport trucks.

10.6) Acclimation procedures.

Minthorn Acclimation --Historically, the proposed acclimation period has been four weeks. Beginning in FY2004, however, two groups of fish will be acclimated for three to four weeks while one group will be released directly into Meacham Creek (adjacent to Bonifer Pond) at RM 2. The fish are fed Biomoist Feed twice each day at rate of approximately 0.5 to 1.0% BWD. Mortalities are removed daily and ODFW pathology personnel are available to address specific disease concerns. Temperature and dissolved oxygen measurements are taken daily during acclimation, and on the day of release, ODFW personnel sample the fish for descaling, weight and fork length.

Beginning in 1997, summer steelhead have been allowed to release volitionally for the final week of holding before the remaining fish are forced out. At Minthorn, one of

three effluent screens in each of the two ponds is removed and the fish are allowed to swim over a V-notched dam board and through an underground pipe directly into Minthorn Springs Creek. One to two days before the remaining fish are released; they are taken off feed to reduce stress. The ponds are lowered and the fish are slowly crowded out. The fish are released over a two day period (one pond /day) and late in the day.

Pendleton Acclimation --At Pendleton, the effluent screen is pulled and the fish are allowed to volitionally swim over a notched dam board and down the outlet channel directly into the Umatilla River. The fish are taken off feed one to two days prior to the remaining fish being released. The effluent dam boards are removed and the pond is lowered. The fish are then crowded out of the pond using a seine.

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

All hatchery steelhead released into the Umatilla River are adipose fin clipped. Program goals are evaluated by annually tagging 40 percent of each release group with coded wire tags (20,000 fish in each group of 50,000) The CWT fish are also given a left ventral fin clip. (table 20)

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

The production goal for FY 2004 and subsequent years is 150,000 smolts. Numbers released from 1993 through 2003 have been between 122,000 and 159,000 (section 10.3). Beginning in brood year 2000, all fish raised in this program have been and will continue to be released into the Umatilla River sub basin.

10.9) Fish health certification procedures applied pre-release.

All monitoring will be consistent with the ODFW fish health policy. Current Umatilla Hatchery Monitoring and Evaluation work statements provide the following protocol: Within four weeks prior to release grab-sampled fish of each species and stock are examined as follows:
-Kidney for *R. salmoninarum* by ELISA from 30 fish per raceway (spring Chinook)
-Gill tissue and body scrapings by microscopy from a minimum of five fish
-Gill/kidney/spleen tissue pools (5 fish per pool) from 10 fish per raceway for culturable viruses.

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

Minthorn Acclimation --The Minthorn acclimation/release facility includes two-10 hp pumps (one primary and one backup), standby generator, two raceways, and outlet pipe for releasing fish. The pumps and generator are located in the upper level of an enclosed pump house well above the 100-year flood levels. Water is pumped from the creek to each of the raceways. In case of power failure, a standby generator provides emergency power to the pump(s). In addition, if the primary pump fails, the backup pump will automatically start. Both ponds are also equipped with high-level and low-level float alarms. In the event of a power or pump failure or pond level alarm, an audio message is sent to a security company who then notifies specified individuals of an alarm condition at the facility. Fish are released from the facility by pulling the dam boards, lowering the pond and crowding out the fish. The fish then exit the pond through an underground pipe to Minthorn Springs Creek. In an extreme emergency, the fish can be released in this way.

Pendleton Acclimation --The Pendleton acclimation/release facility includes three vertical turbine pumps (two primary and one backup), standby generator, four acclimation ponds (one of which is used for acclimating summer steelhead), and outlet pipes on each pond for releasing fish. In case of power failure, a standby generator provides emergency power to the pump(s). If one of the two primary pumps fails, the backup pump will automatically start. In the event of a power or pump failure, a phone dialer will begin calling up to 10 telephone numbers (stating there is an alarm condition at the facility) until the alarm is acknowledged. Fish are released from the facility by pulling the dam boards, lowering the pond and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Two-thirds of production is acclimated. Acclimated fish are released volitionally for one week and the fish remaining are then forced out. This will help to prevent negative impacts from predators focusing fish released at the same time in large groups. Outmigration of hatchery reared smolts is being monitored to help in detection of ecological problems during this life history stage.

TABLES AND FIGURES:

Table 1. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for steelhead reared at Umatilla Hatchery and released in the Umatilla River, 1991-97 broods. Out-of-basin data was downloaded from the central database in October 2001. Returns are incomplete for the 1997 brood.

Brood year	Race-way	Release Date	Release[a] site	Release size (fish/lb)	No.[b] CWT recov-eries	Smolt-to-adult sur-vival (%)	Umatilla[c] River return (%)	No. adults pro-duced	Out-of-[d] basin exploit-ation(%)	In-[e] basin exploit-ation(%)
					Small - grade					
91	M5A	5/01/92	MC	5.5	3	0.030	0.030	20	0.0	0.0
92	M5A	5/13/93	BS	6.1	9	0.073	0.073	48	0.0	0.0
93	M5A	5/12/94	BS	5.2	3	0.036	0.031	19	15.8	31.6
94	M5A	5/12/95	BS	5.5	14	0.211	0.202	101	4.0	5.0
95	M5A	5/09/96	TH	5.1	10	0.129	0.129	64	0.0	0.0
96	M8A	5/15/97	BS	4.9	1	0.014	0.014	7	0.0	100
97	M8A	5/04/98	BS	5.5	10	0.167	0.167	79	0.0	15.2
				4.7	50	0.094	0.92	338	2.1	8.9
					Large - grade					
91	M5B	4/30/92	MC	5.0	2	0.020	0.000	13	100	0.0
92	M5B	4/16/93	MN	5.6	46	0.502	0.406	241	19.1	5.4
93	M5B	4/14/94	MN	5.1	36	0.710	0.520	352	26.1	12.5
94	M5B	4/13/95	MN	4.7	79	1.523	1.144	761	24.8	8.9
95	M5B	4/12/96	MN	5.1	50	0.711	0.650	338	8.6	10.9
96	M8B	4/11/97	MN	4.6	42	0.569	0.543	266	4.5	10.5
97	M8B	4/17/98	MN	4.7	27	0.454	0.397	223	12.6	7.2
				4.4	282	0.641	0.523	2,194	18.7	9.4
					Large - grade					
91	M5C	3/29/92	BS+MN	5.8	27	0.279	0.221	188	20.7	3.2
92	M5C	4/18/93	BS	4.5	67	0.665	0.562	298	15.4	7.1
93	M5C	4/11/94	BS	4.9	39	0.885	0.613	455	30.8	10.1
94	M5C	4/11/95	BS	5.6	59	1.051	0.890	510	15.3	7.1
95	M5C	4/24/96	BS	5.3	21	0.281	0.235	139	16.6	7.2
96	M8C	4/10/97	BS	5.4	22	0.322	0.308	134	4.5	9.0
97	M8C	4/16/98	BS	5.9	15	0.221	0.163	91	26.4	14.3
				4.7	250	0.529	0.427	1,815	19.6	7.9
		All broods and size grades:		4.6	582	0.422	0.348	4,347	17.8	8.7

[a] *MC = Meacham Creek near Bonifer Springs acclimation site, BS = Bonifer Springs acclimation site, TH = Thornhollow acclimation site, MN = Minthorn acclimation site.*

[b] *Number of coded-wire tags recovered.*

[c] *Return = number of fish counted at Three Mile Falls Dam plus harvest beolow Three Mile Falls Dam.*

[d] *Percent of adult production harvested outside of the Umatilla River basin.*

[e] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers*

Table 2. Summer Steelhead Annual Run Counts to Three Mile Falls Dam

Year	Hatchery	Wild	Total
1966-67		1778	1778
1967-68		930	930
1968-69		1917	1917
1969-70		2298	2298
1970-71			
1971-72			
1972-73		2057	2057
1973-74		2640	2640
1974-75		2171	2171
1975-76		2534	2534
1976-77		1258	1258
1977-78		3080	3080
1978-79			
1979-80		2367	2367
1980-81		1298	1298
1981-82		768	768
1982-83		1264	1264
1983-84		2314	2314
1984-85		3197	3197
1985-86		2885	2885
1986-87		3444	3444
1987-88	166	2316	2482
1988-89	371	2104	2475
1989-90	246	1422	1668
1990-91	387	725	1112
1991-92	523	2246	2769
1992-93	616	1297	1913
1993-94	345	945	1290
1994-95	656	875	1531
1995-96	785	1296	2081
1996-97	1463	1014	2477
1997-98	903	862	1765
1998-99	751	1135	1886
1999-00	739	2153	2892
2000-01	1089	2573	3662
2001-02	1860	3659	5519
2002-03	960	2120	3080

Table 3. Disposition and Spawning Ground Data of Natural and Hatchery Summer Steelhead (STS) Returning to the Umatilla River above Three Mile Falls Dam, 1988-1999.

RUN YEAR (Fall/Spring)	1987 1988	1988 1989	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	1994 1995	1995 1996	1996 1997	1997 1998	1998 1999
Natural STS Enumerated at TMD	2315	2104	1422	724	2247	1298	945	875	1299	1014	862	1134
Hatchery STS Enumerated at TMD	165	370	245	387	522	616	345	656	782	1463	903	740
Natural and Hatchery STS Enumerated at TMD	2480	2474	1667	1111	2769	1914	1290	1531	2081	2477	1765	1874
Natural STS Sacrificed or Mortalities at TMD	20	12	40	2	3	4	0	0	8	5	2	1
Hatchery STS Sacrificed or Mortalities at TMD	5	17	143	50	112	69	51	33	73	95	70	74
Natural STS Taken for Brood Stock	151	158	92	99	237	129	93	86	107	100	86	110
Natural STS Spawned	31F	42F	25F	78	172	95	79	59	63	75	68	76
Hatchery STS Taken for Brood Stock	0	0	0	103	95	91	42	68	26	10	30	15
Hatchery STS Spawned	0	0	0	49	0	3	17	22	21	3	21	4
Natural Females Released above TMD	1436	1232			1193	875	642	602	863	689	550	716
Natural Males Released above TMD	708	702			814	290	210	187	321	220	224	308
Natural STS Released above TMD	2144	1934	1290	623	2007	1165	852	789	1184	909	774	1024
Hatchery Females Released above TMD	114	216			161	266	186	274	371	666	476	425
Hatchery Males Released above TMD	46	137			154	190	66	281	312	692	327	236
Hatchery STS Released above TMD	160	353	102	234	315	456	252	555	683	1358	803	661
Natural STS Harvested above TMD-CTUIR						5	5	5	0	0	5	5
Hatchery STS Harvested above TMD-CTUIR						25	20	20	39	33	33	39
Natural STS Harvested above TMD-ODFW								0	0	0	0	0
Hatchery STS Harvested above TMD-ODFW						22	5	21	25	24	12	47
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548	713
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221	306
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769	1019
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454	382
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305	193
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759	575
Total STS Available for Spawning	2304	2287	1392	857	2322	1569	1074	1298	1803	2210	1528	1594
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002	1095
STS Redds Observed in Index Reaches	138	77	H W.	H W	135	H W.	64	74	119	138	126	218
Total STS Redds Observed	275	128	H W.	H W	300	H W.	224	126	150	149	217	270
Index Reaches Miles Surveyed	18.5	20	H W.	H W	21.4	H W.	21.4	21.4	21.4	21.4	21.4	21.4
Redds Per Mile in Index Reaches	7.5	3.9	H W.	H W	6.3	H W.	3.0	3.5	5.6	6.4	5.9	10.2
Total Miles Surveyed in Umatilla River	61.0	50.2	H W.	H W	67.2	H W.	65.8	35.0	34.4	24.6	38.0	35.0
Redds Per Mile in all Areas	4.5	2.5	H W.	H W	4.5	H W.	3.4	3.6	4.4	6.1	5.7	7.7

Harvest not determined and not subtracted from estimates of spawners, 1988-1982. H. W. = high water.
Assumes that harvest steelhead were 50% females and 50% males. No adjustments made for hook and release mortality.
Index reaches are in Squaw, NF Meacham, Buckaroo, Camp, and Boston Canyon Creeks and the SF Umatilla River.

Table 4. Hatchery releases of summer steelhead in the Umatilla River Basin.

Year of Release	Hatchery	Number Released	Age at Release	Location	Date of Release	Type of Release	No./lb	Stock

1967	Gnat Creek	109,805				Direct	75.0	Skamania
1967	Oak Springs	238,020				Direct	117.0	Idaho (Oxbow)
1967	Wallowa	142,240				Direct	240.0	Idaho (Oxbow)
1968	Gnat Creek	23,100				Direct	66.0	Skamania
1968	Gnat Creek	150,000	Eggs			Direct	Eggs	Skamania
1969	Oak Springs	174,341				Direct	145.0	Skamania
1970	Carson	39,489				Direct	8.0-9.0	Skamania
1975	Wizard Falls	11,094				Direct	9.0	Umatilla River
1981	Oak Springs	17,558	Yearling	Upper Umat. R.		Direct	6.0-9.0	Umatilla River
1981	Oak Springs	9,400		Upper Umat. R.		Direct	145.0	Umatilla River
1982	Oak Springs	59,494	Yearling	Upper Umat. R.		Direct	7.0-8.0	Umatilla River
1982	Oak Springs	67,940		Upper Umat. R.		Direct	124.0	Umatilla River
1983	Oak Springs	60,500	Yearling	Upper Umat. R.		Direct	11.0	Umatilla River
1983	Oak Springs	52,700		Upper Umat. R.		Direct	62.0	Umatilla River
1984	Oak Springs	57,939	Yearling	Bonifer	May	Forced	6.5	Umatilla River
1985	Oak Springs	22,000	Yearling /b	Bonifer	March	Forced	135.0	Umatilla River
1985	Oak Springs	53,850	Yearling	Bonifer	May	Forced	7.0	Umatilla River
1986	Oak Springs	39,134	Yearling /b	Bonifer	Spring	Forced	150.0	Umatilla River
1986	Oak Springs	54,137	Yearling	Bonifer	May	Forced	8.4	Umatilla River
1987	Oak Springs	1,485	Yearling	Meacham Cr.(RM 11)	May	Direct	5.5	Umatilla River
1988	Oak Springs	30,549	Yearling	Minthorn	April	Forced	6.5-7.4	Umatilla River
1988	Oak Springs	30,757	Yearling	Near Minthorn	April	Direct	6.5	Umatilla River
1988	Oak Springs	33,984	Yearling	Umatilla RM 23	May	Direct	10.3	Umatilla River
1988	Oak Springs	10,033	Subyearling	Umatilla RM 89	December	Direct	57.5	Umatilla River
1988	Irrigon	24,618	Unfed fry	S. F. Umat. R.	June	Direct	3200.0	Umatilla River
1989	Oak Springs	29,852	Yearling	Minthorn	May	Forced	6.6	Umatilla River
1989	Oak Springs	29,586	Yearling	Near. Minthorn	May	Direct	5.6	Umatilla River
1989	Oak Springs	22,274	Yearling	Bonifer	April/May	Forced	5.5	Umatilla River
1990	Oak Springs	59,747	Yearling	Bonifer	May	Forced	5.9-7.7	Umatilla River
1990	Oak Springs	29,446	Yearling	Near Bonifer	May	Direct	5.5	Umatilla River
1991	Oak Springs	42,610	Yearling	Bonifer	May	Forced	6.2-7.5	Umatilla River
1991	Oak Springs	29,325	Yearling	Near Bonifer	May	Direct	8.7	Umatilla River
1991	Oak Springs	3,998	Yearling	Umatilla RM 3	April	Direct	12.5	Umatilla River
1992	Umatilla	19,977	Yearling	Bonifer	March	Forced	5.8	Umatilla River
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1999	Umatilla	44,226	Yearling	Bonifer	April	Volitional	5.5	Umatilla River
1999	Umatilla	35,564	Yearling	Bonifer	April/May	Volitional	5.9	Umatilla River

Table 5. Age summary of natural summer steelhead from the Umatilla River.

Return Year		Age 1.1	Age 1.2	Age 2.1	Age 2.2	Age 2.3	Age 3.1	Age 3.2	Age 4.1	Total
1994	n=	0	2	24	26	0	5	6	0	63

	%=	0	3.2	38.1	41.3	0	7.9	9.5	0	100
1995	n=	0	0	19	17	0	9	11	0	56
	%	0	0	33.9	30.4	0	16.1	19.6	0	100
1996	n=	0	0	28	8	0	7	1	0	44
	%	0	0	63.6	18.2	0	15.9	2.3	0	100
1997	n=	0	0	19	17	0	5	10	0	51
	%	0	0	37.3	33.3	0	9.8	19.6	0	100
1998	n=	1	1	33	11	1	4	0	1	52
	%	1.9	1.9	63.5	21.2	1.9	7.7	0	1.9	100

Juvenile years of freshwater growth from scales of adult steelhead returning to the Umatilla River.

Return Year		Age 1	Age 2	Age 3	Age 4	Total
1994	n=	2	50	11	0	63
	%=	3.2	79.4	17.4	0	100
1995	n=	0	36	20	0	56
	%	0	64.3	35.7	0	100
1996	n=	0	36	8	0	44
	%	0	81.8	18.2	0	100
1997	n=	0	37	15	0	51
	%	0	70.6	29.4	0	100
1998	n=	2	45	4	1	52
	%	3.8	86.5	7.7	1.9	99.9

Table 6. Life History table of steelhead

Mouth of the Umatilla to the mouth of McKay Creek (RM 0-50.5)

Life History Stage	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sep.**
Adult Migration	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**				
Prespawning Holding												
Spawning												
Incubation												
Rearing	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Juvenile Migration	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**		

Mouth of McKay Creek to the mouth of Meacham Creek (RM 50.5-79) and mid-basin streams

Life History Stage	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sep.**
Adult Migration	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**				
Prespawning Holding					**x**	**x**	**x**	**x**				
Spawning						**x**	**x**	**x**				
Incubation						**x**	**x**	**x**	**x**			
Rearing	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Juvenile Migration	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**			

Mouth of Meacham Creek to the forks (RM 79-89 and headwater streams)

Life History Stage	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sep.**

Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Table 7. The Number and Percent of Steelhead (STS) Available to Spawn Naturally that were of Hatchery Origin; Umatilla River, 1988-1999.

BROOD YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002
Percent Spawners of Hatchery Origin	6.9	15.4	7.3	27.3	13.6	26.1	21.1	39.6	34.3	58.9	49.7
Percent Females Spawners of Hatchery Origin	7.4	14.9			11.9	21.7	21.3	29.7	28.2	48.0	45.3

Harvest not estimated 1988-1992. 1993-1999, Harvest estimate subtracted from total, assumes harvest of 50% females and 50% males No adjustments made for catch and release mortality.

Table 8. Descriptive statistics for the steelhead fishery in the Umatilla River, run years 1993-94 through 1998-99. Catch statistics were based on creel surveys conducted in the lower river (Umatilla mouth to Three Mile

Falls Dam) and upper river (Barnhart Bluffs to lower boundary of the CTUIR).

Statistic[a]	Fish origin[b] or creel area	Run year 93-94	94-95	95-96	96-97	97-98	98-99	Mean
Run size	WSTS	945	875	1296	1014	862	1133	1021
	HSTS	359	696	819	1529	994	739	856
Run composition (%)	WSTS	72	56	61	40	46	61	56
	HSTS	28	44	39	60	54	39	44
Catch composition (%)	WSTS	59	67	70	59	62	65	64
	HSTS	41	33	30	41	38	35	36
Number caught	WSTS	37	172	161	168	239	250	171
	HSTS	26	85	69	115	146	132	96
Percent of run caught	WSTS	3.9	19.6	12.4	16.6	27.7	22.1	17.1
	HSTS	7.2	12.2	8.4	7.5	14.7	17.9	11.3
Percent of run harvested	HSTS	5.3	8.7	7.3	5.9	10.4	13.7	8.6
Composition of lower river catch (%)	WSTS	49	67	64	59	49	50	56
	HSTS	51	33	36	41	51	50	44
Composition of upper river catch (%)	WSTS	71	66	75	60	78	75	71
	HSTS	29	34	25	40	22	25	29
Location of WSTS catch (%)	Lower Rr.	46	70	44	71	44	30	51
	Upper Rr.	54	30	56	29	56	70	49
Location of HSTS catch (%)	Lower Rr.	69	68	56	72	74	56	66
	Upper Rr.	31	32	44	28	26	44	34
Percent of WSTS run caught	Lower Rr.	1.8	13.7	5.4	11.9	12.2	6.6	8.6
	Upper Rr.	2.1	5.9	7.0	4.7	15.5	15.4	8.4
Percent of HSTS run caught	Lower Rr.	5.0	8.3	4.7	5.4	10.9	10.0	7.4
	Upper Rr.	2.2	3.9	3.7	2.1	3.8	7.8	3.9
Percent of HSTS run harvested	Lower Rr.	3.9	5.7	4.2	4.3	9.2	7.3	5.8
	Upper Rr.	1.4	3.0	3.1	1.6	1.2	6.4	2.8

[a] *Hatchery steelhead run = number counted at Three Mile Falls Dam plus harvest below Three Mile Falls Dam; Wild steelhead run = number counted at Three Mile Falls Dam.*

[b] *WSTS = wild steelhead; HSTS = hatchery steelhead; Lower Rr. = lower river creel area; Upper Rr. = upper river creel area.*

Table 9. Summary of Estimated Tribal of Summer Steelhead from 1993 through 1988.

Year	Summer Steelhead Caught by Tribal Anglers
1993-94	30 (5)*
1994-95	25 (5)
1995-96	25 (5)
1996-97	39
1997-98	33
1998-99	39 (5)*
Total	191 (20)*

* Wild Fish in parentheses, estimated for 1993 and 1999.

Table 10. Summary of Estimated Harvest Outside of the Umatilla River Basin for Hatchery Summer Steelhead Adults Returning from Releases in the Umatilla River (based on coded wire tag recoveries).

Year of Release	Estimated Summer Steelhead Harvested Out of Basin		
	Canada and Idaho Catch	Columbia River Catch (Nets)	Columbia River Sport Catch
1988	3	88	15
1989	0	0	6
1990	0	136	74
1991	0	119	63
1992	0	48	4
1993	2	30	56
1994	0	42	157
1995	0	100	75
1996	0	17	11
Total	7	580	461

Table 11. Catch and harvest of fin-clipped "trout" (juvenile hatchery steelhead) and unclipped "trout" (rainbow trout and juvenile native steelhead) during steelhead and spring Chinook salmon fisheries in the upper Umatilla River, 1999.

Steelhead Fishery (Barnhart Bluffs to CTUIR West Boundary)
January 1 – April 15, 1999

Fish Caught	Estimated catch	Estimated harvest	Hrs / fish	Estimated hours of steelhead angling
Clipped "trout"	114	0	77.2	8,805
Unclipped "trout"	340	0	25.9	
Unclipped:Clipped "Trout" Catch Ratio = 3:1				

Spring Chinook Fishery (Three Mile Falls Dam to CTUIR West Boundary)
May 29 – June 20, 1999

Fish Caught	Estimated catch	Estimated harvest	Hrs / fish	
SALMON ANGLERS				Estimated hours of
Clipped "trout"	79	44	37.5	salmon angling
Unclipped "trout"	169	94	17.6	2966
TROUT ANGLERS				Estimated hours of
Clipped "trout"	325	169	9.0	trout angling
Unclipped "trout"	1,737	903	1.7	2932
TOTAL				
Clipped "trout"	404	213	--	
Unclipped "trout"	1,906	997	--	
Unclipped to Clipped "Trout" Catch Ratio = 5:1				

Table 12. Summary of steelhead catch statistics, 1992-2001 run years. Data is combined from lower river (Umatilla mouth to Three Mile Falls Dam) and upper river (Barnhart Bluffs to lower boundary of the Confederated Tribes of the Umatilla Indian reservation near Highway 11).

Year	No. anglers	Hours fished	No. hatchery steelhead harvested	No. hatchery steelhead released	No. natural steelhead released	Catch rate (fish/h)
1992-93	543	5,293	37	NA	140[a]	0.040
1993-94	577	4,504	19	7	37	0.014
1994-95	1,070	6,172	61	24	172	0.042
1995-96	880	4,560	60	10	162	0.051
1996-97	1,409	6,916	90	25	169	0.048
1997-98	898	6,676	101	43	238	0.057
1998-99	1,179	9,097	101	31	272	0.044
1999-00	1,154	8,545	78	22	454	0.065
2000-01	1,455	7,283	90	24	181	0.041
2001-02	1,624	12,057	204	56	733	0.082

[a] *Includes an undetermined number of hatchery steelhead released.*

Table 13. Umatilla River summer steelhead broodstock collection

Run Year	Number Collected								
	Marked			Unmarked			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
82-83	0	0	0	unk	unk	161	unk	unk	161
83-84	0	0	0	20	32	52	20	32	52
84-85	0	0	0	25	79	104	25	79	104
85-86	0	0	0	11	58	69	11	58	69
86-87	0	0	0	57	91	148	57	91	148
87-88	0	0	0	73	78	151	73	78	151
88-89	0	0	0	72	88	160	72	88	160
89-90	0	0	0	49	57	106	49	57	106
90-91	47	56	103	46	53	99	93	109	202
91-92	49	46	95	109	116	225	109	116	225
92-93	1	2	3	64	61	125	65	63	128
93-94	18	25	43	47	45	92	65	70	135
94-95	35	33	68	38	48	86	73	81	154
95-96	16	12	28	56	49	105	72	61	133
96-97	12	1	13	48	49	97	60	50	110
97-98	19	11	30	42	44	86	61	55	116
98-99	17	0	17	52	59	111	69	59	128
99-00	14	1	15	60	55	115	74	56	130
00-01	10	0	10	55	50	105	65	50	115
01-02	10	0	10	50	50	100	60	50	110
02-03	10	0	10	48	51	99	58	51	109

Table 14. Umatilla River summer steelhead broodstock spawning

Run Year	Number Spawned									Eggs Taken	Mean Fecundity
	Marked			Unmarked			Total				
	Males	Females	Total	Males	Females	Total	Males	Females	Total		

82-83	0	0	0	unk	33	unk	unk	33	unk	132,000	4,000
83-84	0	0	0	unk	21	unk	unk	21	unk	100,000	4,762
84-85	0	0	0	unk	33	unk	unk	33	unk	150,000	4,545
85-86	0	0	0	unk	30	unk	unk	30	unk	166,000	5,533
86-87	0	0	0	30	37	67	30	37	67	239,760	6,480
87-88	0	0	0	31	31	62	31	31	62	121,980	5,545
88-89	0	0	0	42	42	84	42	42	84	214,712	5,803
89-90	0	0	0	28	25	53	28	25	53	130,274	5,922
90-91	11	31	42	52	33	85	63	64	127	410,356	6,412
91-92	0	0	0	86	86	172	86	86	172	476,871	5,545
92-93	1	2	3	48	47	95	49	49	98	255,441	5,213
93-94	0	17	17	48	31	79	48	48	96	234,432	4,884
94-95	9	13	22	31	28	59	40	41	81	223,525	5,452
95-96	13	8	21	31	32	63	44	40	84	215,408	5,385
96-97	2	1	3	37	38	75	39	39	78	209,639	5,375
97-98	13	8	21	30	38	68	43	46	89	228,622	5,080
98-99	4	0	4	35	41	76	39	41	80	224,716	5,481
99-00	8	0	8	34	42	76	42	42	84	200,825	4,782
00-01	0	0	0	41	41	82	41	41	82	226,685	5,529
01-02	4	0	4	32	36	68	36	36	72	180,955	5,027
02-03	2	0	2	29	30	59	31	30	61	184,827	6,161

Table 15. Water quality comparisons between Michigan and Oregon raceways during production 1992-1998.

		Inlet			Outlet		
Parameter	Pass	N	Means	Min-Max	N	Means	Min-Max
Temperature	A	113	12.4	10.4-15.2	113	12.4	10.4-15.1
(°C)	B	93	12.5	10.6-15.0	93	12.5	10.6-15.0
	C	87	12.5	10.2-14.9	86	12.5	10.3-15.2
pH	A	108	7.78	6.83-8.63	108	7.68	6.79-8.30
	B	88	7.71	7.08-8.30	88	7.63	6.73-8.18
	C	82	7.64	6.85-8.24	81	7.60	6.73-8.14
Oxygen	A	110	12.1	8.7-17.9	110	9.13	5.7-11.9
(mg/L)	B	90	12.7	8.7-19.5	90	9.51	6.2-12.9
	C	82	13.0	9.3-17.6	81	9.79	7.2-14.5
Unionized	A				88	0.56	0.03-2.56
Ammonia	B				70	1.12	0.12-7.48
(µg/l)	C				65	1.49	0.23-11.75

Table 16. Egg take and survival of summer steelhead (brood years 1992-1998) reared at Umatilla Hatchery during 1992-1998.

Brood	Number of eggs taken	Egg-to-fry survival	Egg-to-smolt survival[a]

Year	or received	(%)	(%)
1991	340,674	79	68
1992	423,810	81	73
1993	255,000	74	75
1994	234,000	85	83
1995	223,525	87	77
1996	224,000	82	72
1997	209,639	82	76
1998	228,622	63	54
1999	224,716	76	74
2000	200,825	79	76
2001	226,685	75	71
2002	180,955	73	69
2003	184,827	75	

[a] *Survival estimate is based on green egg-to-smolt stage.*

Table 17. Rearing conditions immediately before transfer for summer steelhead in Michigan raceways at Umatilla Fish Hatchery during 1991-2001.

Brood year	Maximum density (lb/ft^3)	Maximum loading (lb/gal/min)	Maximum total number reared per gpm in system
1991	5.4-6.7	11.8-14.6	210
1992	4.0-4.5	8.9-9.9	167
1993	3.8-4.6	8.4-10.1	161
1994	4.0-4.2	9.7-10.2	154
1995	4.1-4.3	9.8-10.4	154
1996	3.4-3.9	8.1-9.3	145
1997	3.7-3.8	8.7-9.1	145
1998	2.1-3.5	5.1-8.2	128
1999	5.03	11.9	163
2000	3.82	9.0	149
2001	5.30	12.6	166

Table 18. Mean length, weight, and condition factor at release for summer steelhead reared in first, second, and third pass Michigan raceways from Umatilla Hatchery, 1991-1997 broods (standard error in parentheses).

Brood year	Date Mean(SE)	Pass	Length(mm) N	Length(mm) Mean(SE)	Weight(g) N	Condition factor Mean(SE)	Condition factor N
1991	4/29/92 1.13(0.01)	A	323	194.3(1.4)	100	91.0(3.2)	100
	3/29/92 1.09(0.01)	B	328	200.0(1.1)	101	90.2(2.4)	101
	3/29/92 1.12(0.01)	C	316	186.9(1.0)	99	76.7(2.1)	99
1992	5/13/93 0.93(0.01)	A	298	199.6(1.1)	110	74.8(2.1)	110
	4/16/93 1.01(0.01)	B	308	198.2(1.2)	98	80.9(2.7)	98
	4/18/93 0.93(0.01)	C	324	220.1(1.0)	108	102.4(2.5)	108
1993	4/14/94 0.97(0.01)	A	320	205.9(1.2)	103	86.7(2.5)	103
	3/16/94 1.05(0.01)	B	312	198.3(1.2)	125	88.7(2.4)	125
	3/17/94 0.94(0.01)	C	315	214.2(1.1)	106	93.8(2.3)	106
(Table 18 Cont.)							
1994	5/12/95 0.90(0.01)	A	315	206.3(1.1)	128	82.6(2.2)	128
	3/14/95 1.00(0.01)	B	300	209.7(1.0)	101	96.2(2.7)	101
	3/15/95 0.90(0.01)	C	316	205.9(0.8)	117	81.4(1.8)	117
1995	5/9/96 0.99(0.01)	A	303	207.9(1.1)	100	87.3(2.4)	100
	4/12/96 0.98(0.01)	B	312	206.8(1.3)	102	89.9(2.9)	102
	4/24-26/96a	C					
1996	5/15/97 0.99(0.01)	A	301	208.3(1.0)	99	93.3(2.3)	99
	4/11/97 1.08(0.01)	B	502	208.1(0.9)	381	99.5(1.5)	380
	4/10/97 0.95(0.01)	C	304	203.5(1.1)	202	84.8(1.7)	202
1997	5/4/98 1.04(0.01)	A	255	187.0(1.7)	106	71.9(2.9)	106
	4/17/98 1.01(0.01)	B	302	209.3(1.7)	208	95.5(3.1)	208
	4/17/98 0.94(0.01)	C	289	202.3(1.3)	198	77.0(1.7)	198
1998	5/4/99 0.98(0.01)	A	323	194.7(1.1)	100	76.4(2.6)	100
	4/14/99 1.04(0.01)	B	347	207.3(1.1)	102	91.9(2.9)	102

	4/15/99	C	316	207.7(1.1)	105	83.2(2.5)	105
	0.96(0.01)						
1999	4/11/00	B	69	194.3(2.6)	67	70.6(3.0)	67
	0.93(<0.01)						
	4/4/00	C	610	206.4(0.9)	214	93.8(2.4)	214
	1.05(<0.01)						
	4/26/00	A	325	201.7(1.7)	210	96.5(3.0)	210
	1.08(<0.01)						
2000	4/3/01	C	303	207.3(0.9)	101	94.7(2.5)	101
	1.03(0.01)						
	4/6/01	B	310	207.9(0.9)	101	84.7(1.7)	101
	0.93(0.01)						
	4/26/01	A	319	205.9(1.3)	111	96.9(3.1)	111
	1.03(0.01)						
2001	4/9/02	C	316	211.1(1.0)	99	88.2(2.4)	99
	0.93(<0.01)						
	4/30/02	B	311	222.7(1.3)	105	108.0(3.0)	105
	1.00(0.01)						
	4/29/02	A	333	210.3(1.2)	197	100.1(2.3)	197
	1.03(0.01)						
2002	3/26/03	A	300	212.4(1.5)	98	103.2(4.0)	98
	1.08(0.01)						
	3/27/03	B	297	216.5(1.5)	97	93.8(3.4)	97
	0.95(0.01)						
	3/27/03	C	608	217.8(1.1)	199	112.1(2.9)	199
	1.00(0.01)						

Table 19. Mean proportion of descaled, partially descaled, and undamaged summer steelhead reared in Michigan raceways at Umatilla Fish Hatchery for brood years 1991-2003.

Brood	Sample		Smolting			Descaling		
Year	date	Pass	Smolt	Intermediate	Parr	Descaled	Partial	None
1991		A				0.01	0.43	0.56
		B				0.05	0.39	0.61
1992		A				0.08	0.30	0.62
		B				0.03	0.56	0.41
		C				0.02	0.58	0.40
1993		A				0.05	0.13	0.82
		B				0.01	0.50	0.49
		C				0.11	0.33	0.56
1994		A				0.13	0.39	0.48
		B				0.00	0.21	0.79
		C				0.09	0.42	0.50
1995		A				0.03	0.70	0.28
		B				0.01	0.31	0.69
1996		A				0.12	0.48	0.41
		B				0.02	0.35	0.63
		C				0.32	0.57	0.11
1997		A				0.00	0.04	0.96
		B				0.04	0.32	0.64
		C				0.05	0.34	0.61
1998		A				0.03	0.12	0.85
		B				0.00	0.06	0.94
		C				0.01	0.15	0.84
1999	2/28/2000	B	0.02	0.97	0.01	0.03	0.81	0.16
		C	0.04	0.96	0.00	0.05	0.74	0.21
	4/5/2000	A	0.01	0.96	0.03	0.01	0.14	0.85
2000	3/5/2001	A	0.00	1.00	0.00	0.00	0.00	1.00
		B	0.00	0.99	0.01	0.00	0.00	1.00
		C	0.00	1.00	0.00	0.00	0.00	1.00
2001	2/25/2002	B	0.00	1.00	0.00	0.00	0.03	0.97
		C	0.00	1.00	0.00	0.00	0.00	1.00
		A	0.00	1.00	0.00	0.00	0.00	1.00
	3/20/2002	A	0.01	0.99	0.00	0.01	0.01	0.98
	4/8/2002	B	0.11	0.89	0.00	0.00	0.00	1.00
2002	3/26/03	A	0.07	0.93	0.00	0.00	0.00	1.00
	3/27/03	B	0.07	0.93	0.00	0.00	0.00	1.00
	3/27/03	C	0.12	0.89	0.00	0.00	0.00	1.00

Table 20. Release data for summer steelhead reared at Umatilla Hatchery and released in the Umatilla River (RM= river mile; acclimation facilities: BS - Bonifer Springs acclimation facility; MC - Meacham Creek; MI - Minthorn Springs acclimation facility, RM=63.8; TH - Thornhollow acclimation facility, RM=73.5)

Brood year, CWT code	Last date of release	Race-way	Number released	Number CWT	Number brand/paint or PIT-tag	Fish per pound	Release location (RM)
1991							
075840	5/01/1992	M5A	22,288	10,105		5.5	MC
075838	5/01/1992	M5A	22,469	10,562		5.5	MC
075839	5/01/1992	M5A	22,662	10,275		5.5	MC
075841	4/30/1992	M5B	22,262	10,108		5.0	MC
075842	4/30/1992	M5B	21,365	9,498		5.0	MC
075843	4/30/1992	M5B	20,923	9,747		5.0	MC
074127	3/29/1992	M5C	22,059	10,203		5.8	BS & MN
073862	3/29/1992	M5C	22,902	10,594		5.8	BS & MN
073759	3/29/1992	M5C	22,474	10,394		5.8	BS & MN
Total			199,404	91,486		5.4	
1992							
076052	5/13/1993	M5A	65,465	13,117	9,055	6.1	BS
076053	5/13/1993	M5A		11,410		6.1	BS
076054	5/13/1993	M5A		9,907		6.1	BS
076055	4/16/1993	M5B	47,979	10,031	9,641	5.6	MN
076056	4/16/1993	M5B		9,418		5.6	MN
076057	4/16/1993	M5B		9,643		5.6	MN
076058	4/18/1993	M5C	44,824	10,194	8,863	4.5	BS
076059	4/18/1993	M5C		9,792		4.5	BS
076060	4/18/1993	M5C		9,440		4.5	BS
Total			158,268	92,952	27,559	5.5	
1993							
070139	5/12/1994	M5A	26,411	8,595	7,700	5.2	BS
070140	5/12/1994	M5A	25,686	8,400		5.2	BS
070141	4/14/1994	M5B	24,692	9,952	7,827	5.1	MN
070142	4/14/1994	M5B	24,906	9,965		5.1	MN
070143	4/11/1994	M5C	26,481	10,470	7,718	4.9	BS
070144	4/11/1994	M5C	24,922	9,651		4.9	BS
Total			153,098	57,034	23,346	5.1	
1994							
070655	5/12/1995	M8A	47,941	19,782	8,908	5.5	BS
070656	4/13/1995	M8B	49,983	18,812	8,134	4.7	MN
070657	4/11/1995	M8C	48,539	19,290	7,771	5.6	BS
Total			146,463	57,884	24,813	5.3	
1995							
071034	5/9/1996	M8A	49,783	20,633	8,896	5.1	TH
071035	4/12/1996	M8B	47,543	19,742	8,615	5.1	MN
071036	4/24/1996	M8C	49,377	21,205	8,827	5.3	BS
Total			146,703	61,580	26,338	5.3	

[a] *All fish were adipose clipped and all CWT fish were also left ventral fin-clipped*

Appendix Table A-7 (continued)

Brood year, CWT code	Release date	Race-way	Number released	Number CWT	Number brand/paint or PIT-tag[a]	Fish per pound	Release location (RM)
1996							
091837[b]	5/15/1997	M8A	48,944	20,065	8,655	4.9	BS
091836	4/11/1997	M8B	46,788	19,103		4.6	MN
091835[c]	4/10/1997	M8C	41,555	19,531		5.4	BS
Total			137,287	58,699	8,655	4.9	
1997							
092339	5/4/1998	M8A	47,313	19,468	242	5.5	BS
092340	4/17/1998	M8B	49,084	20,646	244	4.7	MN
092341	4/16/1998	M8C	41,088	20,800	250	5.9	BS
Total			137,485	60,914	736	5.3	
1998							
092527	5/4/1999	M8A	35,564	19,088	288	5.9	BS
092526	4/14/1999	M8B	41,843	20,787	210	4.9	MN
092525	4/13/1999	M8C	44,226	20,450	198	5.5	BS
1999							
092344	4/28/2000	M8A	52,736	21,965	1,356	4.7	64.5
070947	4/11/2000	M8B	49,343	21,552	252	6.4	2.0
070535	4/4/2000	M8C	51,659	20,980	233	4.8	64.5
Total			153,738	64,497	1,841	5.3	
2000							
093225	4/26/2001	M8A	41,403	21,556	1,744	4.7	64.5
093224	4/6/2001	M8B	48,291	20,944	296	5.4	2.0
093223	4/4/2001	M8C	50,829	21,065	282	4.8	64.5
Total			140,523	63,565	2,322	5.0	
2001							
093412	4/30/2002	M8A	47,521	20,422	1,077	4.5	64.5
093411	4/30/2002	M8B	54,366	21,241	568	4.2	56
093410	4/9/2002	M8C	54,917	21,274	268	5.1	2.0
Total			156,804	62,937	1,913	4.6	
2002							
093641	4/30/2003	M8A	42,783	20,240	278	4.4	56
093640	4/28/2003	M8B	41,369	19,217	285	4.8	2.0
093639	4/29/2003	M8C	42,805	18,702	288	4.0	6

2004 DRAFT

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Umatilla Spring Chinook
Species or Hatchery Stock:	Umatilla/Carson Stock Spring Chinook 091
Agency/Operator:	Oregon Department of Fish and Wildlife/ Confederated Tribes of the Umatilla Indian Reservation
Watershed and Region:	Umatilla / Columbia / Oregon
Date Submitted:	2004
Date Last Updated:	May 13, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Umatilla Spring Chinook

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

Umatilla Spring Chinook (Carson stock) *Oncorhynchus tshawytscha*

1.3) Responsible organization and individuals

.**Name (and title):** Scott Patterson – Hatchery Coordinator
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 107 Twentieth Street, La Grande, OR 97850
Telephone: 541-963-2138
Fax: 541-963-6670
Email: Scott.D.Patterson@state.or.us

Name (and title): Gary James – Fisheries Program Manager
Agency or Tribe: Confederated Tribes of the Umatilla Indian Reservation
Address: P.O. Box 638, Pendleton, OR 97801
Telephone: 541-276-4109
Fax: 541-276-4348
Email: garyjames@ctuir.com

Agency or Tribe Name (and title): Tim Bailey – District Fish Biologist
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 73471 Mytinger Lane, Pendleton, OR 97801
Telephone: 541-276-2344
Fax: 541-276-4414
Email: umatfish@oregontrail.net

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

Confederated Tribes of the Umatilla Indian Reservation-- Co-managers – Operators of acclimation and adult collection facilities

Bonneville Power Administration -- Funding – acclimation and adult collection, passage, hatchery, habitat, monitoring and evaluation.

U.S. Fish and Wildlife Service-- Little White Salmon National Fish Hatchery-

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

Umatilla Hatchery is 100% funded by the Bonneville Power Administration. Oregon Department of Fish & Wildlife operates the facility, and staff consists of one F&W Manager 1, one F&W Technician 2, four F&W Technician 1's, one Trades/Maintenance Worker 2, one

half-time F&W Technician 1, and one Trades/Maintenance Worker 1. Fiscal Year 2004 Umatilla Hatchery operations budget is $817,305

Little White Salmon National Fish Hatchery supports a variety of programs with funding from the U.S. Army Corps of engineers, NMFS-Mitchell Act, Bonneville Power Administration and U.S. Fish and Wildlife Service maintenance funding. The Little White Salmon NFH has a staff of thirteen full time employees and an annual budget of $1.08 million in Fiscal Year 2003. The budget for the Umatilla Basin spring chinook program was $71,485 during fiscal year 2003 and funded by the Bonneville Power Administration.

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

Adult Collection--: Spring chinook will be collected at Three Mile Falls Dam adult trapping facility. If broodstock needs can not be met at Three mile Dam, other locations where Carson stock is available, such as Ringold Springs hatchery or Little White Salmon NFH, may be used for broodstock collection. Three Mile Falls Dam adult trapping facility is located approximately 4 miles upstream from the mouth of the Umatilla River, near the town of Umatilla, in Umatilla County, Oregon. The regional mark processing center site code for Three Mile Falls Dam is 5F33427 H27 24.

Little White Salmon NFH is located on the Little White Salmon River at river kilometer 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at river kilometer 261. This position is approximately 45° 42' 30" North Latitude and 121° 37' 30" West Longitude. Site elevation is about 27 meters above sea level.

Ringold Springs hatchery --is located on Ringold Spings near its confluence with the Columbia River at Columbia River mile 354 in Franklin County, Washington..

Holding and Spawning-- Spring chinook broodstock are transferred to the South Fork Walla Walla facility for holding and spawning. The South Fork Walla Walla facility is located at approximately RM 7 on the South Fork of the Walla Walla River, East of Milton-Freewater in Umatilla County, Oregon.

Incubation and rearing (from green egg to smolt-- Green eggs are transferred to Umatilla and eyed eggs to Little White Salmon hatcheries for incubation and rearing. Umatilla Hatchery is located along the Columbia River approximately two miles west of Irrigon in Morrow County, Oregon. The regional mark processing center site code for Umatilla Hatchery is 5F33449 H49 21.

Little White Salmon NFH is located on the Little White Salmon River at river kilometer 2, approximately 19 kilometers east of Stevenson, Washington. The hatchery is situated just above Drano Lake, a water body where the Little White Salmon River joins the Columbia River at river kilometer 261. This position is approximately 45° 42' 30" North Latitude and 121° 37' 30" West Longitude. Site elevation is about 27 meters above sea level.

Acclimation to release-- Juvenile Spring chinook are transferred to Imeques-C-mem-ini-kem for acclimation and release. The Imeques C-mem-ini-kem facility is located on the Umatilla River at RM 79.5 in Umatilla County, Oregon.

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1.6) Type of program.

The Umatilla River spring Chinook program is a re-introduction program.

1.7) Purpose (Goal) of program.

The goal of the program is to re-introduce spring chinook to the Umatilla River, to provide harvest, while rebuilding and maintaining adequate hatchery and natural production.

1.8) Justification for the program.

The indigenous Umatilla River spring chinook were extirpated from the Umatilla River in the mid-1900's. The program was started using Carson stock spring chinook as the donor stock, which is available at numerous locations in the Columbia Basin. Broodstock to meet the program needs are currently collected at Three Mile Falls Dam. All juveniles released are adipose fin clipped.

1.9) List of program "Performance Standards".

The Performance Standards for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."
The Performance Indicators for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed

1.10.1) "Performance Indicators" addressing benefits.

1.10.2) "Performance Indicators" addressing risks.

1.11) Expected size of program.

The current Umatilla River spring chinook yearling production goal is 810,000 smolts. Of this goal 600,000 are reared at Umatilla Hatchery and 210,000 smolts are reared at Little

White Salmon NFH.

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

Broodstock needs are 280 females and 280 males and 28 jacks. Broodstock are collected from April through June.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling		
Yearling	Imeques C-mem-ini-kem RM 79.5 Umatilla River	810,000 Yearling smolts

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

See – (Tables 1-4).

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

The first releases of spring chinook in the Umatilla River were made in 1986, the first releases from Umatilla Hatchery were made in 1992. (Table 5)

1.14) Expected duration of program.

The program is ongoing.

1.15) Watersheds targeted by program.
Umatilla River sub-basin.

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

Managers are currently reassessing hatchery performance goals in the subbasin planning process. When this process is completed, the revised goals and alternative actions will be submitted.

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

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

4d rule research permit applications have been submitted to NMFS for the following:

- Outmigration and Survival Study

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.

Adult age class structure: See table 19
Sex ratio: See table 15
Size range: See table 15
Migrational timing: See table 20
Spawning range:
Spawn timing: See table 20
Juvenile life history strategy, including smolt emigration timing: See table 20

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

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

Umatilla River Summer Steelhead (stock 091) – included as part of the Mid-Columbia ESU - listed as "Threatened" under the federal ESA. Umatilla River bull trout are included as part of the Columbia distinct population segment listed as Threatened under the federal ESA.

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

Chilcote (Unpublished draft) identifies the wild Umatilla summer steelhead critical population threshold at 110, and the viable population threshold at 333. Since 1988, wild adults available for spawning have exceeded 600. (See table 6)

- **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.** The progeny to parent ratio for natural spawning hatchery and natural steelhead compared to Umatilla hatchery steelhead from 1990 through 1999 is presented in Table 7. The progeny to parent ratio of natural spawning hatchery and natural steelhead has been below replacement in eight of the last ten years. In contrast, hatchery progeny to parent ratio was above one for all of the last ten years.

- 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.
The number and percent of adult steelhead available to spawn of wild and hatchery origin since 1988 is presented in Table 6. Total natural adult return numbers to Three Falls Mile Dam have ranged from 725 in 1990-91 to 3,659 in 2001-02 (Table 16).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.
The percent of adults available to spawn that were of hatchery origin has ranged from 6.9% of the total run in 1988, to a high of 58.9% in 1997 with a mean of 27.2% (1988-1998; Table 17).

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.

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

- 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).

- **- 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.**

  Outmigration and Survival Study - As per the 4d rule research application; we will reduce numbers collected by adjusting the sample times and avoid sampling when large numbers of natural steelhead are passing through the sampling facility. To reduce the number of mortalities from fish jumping out of the sample tank or from other areas, we will apply covers and screens to prevent escape and monitor the facility closely. Monitoring information is mostly obtained through remote interrogation of tags, without any handling.

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.

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

1) CTUIR. 1994. Wildlife Mitigation Plan (Draft) May 1996, Columbia Basin Salmon Policy. 1995 pg 9-10, and Water Assessment Report;
2) NMFS - Salmon & Steelhead Enhancement Plan for the Washington and Columbia River Conservation areas.Vol 1. chpt 4, 37pgs;
3) Reeve, R. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Plan;
4)CTUIR/ODFW. 1990. Umatilla Hatchery Master Plan;
5) OWRD. 1988. Umatilla Basin Report;
6) BOR. 1988. Umatilla basin Project Planning Report,
7) Umatilla County - Comprehensive Plan. 1983, chpt 8;
8) USNF - Umatilla National Forest Land & Resource Management Plan. 1990, chpt 2, pg 13. and Final EIS. 1990, chpt III, pgs 59-62;
9) CTUIR/ODFW. 1990. Umatilla River Subbasin Salmon and Steelhead Production Plan;
10) Boyce, R. 1986. A Comprehensive Plan for Rehabilitation of Anadromous Fish Stocks in the Umatilla River Basin; 11)USFWS & NMFS. 1982. Umatilla R. Planning Aid Report.
11) USBR and BPA. 1989. Umatilla Basin Project. Initial project workplan presented to the NWPPC, May 1989.

This HGMP is consistent with these plans and commitments.

3.3) Relationship to harvest objectives.

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

Spring chinook fisheries have occurred nine of the past twelve years in the Umatilla River. The spring chinook fishery generates the highest level of participation and harvest to both tribal and non-tribal fishers in the Umatilla River compared with all the other salmonid runs. Managers have set a harvest goal of 10% of the run to the mouth of the Umatilla River for both the tribal and non-tribal fishery. (Tables 1, 3, & 6)

3.4) Relationship to habitat protection and recovery strategies.

The Umatilla spring chinook Program is a part of an overall Umatilla Basin Salmon and Steelhead Restoration Program. In addition to on-going passage and hatchery operations, restoration efforts include ongoing projects that enhance stream and riparian habitat as well as monitor and evaluate the hatchery and natural components of the restoration program.

Factors limiting the natural production of spring chinook in the Umatilla River Basin include channelization, low or no summer flows, warm water temperatures, sediment, and poor habitat diversity caused by urban and rural development/land management practices. Ocean conditions and the mortalities and stress from the operation of hydropower projects on the mainstem Columbia River are important factors outside the basin. There continues to be degradation to fish habitat in these areas that hampers improvement efforts.

3.5) Ecological interactions.

- Interactions with species that could negatively impact program: a) bird predation during peak smolt migration periods each Spring; and b) Northern Pikeminnow and smallmouth bass - predation during smolt migration periods.

- Interactions with species that could positively impact program: Carcasses from spring chinook add to the Umatilla River subbasin's nutrient recharge cycle. Increased angler effort in the spring Chinook salmon fisheries increases awareness of the Umatilla steelhead program which could potentially lead to increased harvest of hatchery steelhead.

- Interactions with species that could be positively impacted by program: Hatchery and naturally produced spring chinook smolts could add to the food base for bull trout.

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.

Umatilla Hatchery--The water source for the Umatilla Hatchery comes from the Columbia River through a Ranney well system, and four separate wells. The system was initially designed and constructed to produce a maximum of 15,000 gpm of water. However, actual water capacity at UH is 5,500 gpm, and several wells have been subject to failure (Jack Hurst, ODFW, Umatilla Hatchery) Water from the well system averages 12.2°C (54°F). Water quality exceeds BPA requirements (BPA 1987) for all hatchery uses. Water is withdrawn under certificate #72181, permit G 10870, and, certificate #72182, permit #G 11210. Water discharged is monitored under the general NPDES 0300 J permits.

Three Mile Falls Dam-- The water source for the Three Mile Falls Dam adult facility is pumped directly from the Umatilla River. The Denil steep-pass utilizes 2,900 gpm and the holding pond uses 1,450 gpm. Both the steep-pass and holding pond pumps run continuously. The fish lock system uses 630 gpm, but is used only during handling operations (approximately two hours per day). The water source is the same as used by the natural population.

Water temperatures at Three Mile Falls Dam range from approximately 0°C (32°F) in winter to over 21°C (70°F) during the summer. Sediment loads vary dramatically during the return season (late August through early June) and during the migration season (March – July). High sediment loads are experienced annually during high flow conditions.

Natural Production-- Natural spawners use the water available in the streams of the Umatilla River Basin. Water quality is relatively high in the headwater streams where steelhead spawn and rear. The spawning streams contrast greatly to the lower Umatilla River and lower tributaries where sediment loads are high in the spring and summer water temperatures are often lethal to Salmonids (Contor et al. 1998). Water quality in this desert basin contrasts to the hatchery, as there are often large daily fluctuations in water temperature. During the winter and spring, rain-on-snow events interspersed with cold periods often produce large fluctuations in stream flow. During spawning and incubation, the streams are often high and turbid.

Little White Salmon Hatchery-- Water rights for the **Little White Salmon NFH** total 33,868 gpm from the Little White Salmon River, a small well and springs. Water use for fish production ranges from11, 221 gpm to 28,232 gpm. The river supplies most of this water flow. The water intake structure was rebuilt in 1994 and modified in 2001. A water re-use system was constructed in 1967 for egg incubation, but has not been operated for several years.

The re-use system was originally used to supplement water supplies for incubation in low water years, but has not been needed since the well was upgraded. Use of the reused water is avoided whenever possible due to disease transmission concerns. An independent hatchery audit (Montgomery Watson 1997) measuring hatchery operations against IHOT standards (IHOT 1995) reported a remedial action was needed to provide disease-free water for incubation and early rearing (4,700 gpm). The estimated cost was $2.7 million. Such a system would also benefit the incubation of fall Chinook and coho salmon.

The Complex=s water intake structure was examined during the independent audit (Montgomery Watson 1997). The structure was in compliance when measured against NMFS=s screening criteria for approach velocity and screen openings. The hatchery monitors water discharges and is in compliance with the NPDES permit.

Imeques Acclimation-- Imeques is fed by gravity directly from the Umatilla River. Flows are held constant at approximately 1,600 gpm per each of four acclimation ponds. During the juvenile acclimation period (mid-November to mid-April), average monthly temperatures range from approximately 3.6 to 6.7 C (38.5 to 44^{o}F).

4.3) 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.

Imeques Acclimination--Acclimation facility intake screens conform to NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.

Umatilla Hatchery-- Umatilla Hatchery uses 100% well water.

Little White Salmon Hatchery--As stated above in section 4.1, the hatchery intake structure is above an impassable barrier dam which prevents listed anadromous species from having access to the main water supply. The hatchery's effluent discharge is well within its NPDES permit and is further diluted by the Little White Salmon River further reducing any possible negative impacts.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock collection is conducted solely at the Three Mile Falls Dam east bank adult trapping facility. The facility consists of a vertical slot fish ladder, Denil steeppass, adult holding pond (raceway), and fish handling and sorting complex. The construction and operation of the facility has no effect on the critical habitat for summer steelhead. The dimensions of the holding pond are 14' wide by 36' long by 3.5' deep (approximately 1,800 cubic feet). The holding pond has a jump screen located at the upper end and jumpout panels located at both upper corners to prevent adults from jumping out of the pond. The

holding pond is located above the 100 year flood level.

The water supply for the holding pond is pumped directly from the Umatilla River at a rate of 1,450 gpm. A low water discharge alarm is located on the pond supply line to signal any loss of flow to the holding pond. No backup pumps or emergency generator system are located at the site. In case of water loss to the pond, two options are available to on-site personnel. During power outages or other short term losses of flow, the outlet gate from the pond can be closed to maintain water depth. For pump failures or other long term losses of water supply, adults can be dip netted out of the pond and returned to the river.

5.2) Fish transportation equipment

Umatilla Spring Chinook Adults collected are anesthetized with CO2, prior to handling. Broodstock are transported in a 370-gallon fish transport tank, which is mounted on a dual axle trailer and is pulled by a pick-up truck. The trailer is equipped with compressed oxygen aeration and a re-circulation system.

5.3) Broodstock holding and spawning facilities.

South Fork Walla Walla-- Since 2000, all spring Chinook spawning has occurred at South Fork Walla Walla. The facility includes a water intake system with automatic screen cleaning, pump station having a nominal pumping capacity of 8,700 gpm, ozone effluent water treatment system, settling pond, five adult holding ponds, (each 90 x 10 x 5 foot effective water depth; (4,500 f^3), mechanical fish crowder, standby generator, chemical storage and spawning buildings and two homes for night watch personnel. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler/freezer, and restroom and office space.

5.4) Incubation facilities.

Umatilla Hatchery-- Fertilized eggs are transported from South Fork Walla Walla to Umatilla Hatchery in five-gallon buckets with chilled water. Umatilla hatchery incubation equipment consists of four separate units of Marisource incubators (Heath tray type). Water can be used directly from wells or mixed with chilled water. Three units can be supplied with well water at 12.2^{o}C (54^{o}F) or mixed with chilled water 7.2^{o}C (45^o F) for any combination of temperatures from 7.2-12.2^{o}C (45-54^o F) provided that 300 gpm of chilled water is not exceeded. The fourth unit can be mixed with water chilled to 3.3^{o}C (38^o F) to achieve any combination of temperatures from 3.3-12.2^{o}C (38–54^o F) provided that 60 gpm of chilled water is not exceeded. Numerous systems continually monitor temperature, mechanical systems, electrical systems, and flow. Alarms sound if any system fails or is out of criteria. Continual monitoring of systems and preventative maintenance is used to prevent system failure. An emergency gas powered pump installed in the aeration tower structure supplies water for incubation in the event of aeration lift pump failure. In the event of total system failure resulting in total loss of water, eggs may be transported to Irrigon hatchery (if they are still operational and have necessary space).

Pathogen free water is used for incubation at Umatilla Hatchery for all programs. This is a direct preventive measure at minimizing the risk of introducing pathogens into the hatchery program, thus minimizing the risks to fish in the natural environment after these fish

are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor.

Little White Salmon Hatchery--Eyed eggs are received at Little White for their portion of the Umatilla River program. Incubation at Little White Salmon Hatchery is done in the nursery building about 0.5 km from the spawning facility using up to 36 of 132 stacks of vertical incubators with flows set initially to 3 gpm and raised to 5 gpm at hatching. Water for incubation is primarily from springs and a well, with screened river water available if needed. The eggs are treated with 1,667 ppm formalin for fifteen minutes between three and five times a week to control fungus. The formalin is delivered using a newly constructed delivery system which ensures proper dilutions and timing. The installation of egg isolation units has been proposed to prevent potential disease transmission from eggs transported from outside the facility to Little White Salmon stocks.

5.5) Rearing facilities.

Umatilla Hatchery-- Umatilla Hatchery has three different types of rearing units. There are eight 21' Canadian style early rearing tanks located in the main building adjacent to incubation. Water is pumped to the aeration tower and gravity fed to the tanks. Spring Chinook are started in these tanks in mid-May. The fish are moved outside tone Oregon pond when densities reach approximately 80 pounds in each tank. Umatilla Hatchery has 10 Oregon ponds. Rearing dimensions are 91'X18.75'X3.67'. These ponds are designed for serial reuse in-groups of 2 ponds, upper and lower. They also can be supplied with fresh water individually, if necessary. Spring Chinook are reared in these ponds until fish are 100% AD clipped and 120,000 Coded Wire tagged, into 12 Michigan ponds in early August. Umatilla Hatchery has 24 Michigan style ponds, with rearing dimensions of 91'X9'X2.75'. Water is supplied to these ponds in reuse groups of three ponds each. Each pond has a submersible pump that supplies 950 gpm of water to oxygen contact columns, located at the head of each pond. Oxygen is introduced and unwanted saturated gas is removed from incoming water at this point. Each pond has its own oxygen supply line. Supplemental oxygen is either delivered from oxygen generators, (pressure swing absorption units) or from a bulk liquid tank on site. Chinook are reared at enhanced densities to utilize well available water efficiently. Three Michigan ponds (50K ea.) are transferred in November to Imeques acclimation. The remainder is transferred to Imeques in mid-January, and all are released by mid-March. All ponds have a high-low water level alarm, and for Michigan ponds, pump failure and oxygen flow alarms. In the event of total system failure, fish could be moved to nearby Irrigon Hatchery if pond space is available and all logistics were in place prior to the time of failure. Monitoring and maintenance of the water supply system, and forecasting for contingencies, are the best means for dealing with the possibility of rearing pond system failure.

Pathogen free water is used for rearing the fish at the Umatilla Hatchery for all production. This is a direct preventive measure at minimizing the risk of introducing pathogens into hatchery phase of this program, thus minimizing the risks to fish in the natural environment after these fish are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor.

In addition, a fish health program is in place to monitor and evaluate the health status of summer steelhead juveniles reared at Umatilla Hatchery.

Little White Salmon Hatchery--Rearing is performed at Little White Salmon in newly constructed (2001-2002) 10' X 110' X 3.5' mocha colored raceways with maximum flows of approximately 800 gpm, as well as in nine 8' X 80' concrete raceways (flows up to 470 gpm) and two new 10' X 210' X 3.5' colored concrete raceways (flows up to 2,000 gpm). Baffles are being evaluated in the new raceways to determine their usefulness with these fish

5.6) Acclimation/release facilities.

Imeques Acclimation-- The Imeques acclimation/release facility includes a water intake structure with automatic screen cleaner, water head box/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow (approximately 1,600 gpm per pond). The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way. The ponds are thoroughly cleaned prior to fish being received, and ODFW pathology personnel are available to address disease concerns.

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

Umatilla Hatchery--There have been no operational difficulties or disasters at Umatilla that have led to significant fish mortality.

Little White Salmon Hatchery--There have been no operational difficulties or disasters at Little White Salmon that have led to significant fish mortality.

Imeques Acclimation—A early release in December 1998 occurred due to extreme icing. No significant mortality occurred however. See (section 5.6)

Bonifer Ponds--In 1986, one group of spring chinook juveniles was acclimated at Bonifer from July through October. This group suffered significant losses (~25%) due to disease (Columnaris) and excessive aquatic vegetation. In 1988, another group of spring chinook was acclimated at Bonifer from September through November. This group also suffered significant juvenile losses (98%) due to low dissolved oxygen levels and disease (Ich).

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.

Umatilla Hatchery--This is covered in section 5.5

Little White Salmon Hatchery--Hatchery has low water alarm probes positioned in several locations to prevent fish losses due to water system failures. The alarm system is equipped with radio pagers and an automatic phone dialer in case of emergency. Fish disease transmission is managed in accordance with the US Fish and Wildlife Service=s fish health policy and IHOT recommendations.

South Fork Walla Walla -- Since 2000, all spring chinook spawning has occurred at South Fork Walla Walla. The facility includes a water intake system with automatic screen cleaning, pump station having a nominal pumping capacity of 8,700 gpm, five adult holding ponds, standby generator, and two homes for night watch personnel. In the event of power failure, an audio alarm will sound; the standby generator will start automatically, and in turn, the primary pump will restart. If for some reason the primary pump does not start or fails for any reason, one of two backup pumps will start automatically. The audio alarm will alert the facility night watch personnel who will respond to the emergency. If one of the pumps will not run, the effluent standpipes to the individual ponds can be quickly raised, maintaining existing water levels in the ponds. This will keep the fish alive for a period of time. The project maintenance supervisor and technicians are also on call 24 hours per day for emergency response.

Imeques Acclimation--The Imeques acclimation/release facility includes a gravity flow water intake structure with automatic screen cleaner. Water (approximately 1,600 gpm per each of four acclimation ponds) is supplied by gravity to a headbox/water distribution structure where it is gravity fed to the ponds. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Carson stock spring Chinook are used for the Umatilla River program. From brood years 1984 to 1999, Carson stock adults were collected from various sources (Carson National Fish Hatchery, Lookingglass Hatchery, Big Canyon Hatchery, Ringgold Hatchery, Little White Salmon Hatchery, and from adult returns to the Umatilla River. Since 2000, all spring Chinook broodstock have been collected from the Umatilla River.

6.2) Supporting information.

6.2.1) History.

From brood years 1984 to 1999, Carson stock spring Chinook broodstock from various sources (Carson National Fish Hatchery, Lookingglass Hatchery, Big Canyon Hatchery, Ringold Hatchery, Little White Salmon Hatchery, and from adult returns to the Umatilla River), were used for the Umatilla River program. Since 2000, however; all spring Chinook broodstock have been collected from the Umatilla River.

6.2.2) Annual size.

The number of spring Chinook broodstock collected for holding/spawning since 2000, when all broodstock have been collected from Umatilla River adult returns, has varied from 586 in both 2002 and 2003 to 630 in 2001(Table 9). The collection goal for 2004 is 560 adults (230 pairs), and 28 jacks. The collection goal in following years is anticipated to be similar.

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

All fish collected are from reestablished Carson stock of hatchery origin.

6.2.4) Genetic or ecological differences.

Since 2000, broodstock for this program has been collected entirely from the Umatilla River (Carson stock). Broodstock consists of both marked and unmarked fish.

6.2.5) Reasons for choosing.

Carson stock was selected for reestablishment of Spring Chinook salmon in the Umatilla River, due to its existence in adjacent watersheds.

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

The risk of among population genetic diversity loss will be reduced by selecting the indigenous Chinook salmon population for use as broodstock in the program.

SECTION 7. BROODSTOCK COLLECTION

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

All fish collected for broodstock are adults and jacks.

7.2) Collection or sampling design.

Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source.

Preston?

7.3) Identity.

Carson stock spring chinook are used for the Umatilla River program. From brood years 1984 to 1999, Carson stock adults were collected from various sources (Carson National Fish Hatchery, Lookingglass Hatchery, Big Canyon Hatchery, Ringold Hatchery, Little White Salmon Hatchery, and from adult returns to the Umatilla River). Since 2000, all spring chinook broodstock have been collected from the Umatilla River.

7.4) Proposed number to be collected:

The number of spring chinook broodstock collected for holding/spawning since 2000, when all broodstock have been collected from Umatilla River adult returns, has varied from 586 in both 2002 and 2003 to 630 in 2001(Table 9). The collection goal for 2004 is 560 adults (230 pairs), and 28 jacks. The collection goal in following years is anticipated to be similar.

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

The broodstock goal is to collect 280 adult males, 280 adult females, and 28 jacks.

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

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1997	320	276	0	1,029,237	671,683
1998	110	82	8	455,953	Unknown
1999	327	304	32	942,988	689,265
2000	320	286	13	1,120,995	878,971
2001	365	235	30	1,175,281	787,373
2002	322	238	26	1,017,113	869,466
2003	253	306	27	1,051,246	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
Describe procedures for remaining within programmed broodstock collection or allowable upstream hatchery fish escapement levels, including culling.

Broodstock are collected at a rate not to exceed program needs.

7.6) Fish transportation and holding methods.

Umatilla spring Chinook brood stock are collected at the Three Mile Dam adult collection facility, they then are transported to the South Fork Walla Walla holding facility for holding and spawning. Adults collected are anesthetized with CO2, prior to handling. Broodstock are transported in a 370-gallon fish transport tank, which is mounted on a dual axle trailer and is pulled by a pick-up truck. The trailer is equipped with compressed oxygen aeration and a re-circulation system. Transit time is approximately one hour. Water temperatures are monitored in the tank and at the release site to ensure there is less than a 10-degree water temperature difference at release.

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7.7) Describe fish health maintenance and sanitation procedures applied.

South Fork Walla Walla -- Collection--Adults retained for broodstock are injected with oxytetracycline (10mg/kg) and erythromycin (20mg/Kg) at the collection facility and at South Fork.

Holding--At South Fork Walla Walla adult facility, formalin is dripped into the inflowing water to achieve a maximum concentration of 167 ppm. The treatment is applied for one hour to control fungus and parasites three times per week.

Spawning--All hatchery-spawned females are screened for *R. salmoninarum* using enzyme-linked immunosorbent assay (ELISA) techniques. Examination of a minimum of 20 adults for systemic bacteria and *R. salmoninarum* by ELISA. Testing of a minimum of 60 spawned fish for culturable viruses using ovarian fluid and caeca/kidney/spleen in 5 fish sample pools.

Progeny-- Eggs are water hardened in 75ppm iodophor solution for up to 60 minutes to control vertical transmission of pathogens including IHNV. Vertical transmission of BKD (*R. Salmoninarum*) is also a concern. Eggs are culled based on ELISA titers. The overall goal is to only use eggs from females with OD values <0.200.

7.8) Disposition of carcasses.

All spring Chinook broodstock carcasses are buried in the regional 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.
(e.g. "The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines").

??? Brian Zimmerman

SECTION 8. MATING

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

8.1) Selection method.

From mid August to mid-September, all broodstock are sorted once per week for maturation. Fish are anesthetized with MS-222 or electro shocked. Ripe fish are held in live totes until a minimum of one or two family groups (a family group consists of four females and four males) have been sorted before they are killed and spawned. All ripe females are spawned on any given spawn day until the egg goals are met. Males, including jacks, and at a proposed rate of one male for every ripe female, are selected randomly throughout the broodstock population.

8.2) Males.

Males, including jacks, and at a proposed rate of one male for every ripe female, are selected randomly throughout the broodstock population. Whenever possible, one male is used to fertilize the eggs from one female.

8.3) Fertilization.

A 1:1 spawning ratio is utilized whenever possible and matings are random. Females are killed and bled by severing the caudal peduncle. The undersides of the fish are cleansed with a solution of Argentyne and

are then wiped with a clean towel. The eggs from each female are stripped into a colander to remove excess ovarian fluid and then placed into individual buckets. Males are killed, cleansed with Argentyne, and the milt is stripped directly into the eggs (one male per female). After the milt is added, well water from Umatilla Hatchery is added and the eggs and sperm are mixed and allowed to stand for approximately one minute or longer. The fertilized eggs from each bucket are then poured into a colander and combined. The eggs are then poured into a bucket with Umatilla Hatchery well water, rinsed, poured back into the colander, and then are placed into a solution of Argentyne and allowed to water harden for one hour. At the end of the hour, the eggs are again poured into a colander and then into a bucket of fresh well water with a watertight lid for transport to Umatilla Hatchery. Colanders, spawning knives and other equipment are disinfected with Argentyne between each family group. At the time the males and females are stripped, milt and ovarian fluid samples are taken to test for replicating viral agents. After spawning, pyloric caeca, kidney and spleen samples are also taken to test for bacterial kidney disease and other culturable pathogens. Samples of the lower intestine are examined for *Ceratomyxa Shasta*. Fish health procedures used for disease prevention include: 1.) Eggs are water hardened in 75ppm iodophor solution for up to 60 minutes to control vertical transmission of pathogens including IHNV. 2.)Vertical transmission of BKD (*R. Salmoninarum*) is also a concern. Eggs are culled based on gross observation of infected females, and ELISA titers. The overall goal is to only use eggs from females with OD values <0.200. 3) Draining ovarian fluid from eggs by use of colander; 4.)15 minute disinfection in iodophore at the hatchery upon arrival to the facility; and 5) Annual fish health monitoring of Umatilla spring Chinook brood stock to detect any virus or replicating agents or bacterial pathogens. For results from this monitoring see BPA annual reports 1992-1997 (Fish Health Monitoring & Evaluation, Keefe, Hayes, Focher & Groberg, et al.)

8.4) Cryopreserved gametes.

None used--

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.
(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program"*.).

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

Umatilla hatchery has used Carson stock from several hatcheries in the Columbia river basin prior to 1997. Since brood year '97, the sole egg source for Umatilla and little White Salmon,

has been Umatilla stock. (Table 9 & 10)

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

The Umatilla Spring Chinook Program does not collect eggs in excess of program needs.

9.1.3) Loading densities applied during incubation

Umatilla Hatchery--Hatchery incubation consists of four isolated units or sections of Marisource (Heath tray type) incubators as described in section 5.4.1 Loading densities do not exceed 8,000 eggs/tray green, and 7,300 eggs/tray eyed stage.

Little White Salmon Hatchery--Eyed eggs are placed Heath tray's, at 5,000 eggs/tray at 5 gpm. (section 5.4.2)

9.1.4) Incubation conditions.

Umatilla Hatchery--Oxygen saturation levels average 10 ppm influent and 9 ppm effluent. Water flows are regulated to a minimum of 4 gal. /min, with individual egg take temperatures ranging from 38^0F to 54^0F.

Little White Salmon Hatchery--Water temperature is monitored using temperature loggers taking readings every 30 minutes. Temperatures during incubation range from 43°F to 50°F with typical temperatures around 47°F. Dissolved oxygen levels are not regularly monitored, but have been tested and found to be at, or near saturation. All water for incubation is passed through a 70 micron drumscreen to filter out solids.

9.1.4.5) Egg Transfers

Umatilla Hatchery—Transfer of eyed eggs to Little White Salmon for their portion of the program, occurs in mid-to late October.

9.1.5) Ponding

Umatilla Hatchery--Spring Chinook are ponded mid-May at 1,850 temperature units @ approximately 1,375 fish to the pound, and 100% button-up.

Little White Salmon Hatchery--Fish are transferred to the nursery tanks from egg trays when most individuals have absorbed their yolk sac (at around 1,700 Temperature Units, TUs). At this time, eggs destined for an individual tank are emptied into a transport vessel, moved to the appropriate tank and released directly into the tank (i.e. swim up and ponding are forced) in December and early January. The fish are held in the tanks and fed using automatic feeders until they are large enough to be moved into the raceways and/or the next take of fry needs the tank space. At this time the fish are loaded by net into a 400 gallon transport tank and moved to the 8' X 80' raceways. Average length at initial ponding is 33 mm.

9.1.6) Fish health maintenance and monitoring.

Umatilla Hatchery--Eggs brought to Umatilla Hatchery are disinfected in 75 ppm iodophor

for 15 minutes. Fungus is controlled with formalin treatments at a concentration of 1,667 ppm (1:600). Treatments are scheduled seven times per week for 15 minutes. Little mortality has been attributed to yolk-sac malformation. After eyeing, dead eggs are hand picked.

Little White Salmon Hatchery--The current treatment to control fungus on the eggs, at Little White Salmon, is a 1,667 ppm drip of formalin for 15 minutes three to five times a week. The first health exam of newly hatched fish occurs when approximately 50% are beyond the yolk sac stage and begin feeding. Sixty fish are sampled and tested for virus. Regular fish health checks are done on a monthly basis by the fish health specialist from the Lower Columbia River Fish Health Center as per the fish health policy in 713 FW.

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.

Umatilla Hatchery--Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.

Little White Salmon Hatchery--There are no known listed fish that will be affected by incubation procedures.

9.2) <u>Rearing</u>:

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

Umatilla Hatchery--Table 9

Little White Salmon Hatchery-- Table 10

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

Umatilla Hatchery--Current production goals are to have a final density of 5 pound/ft3 and loading of 12 lbs/gpm, with exchange rates of 3.4X/hour.

Little White Salmon Hatchery--Current production goals are to have a final density index of below 0.25 and a flow index of no higher than 1.5 (ref. Fish Hatchery Management, Piper et.al., 1982). Maximum density and loading criteria are for maximum loadings of 4.5 lbs/gpm or 0.87 lbs/ft^3.

9.2.3) Fish rearing conditions

Umatilla Hatchery-- The current program is finally reared exclusively in Michigan style ponds. (Refer to section 5.5) Fish are fed at least once every hour by mechanical feeder.

Ponds are self-cleaning, with the assistance of baffles and high exchange rates. All waste is settled out behind lower pond screen, and is pumped to hatchery settling ponds once per day. Mortality's are removed once per day. Dissolved oxygen is monitored daily, as well as, oxygen delivery systems, and oxygen delivery rates. Water flow rates are monitored weekly and range in temperature from 52^0F to 61^0F. Dissolved oxygen levels are maintained at or above 8ppm. Ammonia and total gas saturation levels have not been a problem. All of our monitoring is recorded as performed. (Table 7, 11)

Little White Salmon--Fingerling spring Chinook are held in the 8' X 80' raceways until mid-May when they are moved to the new colored raceways described in Section 5.5 and Section 9.2.9. Temperature readings are monitored using data loggers taking readings every 30 minutes. Temperatures in the raceways range from 38°F to 49°F during the year. Mortalities are removed daily and raceways are cleaned with a broom while effluent water is drained to a pollution control structure. Cleaning is performed as needed but no less than once a week. Dissolved oxygen, carbon dioxide and total gas pressure have never been problems and are not recorded on a regular basis. Fish are reared on river water for most of their rearing cycle.

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.

Umatilla Hatchery average growth for Spring Chinook. (Brood year 2002)

Month	Fish/lb	Conversion
May	474	1.0
June	245	1.1
July	125	1.2
August	70	1.5
September	45	1.3
October	27	1.3
November	19	1.3
December	14	1.25
January	13.7	1.4

End of Month Growth Parameters for LWS NFH Spring Chinook Brood Year 2000.

Month	Length	#/lb	Condition Factor C	Conversion For Month	Density Index	Flow Index

Month	Length	#/lb	Condition Factor C	Conversion For Month	Density Index	Flow Index
December ,2000	1.417	976		1.53	0.09	0.63
January, 2001	1.724	542		1.18	0.10	0.59
February	1.977	359		1.65	0.13	0.89
March	2.414	197		0.97	0.20	0.90
April	2.827	123		1.01	0.28	0.93
May	3.308	76.7		0.83	0.30	0.98
June	3.547	62.2		1.39	0.34	1.13
July	3.949	45.1		1.27	0.17	0.53
August	4.309	34.7		1.22	0.20	0.64
September	4.746	26.0		1.16	0.24	0.77
October	4.822	24.8		3.86	0.25	0.80
November	4.866	24.1		3.26	0.20	0.95
December	4.953	22.9		1.52	0.22	1.13
January, 2002	5.043	21.7		1.71	0.23	1.17
February	5.154	20.3		1.55	0.24	1.22
March	5.416	17.5		1.03	0.26	1.35

Data from Lot History, Production for Brood Year 2000 spring Chinook.

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

Umatilla and Little White Salmon Hatcheries--Energy reserve information is not available.

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

Umatilla Hatchery-- Spring Chinook are fed Bio-Oregon feed, starter, Bio-moist grower, and Bio-moist feed. Fish are fed hourly up to 12 times per day, by mechanical feeders at rates of

1.8%-6% body weight.

Little White Salmon Hatchery—Fish are fed Bio-Moist starter, grower and feed following manufacturer recommendations (generally between 3.5% and 0.5% of body weight per day). They are fed between two and nine times daily depending on fish size. Overall conversions are around 1.1.

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

Umatilla Hatchery-- Monthly monitoring follows specific protocols in the Umatilla Fish Health Monitoring and Evaluation work statement. All raceways of each species and stock at Umatilla Hatchery are monitored monthly for pathogens and parasites. Five moribund or dead fish per raceway are tested for systemic and gill bacteria. Five Chinook per raceway are examined for *R. salmoninarum* by the DFAT or ELISA. BKD – Erythromycin prophylactic feed treatments are scheduled, with one feeding at Umatilla. The target dose is 100 mg erythromycin per kilogram fish.
Other Infections - Juvenile fish are treated for bacterial infections if necessary with oxytetracycline under an Investigational New Animal Drug Permit (INAD).
Sanitation procedures - Statewide fish health management policy (September 12, 2003) provides guidelines for preventative and therapeutic fish health strategies that will be followed in this program.

Little White Salmon Hatchery--The Lower Columbia River Fish Health Center (LCRFHC) in Underwood, WA provides fish health care for the Little White Salmon NFH as described in the published policy 713 FW in the Fish and Wildlife Service Manual. In addition to this policy, the 1995 annual report "Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries", chapter 5, by the Integrated Hatchery Operations Team provides further fish health guidelines as approved by state, federal, and tribal agencies. The directives of these two documents exceed the requirements of the Washington State and Tribal fish health agencies which follow the directives in the Washington Co-Managers Salmonid Disease Control Policy of 1998.

The documents mentioned above provide guidance for preventing or minimizing diseases within and outside of the hatchery. In general, movements of live fish into or out of the hatchery must be approved by the Production Advisory Committee (PAC) and be noted on the Brood Document for the hatchery. If a fish transfer or release is not on the Brood Document, permits from the Washington Department of Fish & Wildlife, the USFWS, and any other states through which the fish travel must be obtained and approved by co-managers. Fish health exam and certification must be done prior to any releases or transfers from the hatchery to minimize risks from possible disease transmittance.

A pathologist from the LCRFHC visits at least once per month to examine fish at the hatchery. From each stock of juveniles, fish are randomly sampled to ascertain general health. Based on pathological signs, age of fish, concerns of hatchery personnel, and the history of the facility, the examining pathologist determines the appropriate tests. This usually includes an external and internal examination of skin, gills, and internal organs.

Kidneys (and other tissues, if necessary) will be checked for the common bacterial pathogens by culture and by a specific test for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other infections, including viral anemia. Additional tests for virus or parasites are done if warranted.

A diagnostic exam is done on an as-needed basis determined by the pathologist or requested by hatchery personnel. Sick, dying, and/or fish with unusual behavior are examined for disease with appropriate diagnostic tests. A pathologist will normally check symptomatic fish during a monthly examination.

Spring Chinook are given prophylactic medicated feedings once in July at a rate of 100 mg erythromycin/kg fish/day for 21 days. Administration of erythromycin in mid-summer appears to control outbreaks of bacterial kidney disease later in the rearing cycle (LCRFHC fish health reports). The dosage and duration can be variable depending on that brood year's susceptibility to drug-induced toxicity. As of 2001, there is a temporary INAD 4333 that allows feeding of Aquamycin 100 (erythromycin thiocyanate in a wheat flour base) and prescription by a veterinarian is not required

At two to four weeks prior to a release or transfer from the hatchery, 60 fish from the stock of concern are tested for the presence of listed pathogens. These pathogens, defined in USFWS policy 713 FW include infectious hematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), viral hemorrhagic septicemia virus (VHSV), *Renibacterium salmoninarum*, *Aeromonas salmonicida*, *Yersinia ruckeri*, and *Myxobolus cerebralis*.

Table 9.2.7.1 Disease history (1999-2003) of Umatilla River spring chinook adults spawned at South Fork Walla Walla adult facility and juveniles reared at Umatilla Hatchery[a].

Disease or Organism	Adults	Juveniles
IHN Virus	Yes	No
EIBS Virus	No	No
Aeromonas salmonicida	Yes	No
Aeromonas/Pseudomonas	Yes	Yes
Flavobacterium psychrophilum	No	Yes
Fl. columnare	No	No
Renibacterium salmoninarum	Yes	Yes[b]
Yersinia ruckeri	Yes	Yes
Carnobacterium sp.	No	No
Ichthyobodo	No	No
Gyrodactylus	No	Yes
Ichthyophthirius multifilis	No	No
Epistylis	No	No
Scyphidia	No	No
Trichodinids	No	No
Gill Copepods	Yes	No
Coagulated Yolk Disease	No	Yes
External Fungi	Yes	Yes
Internal Fungi	No	Yes

Myxobolus cerebralis	No	No
Ceratomyxa shasta	Yes	No

[a] "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.
[b]There have been no cases of clinical BKD in the last 5 years rearing this stock at Umatilla Hatchery (brood years 1997-2001).

Table 9.2.7.2Umatilla spring Chinook Disease history (2000-2004) of juveniles[a,b] at Little White Salmon NFH.

Disease or Organism	Adults	Juveniles
IHN Virus		Yes
EIBS Virus		Yes
Aeromonas salmonicida		No
Aeromonas/Pseudomonas		No
Flavobacterium psychrophilum		No
Fl. columnare		No
Renibacterium salmoninarum		Yes
Yersinia ruckeri		No
Carnobacterium sp.		No
Ichthyobodo		Yes
Gyrodactylus		Yes
Ichthyophthirius multifilis		Yes
Epistylis		Yes
Scyphidia		Yes
Trichodinids		Yes
Gill Copepods		No
Coagulated Yolk Disease		Yes
External Fungi		Yes
Internal Fungi		No
Myxobolus cerebralis		No
Ceratomyxa shasta		na[c]

[a] "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.
[b] Data represents juveniles at Little White Salmon NFH for BY 1999-2002. Fish were examined by USFWS/LCRFHC from Jan. 2000 to transfer of BY 2002 in Feb 2004.
[c]Didn't look for *C. Shasta* in juveniles.

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

Umatilla Hatchery-- Smolts are transferred to acclimation from Umatilla Hatchery. (Tables 12 & 13)

Little White Salmon Hatchery--Fish are given a 24 hour saltwater challenge before release and observed for survival and outward signs of smoltification, i.e. loss of parr marks, etc. Survival is typically at or near 100%.

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

Umatilla Hatchery-- Baffles are used in Michigan ponds, to assist in self cleaning, reducing the need for human contact with the fish.

Little White Salmon Hatchery--New raceways are now being used that are made of colored concrete to better simulate the river bottom where the fish are released. The new raceways are also equipped with baffles to minimize the amount of cleaning necessary and to give the fish a variety of conditions within the raceway to choose from.

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.

Umatilla Hatchery-- Fish will be reared to a size, and released at a time, to encourage out-migration. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

Little White Salmon Hatchery-- These fish are not listed. There are no listed fish under propagation at this facility at this time.

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").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fry				
Yearling (Little White Salmon Hatchery)	210,000	15	Mid-April	Imeques acclimation RM 80
Yearling (Umatilla Hatchery)	600,000	12	Mid-March	Imeques Acclimation RM 80

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

Stream, river, or watercourse: Umatilla River
Release point: Imeques Acclimation (RM 79.5)
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

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

Juvenile spring Chinook have been released in the Umatilla River basin since 1986. Release numbers have varied between 225,883 (yearling spring releases) in 1997 to 1,836,737 (yearling spring and subyearling fall and spring releases) in 1994. The production goal since 1998 has been 810,000 yearling spring releases and it is anticipated that future releases will be similar.

Release year	Eggs/ Unfed Fry	Avg size	Fall Rel.	Avg size	Subyearling Spring Rel.	Avg size	Yearling	Avg size
1992			234,345	13.8	1,250,210	34.7	304,283	10.6
1993			460,809	19.9	667,367	27.6	491,816	11.5
1994			378,225	8.7	839,377	30.4	610,245	10.5
1995			0		0		673,331	11.1
1996			0		0		378,561	8.9
1997			0		0		225,883	9.1
1998			114,370	18.1	0		827,612	12.7
1999			0		0		659,607	14.0
2000			0		0		816,184	12.7

Release year	Eggs/ Unfed Fry	Avg size	Fall Rel.	Avg size	Subyearling Spring Rel.	Avg size	Yearling	Avg size
2001			0		0		782,733	11.4
2002			0		0		876,121	13.9
2003			0		0		782,106	13.8
Average			89,448	12.8	229,746	31.4	619,040	11.9

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

Historically, fish releases have occurred both in the spring and fall . With two exceptions, all releases since 1995 have been in the spring (March and April). One group of fish was released in February, 2002, and one group was emergency released in December, 1998. From 1986 to 1994, releases were made directly into the Umatilla River or were acclimated and force released at the end of the holding period. From 1995 to 1999, all fish were acclimated and force released. Beginning in 2000, all groups of fish have been acclimated and have been allowed to volitionally release for the last few days to week of holding before being forced out. It is anticipated that future releases will also be volitional. (Table 14)

10.5) Fish transportation procedures, if applicable.

Umatilla Hatchery--Chinook smolts are loaded with water using a fish pump. Fish are separated from the water and transferred into insulated liberation tankers ranging in capacity from 2,000 to 5,000-gallons. Fish are loaded at maximum rate of 1.0 lbs/gallon. Transport time from Umatilla Hatchery to acclimation sites is less than two hours. Supplemental oxygen and aeration is provided and temperature is monitored during transport.

Little White Salmon Hatchery—Same as above.

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

Juvenile spring Chinook are transported to Imeques using 3,000 and 5,000 gallon fish transport trucks. The proposed acclimation period is three to four weeks. The fish are fed Bio-moist Feed twice each day at rate of approximately 0.5 to 1.0% BWD. Mortalities are removed daily and ODFW pathology personnel are available to address specific disease concerns. Temperature and dissolved oxygen measurements are taken daily during acclimation, and on the day of release, ODFW personnel sample the fish for weight and fork length. Since 2000, the fish have been allowed to release volitionally for the final few days to week of holding before the remaining fish are forced out. The effluent pond screen is removed and the fish are allowed to swim over a notched dam board and through an underground pipe directly into the Umatilla River. One to two days before the remaining fish are released; they are taken off feed to reduce stress. The ponds are lowered and the fish are slowly crowded out using a seine.

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

Historically, spring Chinook releases were either unmarked, adipose clipped and CWT, or adipose right ventral or left ventral clipped and CWT. Since 2002 releases, all spring Chinook have been either adipose clipped and not CWT or adipose right ventral or left ventral clipped and CWT(ventral clips are alternated yearly). It is anticipated that all future releases will be marked the same.

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

There is no plan for surplus smolt production. Fish surplus to programmed needs would be released at an earlier life stage or culled as eggs.

10.9) Fish health certification procedures applied pre-release.

Umatilla Hatchery-- All monitoring will be consistent with the ODFW fish health policy. Current Umatilla Hatchery Monitoring and Evaluation work statements provide the following protocol: Within four weeks prior to release grab-sampled fish of each species and stock are examined as follows:
-Kidney for *R. salmoninarum* by ELISA from 30 fish per raceway (spring chinook)
-Gill tissue and body scrapings by microscopy from a minimum of five fish
-Gill/kidney/spleen tissue pools (5 fish per pool) from 10 fish per raceway for culturable viruses.

Little White Salmon Hatchery-- For production groups at Little White Salmon NFH pre-transfer examinations will be conducted by Lower Columbia River Fish Health Center (LCRFHC) staff following standard protocols. (See section 9.2.7)

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

Imeques Acclimation-- The Imeques acclimation/release facility includes a gravity flow water intake structure with automatic screen cleaner. Water (approximately 1,600 gpm per each of four acclimation ponds) is supplied by gravity to a headbox/water distribution structure where it is gravity fed to the ponds. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Brian ??

TABLES AND FIGURES:

Table 1. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for yearling spring chinook salmon reared at Umatilla, Bonneville, Carson, and Little White Salmon hatcheries and released in the Umatilla River, 1991-96 broods. Out-of-basin data was downloaded from the central database in October 2001.

Brood year	Hatch-[a] ery	Release date	Release[b] site	Release size (fish/lb)	No.[c] CWT recov-eries	Smolt-to-adult sur-vival (%)	Umatilla[d] River return (%)	No. adults pro-duced	Out-of-[e] basin exploit-ation(%)	In-[f] basin exploit-ation(%)
				March releases						
91	UFH	3/23/93	RM80	8.3	12	0.037	0.036	78	0.0	0.0
91	BFH	3/22/93	RM80	14.5	29	0.196	0.180	179	7.8	0.0
92	UFH	3/21/94	RM80	8.5	17	0.059	0.058	121	1.7	10.7
92	BFH	3/25/94	RM80	12.0	190	0.552	0.521	2,237	2.7	17.0
93	UFH	3/13/95	RM80	7.9	22	0.030	0.028	83	4.8	0.0
93	BFH	3/13/95	RM80	13.9	40	0.301	0.280	225	7.1	2.7
94	UFH	3/13/96	IC	9.0	3	0.003	0.003	12	0.0	0.0
95	UFH	3/26/97	IC	9.1	482	1.009	0.935	2,279	0.8	7.1
96	UFH	3/08/98	IC	11.7	584	0.734	0.730	2,809	0.1	12.9
96	LWSFH	3/08/98	RM80	15.6	21	0.221	0.223	339	0.0	3.2
				April releases						
93	BFH	4/14/95	RM80	11.4	91	0.559	0.545	419	1.9	3.3
93	BFH	4/21/95	RM80	10.4	164	0.612	0.602	1,518	1.1	3.9
96	LWSFH	4/14/99	RM80	11.6	14	0.138	0.138	238	0.0	16.0
96	CNFH	4/14/99	RM80	16.3	46	0.490	0.490	488	0.0	12.1

[a] *UFH = Umatilla Fish Hatchery, BFH = Bonneville Fish Hatchery, LWSFH = Little White Salmon Fish Hatchery, CNFH = Carson National Fish Hatchery.*

[b] *RM = river mile, IC = Imeques acclimation site.*

[c] *Number of coded-wire tags recovered.*

[d] *Return = number of fish counted at Three Mile Falls Dam plus harvest beolow Three Mile Falls Dam.*

[e] *Percent of adult production harvested outside of the Umatilla River basin.*

[f] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers.*

Table 2

Spring Chinook Annual Run Counts To Three Mile Dam			
Year	Adults	Jacks	Total
1988	13	0	13
1989	66	97	163
1990	2158	32	2190
1991	1291	39	1330
1992	460	4	464
1993	1205	16	1221
1994	263	8	271
1995	388	108	496
1996	2152	121	2273
1997	2194	4	2198
1998	409	20	429
1999	1764	210	1974
2000	4215	124	4339
2001	4382	185	4567
2002	5058	188	5246
2003	3607	135	3742

Table 3. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for yearling spring chinook salmon reared in Michigan and Oregon raceways at Umatilla Hatchery and released in the Umatilla River, 1993-94 and 1996 broods. Returns are incomplete for the 1996 brood.

BY[a]	Rear-ing system	Release date	Rel-ease site	Rel-easе size (fish/lb)	No. CWT[d] recov-eries	Smolt-to-adult sur-vival (%)	Umatilla[e] River return (%)	No. adults pro-duced	No. adults/ goal/h[f]	Out-of-basin[g] exploit-ation(%)	In-basin exploit-ation(%)
93	M	3/13/95	RM80	7.8	7	0.032	0.032	29	2.8	0.0	0.0
93	O	3/13/95	RM80	8.0	15	0.029	0.026	54	1.3	7.4	0.0
94	M	3/13/96	IC	9.6	1	0.003	0.003	4	0.3	0.0	0.0
94	O	3/13/96	IC	9.0	2	0.003	0.003	4	0.2	0.0	0.0
96	M	3/08/98	IC	11.3	219	0.637	0.629	993	63.6	0.0	10.2
96	O	3/08/98	IC	9.1	365	0.801	0.800	1,816	43.6	0.1	14.4

[a] *BY = brood year*
[b] *M = Michigan raceways, O = Oregon raceways.*
[c] *RM = river mile, IC = Imeques acclimation site.*
[d] *Number of coded-wire tags recovered.*
[e] *Return = number of fish counted at Three Mile Falls Dam plus harvest below Three Mile Falls Dam.*
[f] *Number of adults produced per water use at Umatilla Hatchery (gallons/h).*
[g] *Percent of adult production harvested outside of the Umatilla River basin.*
[h] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers*

Table 4. Number of hatchery and natural spring chinook salmon that returned to the eastbank fish ladder, Three Mile Falls Dam, Umatilla River, 2000-2002.

	Hatchery				Natural					
	Male		Female		Male		Female		Total	
Age[a]	Number	%	Number	%	Number	%	Number	%	Number	%
					2000					
Subjack	0	0.(	0	0.0	0	0.(	0	0.0	0	0.0
Jack	118	95.2	0	0.0	6	4.8	0	0.0	124	2.9
Adult	1667	39.6	2197	52.2	178	4.2	168	4.0	4210	97.1
Total	1785	41.2	2197	50.7	184	4.2	168	3.9	4334	100.0
					2001					
Subjack	0	0.(	0	0.0	0	0.(	0	0.0	0	0.0
Jack	161	85.2	0	0.0	28	14.8	0	0.0	189	4.1
Adult	1629	37.2	2535	57.9	83	1.9	129	2.9	4376	95.9
Total	1790	39.2	2535	55.5	111	2.4	129	2.8	4565	100.0
					2002					
Subjack	0	0.(	0	0.0	0	0.(	0	0.0	0	0.0
Jack	171	94.0	0	0.0	11	6.(	0	0.0	182	3.5
Adult	1842	36.4	3051	60.3	61	1.2	107	2.1	5061	96.5
Total	2013	38.4	3051	58.2	72	1.4	107	2.0	5243	100.0

[a] *Age designation based on fork length: subjacks <381 mm, jacks 382-610 mm and adults > 610 mm. Length-age relationships were determined by known coded wire tag returns.*

Hatchery and natural was not distinguished prior to 1996.

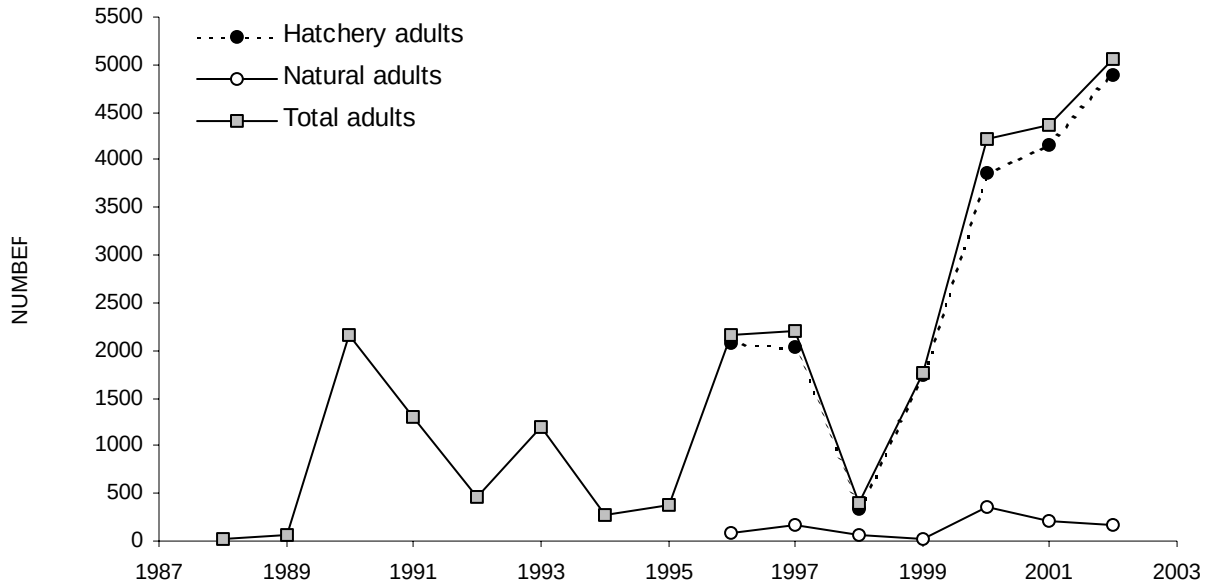

Figure 1. Number of adult spring chinook salmon that returned to Three Mile Falls Dam (1988-2002)

Table 5. Hatchery releases of spring chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No./lb.	Stock

1986	Carson	99,970	22.8	Carson
1986	Irrigon	300,438	87.0	Carson
1986	Irrigon	75,000	15.0	Carson
1987	Carson	99,897	10.4	Carson
1987	Oxbow	169,100	199.0	Carson
1988	Bonneville	1,196	21.4	Carson /a
1988	Carson	99,895	20.6	Carson
1988	Bonneville	297,377	8.3-10.3	Carson /a
1988	Bonneville	75,767	11.1	Carson /a
1989	Bonneville	325,520	10.6-12.0	Carson /a
1990	Carson	99,775	18.6	Carson
1990	Bonneville	390,208	9.0-13.4	Carson /a
1991	Carson	96,733	16.9-20.6	Carson
1991	Bonneville	196,657	10.1-11.8	Carson /a
1991	Bonneville	159,624	16.5-16.8	Carson /b
1992	Carson	90,982	18.7	Carson
1992	Carson	5,272	18.7	Carson
1992	Bonneville	208,029	8.5-9.2	Carson /a
1992	Umatilla	955,752	35.4	Carson
1992	Irrigon	294,458	32.5	Carson
1992	Bonneville	132,929	11.3	Carson
1992	Umatilla	101,416	19.4	Carson
1993	Bonneville	186,948	14.5	Carson
1993	Umatilla	208,782	8.3	Carson
1993	Carson	85,134	20.3	Carson
1993	Carson	10,952	20.0-20.5	Carson
1993	Umatilla	667,367	27.6	Carson
1993	Umatilla	460,809	19.9	Carson
1994	Umatilla	205,143	8.4	Carson
1994	Bonneville	152,854	11.5	Carson
1994	Bonneville	252,248	12.3	Carson
1994	Umatilla	8,890	8.1-8.3	Carson
1994	Umatilla	839,377	30.4	Carson
1994	Umatilla	378,225	8.7	Carson
1995	Bonneville	247,871	10.3	Carson
1995	Umatilla	275,804	7.9	Carson
1995	Bonneville	74,735	14.4	Carson
1995	Bonneville	74,921	11.4	Carson
1996	Umatilla	378,561	8.9	Carson /c
1997	Umatilla	225,883	9.1	Carson /d
1998	Umatilla	382,714	11.6	Carson /e
1998	Umatilla	114,370	18.1	Carson /f
1998	Little White Salmon	172,999	15.6	Carson /e
1998	Little White Salmon	172,258	11.6	Carson /e
1998	Carson	99,641	16.3	Carson
1999	Umatilla	253,831	13.7	Carson /f
1999	Little White Salmon	302,015	12.7-16.1	Carson /f
1999	Carson	103,761	13.2	Carson

Table 5 cont.				
Year of Release	Hatchery	No. Released	No./lb.	Stock

2000	Umatilla	254,101	13.3	Carson /g
2000	Umatilla	103,621	12.2	Carson /g
2000	Little White Salmon	173,545	13.1	Carson /h
2000	Little White Salmon	185,069	11.1	Carson /h
2000	Carson	99,848	14.4	Carson
2001	Umatilla	91,727	14.8	Carson /f
2001	Umatilla	244,794	10.4	Carson /f
2001	Little White Salmon	165,310	13.0	Carson /f
2001	Little White Salmon	180,919	11.3	Carson /f
2001	CNFH	99,983	13.9	Carson
2002	Umatilla	107,717	13.8	Carson /f
2002	Umatilla	104,089	12.0	Carson /f
2002	Umatilla	148,048	13.7	Carson /f
2002	Umatilla	152,026	12.3	Carson /f
2002	Willard NFH	143,516	17.0	Carson /f
2002	Willard NFH	220,725	14.9	Carson /f
2003	Umatilla	104,679	13.0	Carson /f
2003	Umatilla	102,217	12.1	Carson /f
2003	Umatilla	148,748	12.2	Carson /f
2003	Umatilla	103,656	11.6	Carson /f
2003	Little White Salmon	322,806	16.9	Carson /f

/a Carson via Lookingglass broodstock
/b Carson via Lookingglass, Umatilla River and Big Canyon broodstock
/c Carson via Lookingglass (Wallowa H.) and Ringold (Lyons Ferry H.) broodstock
/d Carson via Ringold (Lyons Ferry H.) and Little White Salmon broodstock
/e Carson via Little White Salmon broodstock
/f Carson via Umatilla River broodstock
/g Carson via Ringold (Lyons Ferry H.) and Umatilla River broodstock
/h Carson via Ringold (Little White Salmon H.) broodstock

Table 6. Statistical summary of spring chinook salmon sport fishery in the Umatilla River, 1990-2002. There was no sport fishery during years not listed.

Year	Survey area[a]	Ang-ling days	No. days sam-pled	No. ang-lers	Hours fished	No. kept	No. released	Run size	Catch rate (fish/h)
1990	Ryan Creek to Forks	12	11	80	1,248	20	0	2,190	0.016
1991	Ryan Creek to Forks	12	12	235	1,544	23	0	1,330	0.015
1993	Yoakum Bridge to wCTUIR	16	12	39	317	0	0	1,220	0.000
	Ryan Creek to Forks	16	12	145	1,211	18	0		0.015

1996	Rieth Bridge to wCTUIR	20	15	428	2,471	205	0	2,273	0.083
	Ryan Creek to Forks	20	12	67	429	1	0		0.002
1997	TMFD to Yoakam Bridge	23	10	58	812	19	0	2,196	0.023
	Yoakam Bridge to wCTUIR	23	13	337	2,529	12	0		0.005
1999	TMFD to Yoakam Bridge	23	4	18	21	0	0	1,974	0.000
	Yoakam Bridge to wCTUIR	23	16	222	531	4	2		0.011
2000	Mouth to TMFD	76	39	1,103	9,198	443	82	4,777	0.057
	Yoakum Bridge to wCTUIR	76	12	214	4,274	141[b]	9		0.035
2001	Mouth to TMFD	76	41	1,404	10,872	463	13	5,028	0.043
	Yoakum Bridge to wCTUIR	76	24	324	4,053	80	2		0.020
2002	Mouth to TMFD	40	27	924	10,326	645	11	5,884	0.064
	Yoakum Bridge to wCTUIR	53	17	222	7,227	110	6		0.016

[a] *wCTUIR = west boundary of Confederated Tribes of the Umatilla Indian Reservation (RM); Forks = confluence of Umatilla River north and south forks (river mile 89.5); TMFD = Three Mile Falls Dam (river mile 3.7).*

[b] *Includes an estimated 57 fish caught prior to the initiation of creel surveys.*

HGMP: Umatilla River spring chinook salmon

Table 7. Water quality comparisons between Michigan and Oregon raceways during production 1992-1998.

		Inlet			Outlet		
Parameter	Pass	N	Means	Min-Max	N	Means	Min-Max
Temperature	A	89	13.9	11.4-16.3	89	13.9	11.4-16.1
(°C)	B	89	13.9	11.4-16.4	89	14.0	11.4-16.6
	C	57	13.9	11.2-16.1	57	14.0	11.2-16.3
pH	A	83	7.84	6.64-8.70	83	7.80	6.65-8.65
	B	83	7.82	6.67-8.65	83	7.80	6.66-8.65
	C	51	7.79	6.63-8.17	51	7.76	6.65-8.20
Oxygen	A	85	11.10	7.9-13.7	84	9.70	7.3-11.8
(mg/L)	B	85	10.96	8.8-13.7	85	9.68	7.9-11.8
	C	54	10.69	8.5-14.0	53	9.49	7.3-11.7
Unionized	A				62	0.33	0.02-1.35
Ammonia	B				62	0.55	0.02-2.56
(µg/l)	C				30	0.58	0.03-1.42

Table 8. Spring Chinook salmon abundance by life stage reared at Umatilla (UFH), Little White Salmon (LWSH),

Carson (CNFH), and Willard Fish Hatcheries for 1991-2002 broods. 0+ = subyearling, 1+ = yearling. Additional egg sources from Ringgold (RIN) and Lyons Ferry (LF) hatcheries.

Brood year	Number of Umatilla River females spawned	Rearing and release strategies	Egg source	Number of eggs taken	Number Of eyed eggs received	Number of fry	Number of smolts released
			Umatilla Fish Hatchery				
1991		1+, spring	CNFH		332,000	322,704	208,880
1992		1+, spring	CNFH		319,000	227,447	205,400
1993		1+, spring					286,243
1994		1+, spring	RIN/LF		602,000	432,236	381,122
1995		1+, spring	CNFH/LF/LWSH		227,000	218,296	226,909
1996		1+,spring	CNFH/LF/UFH		487,612	391,065	383,449
1997		1+, spring	UFH				254,324
1998	96	1+, spring	UFH	455,953	82,000	441,628	360,056
1999	276	1+, spring	UFH	942,988		362,104	338,723
2000	300	1+, spring	UFH	1,120,995		526,628	513,913
2001	282	1+, spring	UFH	1,175,281		477,691	460,048
			Little White Salmon Fish Hatchery				
1997		1+, spring	UFH	396,000			379,693
1998		1+, spring	RIN	307,624			294,267
1999		1+, spring	UFH	398,784			355,776
2001		1+, spring	UFH	364,752			346,664
			Carson National Fish Hatchery				
1997		1+, spring	CNFH			102,462	103,838
1998		1+, spring	CNFH			100,067	99,916
1999		1+, spring	CNFH			100,309	100,111
			Willard Fish Hatchery				
2000		1+, spring	UFH			401,065	394,348

Table 9. Egg take and survival of Umatilla River stock Spring Chinook (brood years 1997-2002) reared at Umatilla Hatchery during 1998-2003.

Brood Year	Number of eggs taken or received	Egg-to-fry survival (%)	Egg-to-smolt survival[a] (%)
1997	1,029,237	81	78
1998	455,953	97	82
1999	942,988	81	78
2000	1,120,955	84	82
2001	1,175,281	81	80
2002	986,145	86	86

[a] *Survival estimate is based on green egg-to-smolt stage*.

Table 10. Little White Salmon Survival for Spring Chinook brood years (1996-2001) Brood years 1997, and 1999-2001 are eggs from Umatilla Stock.

BROOD YEAR	EGGS TAKEN	% SURVIVAL TO EYED	EYED EGGS RECEIVED	% SURVIVAL TO POND	% SURVIVAL POND TO RELEASE
1996	382,382	94.10	0	99.41	97.26
1997	0	N/A	396,000	99.07	97.79
1998	507,844	91.83	0	90.04	97.27
1999	0	N/A	398,784	91.81	97.13
2000	0	N/A	401,065	99.88	98.39
2001	0	N/A	373,062	97.77	94.79
Average	445,113	92.97	392,228	96.33	97.11

Table 11. Rearing conditions immediately before transfer for spring chinook salmon at Umatilla Fish Hatchery in Oregon raceways during 1991-2000.

Brood year	System	Maximum density (lb/ft^3)	Maximum loading (lb/gal/min)	Total number reared per gpm in system
1991	Oregon	1.0	5.0	83
1992	Oregon	1.0	4.8-5.0	84
1993	Oregon	0.9-1.1	4.6-5.4	74
1994	Michigan	2.4-2.7	5.9-6.6	115
	Oregon	1.2-1.3	5.6-6.2	94
1995	Oregon	1.0	4.8-4.9	92
1996	Michigan	2.0	4.9	164
	Oregon	0.9	4.2	91
1997	Michigan	3.5	8.4	157
	Oregon	0.7-1.3	3.2-6.2	46
1998	Michigan	1.73	4.2	159
	Oregon	0.75	3.6	84
1999	Michigan	1.70	4.1	143
	Oregon	0.77	3.7	90
2000	Michigan	1.76	4.2	163
	Oregon	0.68	3.3	84

Table 12. Mean length, weight, and condition factor at transfer for yearling spring chinook salmon reared in Michigan or Oregon raceways at Umatilla Hatchery, 1991-97 broods (standard error in parentheses).

Brood year	System	Length (mm)	Weight (g)	Condition factor
1991[a]	Oregon	158.8(0.0)	50.5(0.0)	1.20(<0.01)
1992	Oregon	163.0(0.7)	55.2(1.3)	1.23(0.01)
1993[b]	Michigan	166.9	57.8	1.24
	Oregon	171.0	56.9	1.16
1994[b]	Michigan	160.9	46.4	1.11
	Oregon	167.7	53.0	1.12
1995[b]	Oregon	149.2	45.9	1.35
1996	Michigan	147.1(0.4)	39.9(0.5)	1.21(<0.01)
	Oregon	145.9(0.3)	40.0(0.5)	1.25(<0.01)
1997	Michigan	131.8(0.4)	28.3(0.4)	1.22(<0.01)
	Oregon(10/15/1998)	108.3(0.3)	15.7(0.2)	1.21(<0.01)
	Oregon(1/20/1999)	137.9(0.4)	33.4(0.5)	1.23(<0.01)
1998	Michigan	133.7(0.6)	31.8(0.8)	1.29(0.01)
	Oregon (11/1/99)	122.2(0.4)	26.3(0.5)	1.41(0.01)
	Oregon (1/4/00)	135.6(0.5)	32.4(0.7)	1.3(0.01)
1999	Michigan	137.1(0.6)	32.8(0.9)	1.27(0.01)
	Oregon (11/8/00)	134.1(0.6)	32.3(0.7)	1.28(0.01)
	Oregon (1/8/01)	139.7(0.5)	35.7(0.7)	1.29(0.01)
2000	Michigan	133.7(0.6)	30.4(0.8)	1.25(0.01)
	Oregon (11/2/01)	117.2(0.4)	21.3(0.4)	1.30(0.01)
	Oregon (1/7/02	136.5(0.5)	33.5(0.8)	1.28(0.01)

[a] *Brood years 1991-92 were not acclimated and were released directly into the Umatilla River.*
[b] *Fish from the 1993 through 1995 brood years were measured at release after acclimation, standard errors were not determined.*

Table 13. Percent descaled, partially descaled, and undamaged yearling spring chinook salmon reared in Michigan and Oregon raceways at Umatilla Hatchery, brood years 1991-2000.

		Smolting			Descaling		
Brood year	System[a]	Smolt	Interme-diate	Parr	Descaled[b]	Partially descaled[c]	Undam-aged[d]
1991	Oregon				1.0	1.0	99.0
1992	Oregon				1.0	18.0	81.0
1993	Michigan				3.0	24.0	74.0
	Oregon				0.0	15.0	85.0
1994	Michigan				13.0	54.0	33.0
	Oregon				1.0	12.0	87.0
1995	Oregon				1.0	13.0	86.0
1996	Michigan				0.0	17.0	83.0
	Oregon				1.0	24.0	76.0
1997	Michigan				3.0	53.0	44.0
	Oregon(10/15/1998)				0.0	0.0	100.0
	Oregon(1/20/1999)				1.0	87.0	12.0
1998	Michigan	0.0	100.0	0.0	0.0	0.0	100.0
	Oregon(11/1/1999)	0.0	98.0	2.0	0.0	0.0	100.0
	Oregon(1/4/2000)	0.0	100.0	0.0	0.0	0.0	100.0
1999	Michigan	0.0	100.0	0.0	0.0	0.0	100.0
	Oregon(11/8/2000)	0.0	100.0	0.0	0.0	0.0	100.0
	Oregon(1/8/2001)	0.0	100.0	0.0	0.0	0.0	100.0
2000	Michigan	0.0	100.0	0.0	0.0	0.0	100.0
	Oregon(11/2/2001)	0.0	100.0	0.0	0.0	0.0	100.0
	Oregon(1/7/2002)	0.0	100.0	0.0	0.0	0.0	100.0

[a] *Data are mean of A and B passes.*

[b] *More than 20 % descaling on either side of the fish.*

[c] *Descaling = 3 to 20 % on either side of the fish.*

[d] *Less than 3 % descaling on either side of the fish.*

Table 14. Release data for yearling spring Chinook salmon reared at Bonneville, Umatilla, Little White Salmon, and Carson hatcheries and released in the Umatilla River (IC=Imeques acclimation facility).

Brood year, CWT code	Release date	Race-way	Number released[a]	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound	Release location (RM)
			Bonneville Hatchery				
1991							
071455	3/23/1993	B1	92,728	19,951		14.8	80
071456	3/22/1993	B2	94,220	20,022		14.3	80
Total			186,948	39,973		14.5	
1992							
070250	3/25/1994	B6	99,616	26,716		11.7	80
070251	3/25/1994	B5	101,830	26,305		11.7	80
075944	3/25/1994	B8	103,980	20,109	4,818	12.5	80
075945	3/25/1994	B7	99,676	20,219	5,200	12.2	80
Total			405,102	93,349	10,018	12.0	
1993							
070649	4/21/1995	B7	123,257	22,189	5,137	10.5	80
070650	4/21/1995	B8	124,614	24,088	4,878	10.2	80
070660	3/13/1995	B5	74,735	23,607		13.9	80
070661	4/14/1995	B6	74,921	28,765		11.4	80
Total			397,527	98,649	10,015	11.2	
			Umatilla Hatchery				
1991							
075739	3/23/1993	O5B	50,312	21,499	5,300	8.2	80
075740	3/23/1993	O4B	50,109	20,880	4,934	8.1	80
075741	3/24/1993	O4A	54,347	21,157	5,548	8.3	80
075742	3/24/1993	O5A	54,014	20,307	5,242	8.6	80
Total			208,782	83,843	21,085	8.3	
1992							
070217	3/21/1994	O5A	51,210	20,070	5,082	8.5	80
070218	3/21/1994	O5B	49,375	19,920	5,142	8.1	80
070219	3/21/1994	O4B	52,620	20,971	5,151	8.8	80
070220	3/22/1994	O4A	51,938	20,982	5,419	8.4	80
Total			205,143	81,943	20,797	8.5	

[a] *All fish from even numbered brood years were LV fin-clipped and fish from odd numbered brood years were RV fin-clipped. All coded-wire-tagged fish were adipose fin-clipped.*
[b] *Fish from 1991-93 broods were branded.*

Table 14 (continued)

Brood year, CWT code	Release date	Race-way	Number released[a]	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound	Release location (RM)
1993							
071453	3/13/95	M5A	50,007	20,315	4,910	8.3	80
071454	3/13/95	M5B	40,685	15,661	4,436	8.9	80
subtotal			90,692	35,976	10,015	7.8	
070651	3/13/95	O4A	49,001	18,864	5,176	9.1	80
070652	3/13/95	O4B	44,077	19,052	4,975	8.2	80
070653	3/13/95	O5B	44,188	18,175	5,133	9.0	80
070654	3/13/95	O5A	47,846	19,091	5,063	8.7	80
subtotal			185,112	75,182	20,347	8.0	
Total			275,804	111,158	29,673	7.9	
1994							
071027	3/13/96	M6A	49,032	19,622	5,083	9.0	IC
071028	3/13/96	M6B	45,887	18,844	4,682	10.8	IC
071029	3/13/96	M6C	49,121	19,258	5,275	9.0	IC
subtotal			144,040	57,724	15,040	9.6	
071030	3/13/96	O4A	60,599	19,961	4,531	7.5	IC
071031	3/13/96	O5A	60,137	20,066	5,026	8.8	IC
071032	3/13/96	O5B	57,076	19,874	5,092	8.7	IC
071033	3/13/96	O4B	56,709	19,583	4,232	9.5	IC
subtotal			234,521	79,484	18,881	8.6	
Total			378,561	137,208	33,921	9.0	
1995							
091730[a]	3/26/97	O4A	57,668	19,842	3,724	9.3	IC
091750	3/26/97	O4B	56,901	20,289		9.3	IC
091749	3/26/97	O5A	56,764	19,818		8.9	IC
091751	3/26/97	O5B	54,550	20,597		8.9	IC
Total			225,883	80,546		9.1	
1996							
092256	3/8/98	M2A	52,159	23,162	248	11.2	IC
092257	3/8/98	M2B	51,972	22,788	243	11.2	IC
092258	3/8/98	M2C	51,743	22,450	240	11.5	IC
subtotal			155,874	68,400	731	11.3	
092259	3/8/98	O5A	60,277	23,247	237	11.8	IC
092260	3/8/98	O4A	59,744	22,759	247	11.9	IC
092261	3/8/98	O5B	53,502	23,248	233	11.9	IC
092262	3/8/98	O4B	53,317	23,778	244	12.0	IC
subtotal			226,840	93,032	961	11.9	
Total			382,714	161,432	1,692	11.7	

[a] *All fish from even numbered brood years were LV fin-clipped and fish from odd numbered brood years were RV fin-clipped. All coded-wire tagged fish were adipose fin-clipped.*

[b] *Fish from 1991-94 broods were branded; 1995 brood was paint-marked (3,724) green on the anal fin. Mark represents tag codes 091730, 091750, and 091751; 1996 brood was PIT-tagged.*

Table 14 (continued)

Brood year, CWT code	Release date	Race-way	Number released[a]	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound	Release location (RM)
1997							
092414	12/20/1998	O4A	61,849	21,795	243	18.1	IC
092416	12/20/1998	O4B	52,521	21,969	240	18.1	IC
subtotal			114,350	43,754	483	18.1	
092347	3/08/1999	M2A	49,190	20,832	240	13.9	IC
092411	3/08/1999	M2B	48,901	21,741	247	13.4	IC
092412	3/08/1999	M2C	51,017	21,833	240	14.4	IC
subtotal			149,108	64,405	727	13.9	
092413	3/08/1999	O5A	53,403	21,602	241	14.0	IC
092415	3/08/1999	O5B	51,319	21,740	233	12.8	IC
subtotal			104,722	43,342	474	13.4	
Total			368,180	151,501	1,684	15.1	
1998							
076040	3/9/2000	O4A	53,256	22,483	266	12.1	IC
076039	3/9/2000	O4B	50,365	21,070	263	12.1	IC
subtotal			103,621	43,553	529	12.1	
076138	3/9/2000	M1A	47,489	21,112	253	13.1	IC
076051	3/9/2000	M1B	49,189	22,102	249	12.7	IC
076050	3/9/2000	M1C	52,426	22,115	263	13.5	IC
subtotal			149,104	65,329	765	13.1	
076049	3/9/2000	O5A	53,621	22,137	291	13.5	IC
076041	3/9/2000	O5B	51,376	21,848	279	13.5	IC
subtotal			104,997	43,985	570	13.5	
Total			357,722	152,867	1,864	12.9	
1999							
093154	3/9/2001	O4A	58,418	19,879	294	10.4	IC
093152	3/9/2001	O4B	52,671	21,113	299	10.4	IC
subtotal			111,089	40,992	593	10.4	
093158	3/9/2001	M1A	29,130	11,063	280	10.4	IC
093157	3/9/2001	M1B	52,986	20,203	290	10.4	IC
093155	3/9/2001	M1C	51,589	22,086	293	10.4	IC
subtotal			133,705	53,352	863	10.4	
093156	3/9/2001	O5A	42,762	21,195	298	14.8	IC
093153	3/9/2001	O5B	48,965	20,991	295	14.8	IC
subtotal			91,727	42,186	593	14.8	
Total			336,521	136,530	2,049	11.7	

Table 14 (continued)

Brood year, CWT code	Last date of release	Race-way	Number released[a]	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound	Release location (RM)
2000							
093360	3/9/2002	O4A	53,961	21,450	297	13.8	IC
093361	3/9/2002	O4B	53,756	20,616	299	13.8	IC
subtotal			107,717	42,066	596	13.8	
092657	2/7/2002	M1A	49,095	6,503	298	13.7	IC
092658	2/7/2002	M1B	49,159	6,582	297	13.7	IC
092659	2/7/2002	M1C	49,794	6,458	297	13.7	IC
subtotal			148,048	19,543	892	13.7	
093362	3/9/2002	M2A	50,412	21,020	294	12.3	IC
093363	3/9/2002	M2B	50,804	20,401	298	12.3	IC
093401	3/9/2002	M2C	50,810	20,835	299	12.3	IC
subtotal			152,026	62,256	891	12.3	
093358	3/9/2002	O5A	54,045	21,187	299	12.0	IC
093359	3/9/2002	O5B	50,144	20,657	298	12.0	IC
subtotal			104,089	41,844	597	12.0	
Total			511,880	165,709	2,976		
2001							
093606	3/6/2003	O4A	52,399	21,197	298	13.0	IC
093603	3/6/2003	O4B	52,280	20,620	298	13.0	IC
subtotal			104,679	41,817	596	13.0	IC
093609	3/6/2003	M2A	49,631	20,984	298	12.1	IC
093608	3/6/2003	M2B	49,843	20,061	295	12.2	IC
093607	3/6/2003	M2C	49,972	20,849	295	12.2	IC
subtotal			149,446	61,894	888	12.2	
	3/6/2003	M1A	49,617			11.7	IC
	3/6/2003	M1B	53,341			11.6	IC
subtotal			102,958			11.6	
093605	3/6/2003	O5A	49,850	21,415	299	12.1	IC
093604	3/6/2003	O5B	52,367	20,895	300	12.1	IC
subtotal			102,217	42,310	599	12.1	
Total			459,300	146,021	2,083		

Table 14 (continued)

Brood year, CWT code	Last date of release	Race-way	Number released[a]	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound	Release location (RM)
Little White Salmon Hatchery							
1996							
071420	3/08/1998	39-43	172,999	19,403	235	15.6	80
075743	4/14/1998	34-38	172,258	19,255	244	11.6	80
Total			345,257	38,658	479	13.6	
1997							
076037	3/08/1999	39-43	177,655	17,707	248	16.1	IC
076038	4/14/1999	35-38	124,360	17,993	218	12.7	IC
Total			302,015	35,700	466	14.7	
1998							
053645	3/9/2000	39-43	173,545	19,712	297	13.1	IC
053647	4/12/2000	34-38	185,069	19,597	270	11.1	IC
			358,614	39,309	567	12.1	
1999							
054660	3/16/2001	39-43	165,310	18,266	289	13.0	IC
054659	4/11/2001	34-38	180,919	18,133	286	11.3	IC
Total			346,229	36,399	575	12.1	
2001							
054657	4/15/2003	8-10	199,991	16,334		17.0	IC
054658	4/15/2003	11-12	122,815	17,404	291	16.8	IC
Total			322,806	33,738		16.9	
Willard National Fish Hatchery							
2000							
054662	3/14/2002	41-46	143,516	15,993	289	14.6	IC
054761	4/11/2002	47-50,21-22	220,725	23,849	283	14.0	IC
Total			364,241	39,841	572	14.3	
Carson Hatchery							
1996							
076036	4/14/1998	37-40	99,641	18,721	241	16.3	80
1997							
075746	4/14/1999	37-40	103,761	19,593	248	13.3	IC
1998							
054655	4/12/2000	37-40	99,848	19,444	297	14.4	IC
1999							
054661	4/17/2001	37-40	99,983	18,398	288	13.9	IC

[a] *All fish from even numbered brood years through 1996 were LV fin-clipped and fish from odd numbered brood years were RV fin-clipped. All coded-wire tagged fish were adipose fin-clipped. CWT fish from the 1997 brood at Little White Salmon and Carson hatcheries were adipose and LV fin-clipped. Non-CWT fish from the 1997 brood at Umatilla Hatchery were unmarked.* [b] *1996 brood was PIT-tagged.*

Table 15. Disposition and Spawning Ground Data of Natural and Hatchery Summer Steelhead (STS) Returning to the
Umatilla River above Three Mile Falls Dam, 1988-1999.

RUN YEAR (Fall/Spring)	1987 1988	1988 1989	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	1994 1995	1995 1996	1996 1997	1997 1998	1998 1999
Natural STS Enumerated at TMD	2315	2104	1422	724	2247	1298	945	875	1299	1014	862	1134
Hatchery STS Enumerated at TMD	165	370	245	387	522	616	345	656	782	1463	903	740
Natural and Hatchery STS Enumerated at TMD	2480	2474	1667	1111	2769	1914	1290	1531	2081	2477	1765	1874
Natural STS Sacrificed or Mortalities at TMD	20	12	40	2	3	4	0	0	8	5	2	1
Hatchery STS Sacrificed or Mortalities at TMD	5	17	143	50	112	69	51	33	73	95	70	74
Natural STS Taken for Brood Stock	151	158	92	99	237	129	93	86	107	100	86	110
Natural STS Spawned	31F	42F	25F	78	172	95	79	59	63	75	68	76
Hatchery STS Taken for Brood Stock	0	0	0	103	95	91	42	68	26	10	30	15
Hatchery STS Spawned	0	0	0	49	0	3	17	22	21	3	21	4
Natural Females Released above TMD	1436	1232			1193	875	642	602	863	689	550	716
Natural Males Released above TMD	708	702			814	290	210	187	321	220	224	308
Natural STS Released above TMD	2144	1934	1290	623	2007	1165	852	789	1184	909	774	1024
Hatchery Females Released above TMD	114	216			161	266	186	274	371	666	476	425
Hatchery Males Released above TMD	46	137			154	190	66	281	312	692	327	236
Hatchery STS Released above TMD	160	353	102	234	315	456	252	555	683	1358	803	661
Natural STS Harvested above TMD-CTUIR						5	5	5	0	0	5	5
Hatchery STS Harvested above TMD-CTUIR						25	20	20	39	33	33	39
Natural STS Harvested above TMD-ODFW								0	0	0	0	0
Hatchery STS Harvested above TMD-ODFW						22	5	21	25	24	12	47
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548	713
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221	306
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769	1019
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454	382
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305	193
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759	575
Total STS Available for Spawning	2304	2287	1392	857	2322	1569	1074	1298	1803	2210	1528	1594
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002	1095
STS Redds Observed in Index Reaches	138	77	H W.	H W	135	H W.	64	74	119	138	126	218
Total STS Redds Observed	275	128	H W.	H W	300	H W.	224	126	150	149	217	270
Index Reaches Miles Surveyed	18.5	20	H W.	H W	21.4	H W.	21.4	21.4	21.4	21.4	21.4	21.4
Redds Per Mile in Index Reaches	7.5	3.9	H W.	H W	6.3	H W.	3.0	3.5	5.6	6.4	5.9	10.2
Total Miles Surveyed in Umatilla River	61.0	50.2	H W.	H W	67.2	H W.	65.8	35.0	34.4	24.6	38.0	35.0
Redds Per Mile in all Areas	4.5	2.5	H W.	H W	4.5	H W.	3.4	3.6	4.4	6.1	5.7	7.7

Harvest not determined and not subtracted from estimates of spawners, 1988-1982. H. W. = high water.
Assumes that harvest steelhead were 50% females and 50% males. No adjustments made for hook and release mortality.
Index reaches are in Squaw, NF Meacham, Buckaroo, Camp, and Boston Canyon Creeks and the SF Umatilla River

Table 16. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for steelhead reared at Umatilla Hatchery and released in the Umatilla River, 1991-97 broods. Out-of-basin
data was downloaded from the central database in October 2001. Returns are incomplete for the 1997 brood.

Brood year	Race-way	Release date	Release site[a]	Release size (fish/lb)	No.[b] CWT recov-eries	Smolt-to-adult sur-vival (%)	Umatilla[c] River return (%)	No. adults pro-duced	Out-of-[d] basin exploit-ation(%)	In-[e] basin exploit-ation(%)
					Small - grade					
91	M5A	5/01/92	MC	5.5	3	0.030	0.030	20	0.0	0.0
92	M5A	5/13/93	BS	6.1	9	0.073	0.073	48	0.0	0.0
93	M5A	5/12/94	BS	5.2	3	0.036	0.031	19	15.8	31.6
94	M5A	5/12/95	BS	5.5	14	0.211	0.202	101	4.0	5.0
95	M5A	5/09/96	TH	5.1	10	0.129	0.129	64	0.0	0.0
96	M8A	5/15/97	BS	4.9	1	0.014	0.014	7	0.0	100
97	M8A	5/04/98	BS	5.5	10	0.167	0.167	79	0.0	15.2
				4.7	50	0.094	0.92	338	2.1	8.9
					Large - grade					
91	M5B	4/30/92	MC	5.0	2	0.020	0.000	13	100	0.0
92	M5B	4/16/93	MN	5.6	46	0.502	0.406	241	19.1	5.4
93	M5B	4/14/94	MN	5.1	36	0.710	0.520	352	26.1	12.5
94	M5B	4/13/95	MN	4.7	79	1.523	1.144	761	24.8	8.9
95	M5B	4/12/96	MN	5.1	50	0.711	0.650	338	8.6	10.9
96	M8B	4/11/97	MN	4.6	42	0.569	0.543	266	4.5	10.5
97	M8B	4/17/98	MN	4.7	27	0.454	0.397	223	12.6	7.2
				4.4	282	0.641	0.523	2,194	18.7	9.4
					Large - grade					
91	M5C	3/29/92	BS+MN	5.8	27	0.279	0.221	188	20.7	3.2
92	M5C	4/18/93	BS	4.5	67	0.665	0.562	298	15.4	7.1
93	M5C	4/11/94	BS	4.9	39	0.885	0.613	455	30.8	10.1
94	M5C	4/11/95	BS	5.6	59	1.051	0.890	510	15.3	7.1
95	M5C	4/24/96	BS	5.3	21	0.281	0.235	139	16.6	7.2
96	M8C	4/10/97	BS	5.4	22	0.322	0.308	134	4.5	9.0
97	M8C	4/16/98	BS	5.9	15	0.221	0.163	91	26.4	14.3
				4.7	250	0.529	0.427	1,815	19.6	7.9
	All broods and size grades:			4.6	582	0.422	0.348	4,347	17.8	8.7

[a] *MC = Meacham Creek near Bonifer Springs acclimation site, BS = Bonifer Springs acclimation site, TH = Thornhollow acclimation site, MN = Minthorn acclimation site.*

[b] *Number of coded-wire tags recovered.*

[c] *Return = number of fish counted at Three Mile Falls Dam plus harvest beolow Three Mile Falls Dam.*

[d] *Percent of adult production harvested outside of the Umatilla River basin.*

[e] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers*

Table 17
Summer Steelhead Annual Run Counts

Year	Hatchery	Wild	Total
1966-67		1778	1778
1967-68		930	930
1968-69		1917	1917
1969-70		2298	2298
1970-71			
1971-72			
1972-73		2057	2057
1973-74		2640	2640
1974-75		2171	2171
1975-76		2534	2534
1976-77		1258	1258
1977-78		3080	3080
1978-79			
1979-80		2367	2367
1980-81		1298	1298
1981-82		768	768
1982-83		1264	1264
1983-84		2314	2314
1984-85		3197	3197
1985-86		2885	2885
1986-87		3444	3444
1987-88	166	2316	2482
1988-89	371	2104	2475
1989-90	246	1422	1668
1990-91	387	725	1112
1991-92	523	2246	2769
1992-93	616	1297	1913
1993-94	345	945	1290
1994-95	656	875	1531
1995-96	785	1296	2081
1996-97	1463	1014	2477
1997-98	903	862	1765
1998-99	751	1135	1886
1999-00	739	2153	2892
2000-01	1089	2573	3662
2001-02	1860	3659	5519
2002-03	960	2120	3080

Table 18. The Number and Percent of Steelhead (STS) Available to Spawn Naturally that were of Hatchery Origin; Umatilla River, 1988-1999.

BROOD YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002
Percent Spawners of Hatchery Origin	6.9	15.4	7.3	27.3	13.6	26.1	21.1	39.6	34.3	58.9	49.7
Percent Females Spawners of Hatchery Origin	7.4	14.9			11.9	21.7	21.3	29.7	28.2	48.0	45.3

Harvest not estimated 1988-1992. 1993-1999, Harvest estimate subtracted from total, assumes harvest of 50% females and 50% males
No adjustments made for catch and release mortality.

Table 19. Age summary of natural summer steelhead from the Umatilla River.

Return Year		Age 1.1	Age 1.2	Age 2.1	Age 2.2	Age 2.3	Age 3.1	Age 3.2	Age 4.1	Total
1994	n=	0	2	24	26	0	5	6	0	63
	%=	0	3.2	38.1	41.3	0	7.9	9.5	0	100
1995	n=	0	0	19	17	0	9	11	0	56
	%	0	0	33.9	30.4	0	16.1	19.6	0	100
1996	n=	0	0	28	8	0	7	1	0	44
	%	0	0	63.6	18.2	0	15.9	2.3	0	100
1997	n=	0	0	19	17	0	5	10	0	51
	%	0	0	37.3	33.3	0	9.8	19.6	0	100
1998	n=	1	1	33	11	1	4	0	1	52
	%	1.9	1.9	63.5	21.2	1.9	7.7	0	1.9	100

Juvenile years of freshwater growth from scales of adult steelhead returning to the Umatilla River.

Return Year		Age 1	Age 2	Age 3	Age 4	Total
1994	n=	2	50	11	0	63
	%=	3.2	79.4	17.4	0	100
1995	n=	0	36	20	0	56
	%	0	64.3	35.7	0	100
1996	n=	0	36	8	0	44
	%	0	81.8	18.2	0	100
1997	n=	0	37	15	0	51
	%	0	70.6	29.4	0	100
1998	n=	2	45	4	1	52
	%	3.8	86.5	7.7	1.9	99.9

Table 20. Life History table of steelhead

Mouth of the Umatilla to the mouth of McKay Creek (RM 0-50.5)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding												
Spawning												
Incubation												
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x	x		

.

Mouth of McKay Creek to the mouth of Meacham Creek (RM 50.5-79) and mid-basin streams

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Mouth of Meacham Creek to the forks (RM 79-89 and headwater streams)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

2004 DRAFT

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Umatilla River Fall Chinook
Species or Hatchery Stock:	Umatilla River Fall Chinook stock 091
Agency/Operator:	Oregon Department of Fish & Wildlife/ Confederated Tribes of the Umatilla Indian Reservation
Watershed and Region:	Umatilla/Columbia/Oregon
Date Submitted:	2004
Date Last Updated:	May 13, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program. Umatilla River Fall Chinook Program

1.2) Species and population (or stock) under propagation, and ESA status.
Fall Chinook (Oncorhynchus tshawytscha) Upriver Bright (stock 091).

1.3) Responsible organization and individuals

Name (and title): Scott Patterson – Hatchery Coordinator
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 107 Twentieth Street, La Grande, OR 97850
Telephone: 541-963-2138
Fax: 541-963-6670
Email: Scott.D.Patterson@state.or.us

Name (and title): Gary James – Fisheries Program Manager
Agency or Tribe: Confederated Tribes of the Umatilla Indian Reservation
Address: P.O. Box 638, Pendleton, OR 97801
Telephone: 541-276-4109
Fax: 541-276-4348
Email: garyjames@ctuir.com

Name (and title): Tim Bailey – District Fish Biologist
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 73471 Mytinger Lane, Pendleton, OR 97801
Telephone: 541-276-2344
Fax: 541-276-4414
Email: umatfish@oregontrail.net

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

1. *Confederated Tribes of the Umatilla Indian Reservation* – Co-managers – Operators of acclimation and adult collection facilities.
2. *Bonneville Power Administration* – Funding for– Hatchery, acclimation, adult collection and monitoring and evaluation.
3. *Washington Department of Fish & Wildlife Priest Rapids Hatchery*—Broodstock and egg source for sub-yearling program.

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

Umatilla Hatchery is 100% funded by the Bonneville Power Administration. Oregon Department of Fish & Wildlife operates the facility, and staff consists of one F&W Manager 1, one F&W Technician 2, four F&W Technician 1's, one Trades/Maintenance Worker 2, one half-time F&W Technician 1, and one Trades/Maintenance Worker 1. Fiscal Year 2004 Umatilla Hatchery operations budget is $817,305

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

Adult Collection-- Fall chinook broodstock are collected at the Three Mile Falls Dam adult trapping facility and Priest Rapids Hatchery. The Threemile Dam facility is located approximately 4 miles upstream from the mouth of the Umatilla River, near the town of Umatilla, in Umatilla County, Oregon. The regional mark processing center site code for Three Mile Falls Dam is 5F33427 H27 24. The Priest Rapids Hatchery is located on the Columbia River at RM----, County, Washington.

Holding and Spawning-- Fall chinook collected at Three Mile Dam are held and spawned at the Three Mile holding and spawning facility. Adults collected at Priest Rapids are held and spawned on site.

Incubation and rearing (sub-yearling program)-- Eyed eggs are transferred from Priest Rapids Hatchery, to Umatilla Hatchery for incubation and rearing. Egg source priorities for Umatilla Hatchery sub-yearling program are: Priest Rapids, Bonneville and Little White Salmon hatcheries.

Incubation (Umatilla Hatchery-Yearling Program)—Eggs are incubated at Umatilla Hatchery until the eyed stage, and then transferred to Bonneville hatchery for final incubation and rearing. Umatilla Hatchery is located along the Columbia River approximately two miles west of Irrigon in Morrow County, Oregon. The regional mark processing center site code for Umatilla Hatchery is 5F33449 H49

Final Incubation and Rearing (Bonneville Hatchery-Yearling Program)—Eyed eggs are received from Umatilla Hatchery. Egg source priorities for Bonneville hatchery will be in the preceding order: Three Mile Falls Dam, Bonneville and Little White Salmon hatcheries. Bonneville Hatchery is located on Tanner Creek near its confluence with the Columbia River at Bonneville Dam in Multnomah County, Oregon.

Acclimation to release: Yearling fall chinook from Bonneville hatchery will be transferred and released from the Thornhollow acclimation facility (RM 73.5). Two groups of 150,000 sub-yearling fall chinook from Umatilla hatchery will be transferred to Thornhollow for acclimation and release. Two groups of 150,000 sub-yearling fall chinook from Umatilla hatchery will be released directly into the Umatilla River at Reith (RM 48).

1.7) Type of program.

Re-introduction of Fall Chinook to the Umatilla River.

1.7) Purpose (Goal) of program.

The primary goal of the Umatilla River fall chinook program is to reintroduce fall chinook for harvest in the Umatilla River while rebuilding and maintaining adequate hatchery and natural production.

1.8) Justification for the program.

Fall chinook were extirpated for the Umatilla river in the early 1900's. Reintroduction of fall chinook is intended to provide harvest opportunities while rebuilding and maintaining adequate hatchery and natural production.

1.9) List of program "Performance Standards"

The Performance Standards for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed

1.12) List of program "Performance Indicators", designated by "benefits" and "risks"

The Performance Indicators for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed

1.10.1) "Performance Indicators" addressing benefits.

1.10.2) "Performance Indicators" addressing risks.

1.13) Expected size of program.

The Umatilla Hatchery Master Plan goal for the Umatilla River was to produce 10,000 hatchery and 11,000 naturally returning fall chinook adults annually. Currently the goal of the program is produce 1.08 million juveniles annually, the production is divided in two programs. The yearling program consists of 480,000 smolts, which are produced at Bonneville Hatchery and the sub-yearlings program consisting of 600,000 smolts, which are produced at Umatilla Hatchery.

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

Broodstock needs for the Bonneville hatchery yearling production is 190 females, 190 male and 19 jacks, and will be collected at Three Mile Dam. Broodstock priorities for the Umatilla hatchery sub-yearling program will be in the preceding order: Priest Rapids, Bonneville and Little White Salmon hatcheries. The collecting hatchery will spawn approximately 220 females to provide Umatilla hatchery with 670,000 eyed eggs.

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

location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		0
Unfed Fry		0
Fry		0
Fingerling	Thornhollow(RM73.5)	300,000
	Reith(RM48)	300,000
Yearling	Thornhollow (RM73.5)	480,000

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

- *Estimated smolt-to-adult survival*--Master Plan goal for the program is 0.3% for the subyearlings and 0.75% for the yearlings. The average smolt-to-adult survival of the Umatilla yearling and subyearling program has ranged from 0.001% to 0.149% (Tables 1&2).

- **Total adult production--** ***The Master Plan goal for fall chinook hatchery return was 10,000. Since 1992, hatchery adult returns to Three Mile Falls Dam have ranged from 6028 to 303, and averaged 2052 (Table 3).***

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

The first release of fall chinook in the Umatilla River took place in 1982 using Tule stock, since that time only upriver bright fall chinook stock has been released. The current program of releasing 1.08 million juveniles was started in 2001 (table 4).

1.16) Expected duration of program.

This is an on-going program.

1.17) Watersheds targeted by program.

The Umatilla Fall Chinook Program targets the Umatilla River sub-basin.

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

Managers are currently reassessing hatchery performance goals in the subbasin planning process. When this process is completed, the revised goals and alternative actions will be submitted.

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

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

4d rule research permit applications have been submitted to NMFS for the following: Umatilla River Juvenile Salmonid out migration and survival studies; permit #OR2004-1408

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.

:

Adult age class structure: See table 18
Sex ratio: See table 15
Size range:
Migrational timing: See table 20
Spawning range:
Spawn timing: See table 20
Juvenile life history strategy, including smolt emigration timing: See table 20

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

None.

Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

Umatilla River Summer Steelhead (stock 091) – included as part of the Mid-Columbia ESU - listed as "Threatened" under the federal ESA.
Umatilla River bull trout are included as part of the Columbia distinct population segment listed as Threatened under the federal ESA.

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

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

Chilcote (Unpublished draft) identifies the wild Umatilla summer steelhead critical population threshold at 110, and the viable population threshold at 333. Since 1988, wild adults available for spawning has exceeded 600 (see Table15).

The U.S Fish and Wildlife Service bull trout recovery plan for the Umatilla/Walla Walla Recovery Unit (2002) list recovery criteria for the Umatilla River. Recovery criteria for the Umatilla River core area are to maintain 500 to 1,000 spawning adults annually for at least two generations(i.e.,10 to 14 years) The redd count average for the last four years(1999-2002)in the North Fork Umatilla River equates to a population estimate of 281 spawning adults.

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.

The progeny to parent ratio for natural spawning hatchery and natural steelhead compared to Umatilla hatchery steelhead from 1990 through 1999 is presented in Table17. The progeny to parent ratio of natural spawning hatchery and natural steelhead has been below replacement in eight of the last ten years. In contrast, hatchery progeny to parent ratio was above one for all of the last ten years.

- 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.

The number and percent of adult steelhead available to spawn of wild and hatchery origin since 1988 is presented in Table 6. Total natural adult return numbers to Three Falls Mile Dam have ranged from 725 in 1990-91 to 3,659 in 2001-02 (Table 16).

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

The percent of adults available to spawn that were of hatchery origin has ranged from 6.9% of the total run in 1988, to a high of 58.9% in 1997 with a mean of 27.2% (1988-1998; Table 21).

2.2.3) <u>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</u>

- 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.

The Umatilla Summer Steelhead program currently collects 100 unmarked steelhead to provide the egg needs for the hatchery program .

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

Table 22 provides the numbers of Umatilla summer steelhead collected and spawned for broodstock needs for the program.

- 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).

- 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.

- Outmigration and Survival Study - As per the 4d rule research application; we will reduce numbers collected by adjusting the sample times and avoid sampling when large numbers of natural steelhead are passing through the sampling facility. To reduce the number of mortalities from fish jumping out of the sample tank or from other areas, we will apply covers and screens to prevent escape and monitor the facility closely. Monitoring information is mostly obtained through remote interrogation of tags, without any handling.

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.

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

1) CTUIR. 1994. Wildlife Mitigation Plan (Draft) May 1996, Columbia Basin Salmon Policy. 1995 pg 9-10, and Water Assessment Report;
2) NMFS - Salmon & Steelhead Enhancement Plan for the Washington and Columbia River Conservation areas.Vol 1. chpt 4, 37pgs;
3) Reeve, R. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Plan; 4)CTUIR/ODFW. 1990. Umatilla Hatchery Master Plan;
5) OWRD. 1988. Umatilla Basin Report;
6) BOR. 1988. Umatilla basin Project Planning Report,
7) Umatilla County - Comprehensive Plan. 1983, chpt 8;
8) USNF - Umatilla National Forest Land & Resource Management Plan. 1990, chpt 2, pg 13. and Final EIS. 1990, chpt III, pgs 59-62;
9) CTUIR/ODFW. 1990. Umatilla River Subbasin Salmon and Steelhead Production Plan;
10) Boyce, R. 1986. A Comprehensive Plan for Rehabilitation of Anadromous Fish Stocks in the Umatilla River Basin; 11)USFWS & NMFS. 1982. Umatilla R. Planning Aid Report.
11) USBR and BPA. 1989. Umatilla Basin Project. Initial project workplan presented to the NWPPC, May 1989.

This HGMP is consistent with these plans and commitments.

3.6) Relationship to harvest objectives.

State and tribal comanagers as part of the Umatilla Hatchery Master Plan developed fall chinook harvest guidelines. Harvest guidelines are designed to support the rebuilding of the fall chinook run, support the monitoring and evaluation program, be consistent with Indian treaty fishing rights. The fall chinook fishery in the lower Umatilla has been limited to a jack only bag limit, due to low adult returns. The fall chinook program primarily contributes to ocean and Columbia River fisheries.

3.3.2 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 fall chinook fishery in the lower Umatilla has been limited to a jack only bag limit, due to low adult returns. The fall chinook program primarily contributes to ocean and Columbia River fisheries. Releases of fall chinook smolts in the Umatilla River

contributed an average of 750 fish annually to fisheries from 1993 to 2000. Mean annual fishery contributions were considerably higher (8,872 fish/yr.) from 1985-1992. (Tables 1&2)

3.7) Relationship to habitat protection and recovery strategies.

The Umatilla Fall Chinook Program is a part of an overall Umatilla Basin Salmon and Steelhead Restoration Program. In addition to on-going passage and hatchery operations, restoration efforts include ongoing projects that enhance stream and riparian habitat as well as monitor and evaluate the hatchery and natural components of the restoration program.

Factors limiting the natural production of fall chinook in the Umatilla River Basin include channelization, low or no summer flows, warm water temperatures, sediment, and poor habitat diversity caused by urban and rural development/land management practices. Ocean conditions and the mortalities and stress from the operation of hydropower projects on the mainstem Columbia River are important factors outside the basin. There continues to be degradation to fish habitat in these areas that hampers improvement efforts.

3.6) Ecological interactions.

- Interactions with species that could negatively impact program: a) bird predation during peak smolt migration periods each spring; and b) Northern Pikeminnow and smallmouth bass - predation during smolt migration periods.

- Interactions with species that could positively impact program: Carcasses from fall chinook add to the Umatilla River subbasin's nutrient recharge cycle. Increased angler effort in the fall Chinook salmon fisheries increases awareness of the Umatilla steelhead program which could potentially lead to increased harvest of hatchery steelhead.

- Interactions with species that could be positively impacted by program: Hatchery fall chinook smolts could add to the food base for bull trout.

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.

Umatilla Hatchery--The water source for the Umatilla Hatchery comes from the Columbia River through a Ranney well system, and for separate wells. The system was initially designed and constructed to produce a maximum of 15,000 gpm of water. However, actual water capacity at UH is 5,500 gpm, and several wells have been subject to failure (Jack Hurst, ODFW, Umatilla Hatchery) Water from the well system averages 12.2°C (54°F). Water quality exceeds BPA requirements (BPA 1987) for all hatchery uses.

Water is withdrawn under certificate #72181, permit G 10870, and, certificate #72182, permit #G 11210. Water discharged is monitored under the general NPDES 0300 J permits.

Three Mile Falls Dam-- The water source for the Three Mile Falls Dam adult facility is pumped directly from the Umatilla River. The Denil steep-pass utilizes 2,900 gpm and the holding pond uses 1,450 gpm. Both the steep-pass and holding pond pumps run continuously. The fish lock system uses 630 gpm, but is used only during handling operations (approximately two hours per day). The water source is the same as used by the natural population.

Water temperatures at Three Mile Falls Dam range from approximately 0°C (32°F) in winter to over 21°C (70°F) during the summer. Sediment loads vary dramatically during the return season (late August through early June) and during the migration season (March – July). High sediment loads are experienced annually during high flow conditions.

Bonneville Hatchery--The facility has water rights to 50 CFS of water from Tanner Cr. Water quality is high. Temperatures range from 32 to 55 degrees, September recording the highest temperature and February the lowest.

Limitations are as follows; Tanner Cr. water is dependent on rainfall and snow pack which effects water temperature and available CFS. During high water adult salmon and steelhead can pass above the Tanner Cr. intake to spawn. These fish have been known to carry IHN and have infected programs at Bonneville. Tanner Cr. location subjects itself to very cold weather which results in minus 32 degree temperatures and intake problems resulting from anchor ice and slush build up and potential loss of flow.

A secondary source of water for Bonneville hatchery is a well field located on Robbins Island within the confines of the Bonneville Dam / Corp of Engineers Project. Originally seven wells operated to produce 18,000 GPM. In recent years the well field has become depleted and now can only produce approximately 14,000 GPM. Plans are in effect for funding and surveys to resurrect these wells.

Bonneville Hatchery operates under NPDES permit # 300J which allows treated discharge from aquatic animal facilities which produce at least 20,000 pounds of fish per year, but have less than 300,000 pounds on hand at anyone time.

Bonneville Hatchery intake at this time is not NOAA fisheries screen compliant, but Oregon Dept. Fish and wildlife Fish Passage and Screening section is currently reviewing the work necessary to bring it into compliance.

Priest Rapids Hatchery --

Thornhollow Acclimation-- Water for the Thornhollow facility is pumped directly from the Umatilla River. Flows are held constant at approximately 1,600 gpm per each of two acclimation ponds. During the juvenile acclimation period (mid-February to late May), average monthly temperatures range from approximately 3.6 to 6.7 C (38.5 to 44^{o}F).

Natural Production-- Natural spawners use the water available in the streams of the

Umatilla River Basin. Water quality is relatively high in the headwater streams where steelhead spawn and rear. The spawning streams contrast greatly to the lower Umatilla River and lower tributaries where sediment loads are high in the spring and summer water temperatures are often lethal to Salmonid's (Contor et al. 1998). Water quality in this desert basin contrasts to the hatchery, as there are often large daily fluctuations in water temperature. During the winter and spring, rain-on-snow events interspersed with cold periods often produce large fluctuations in stream flow. During spawning and incubation, the streams are often high and turbid.

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.

Umatilla Hatchery-- Umatilla Hatchery uses 100% well water, and operates under DEQ NPDES discharge permit # 300 J.

Bonneville Hatchery --Intake at this time is not NOAA fisheries screen compliant, but Oregon Dept. Fish and wildlife Fish Passage and Screening section is currently reviewing the work necessary to bring it into compliance. Bonneville Hatchery operates under DEQ NPDES discharge permit # 300 J.

Thornhollow Acclimation— Acclimation facility intake screens conform to NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.

Priest Rapids Hatchery--

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Three Mile Falls Dam--Broodstock collection is conducted solely at the Three Mile Falls Dam east bank adult trapping facility. The facility consists of a vertical slot fish ladder, Denil steeppass, adult holding pond (raceway), and fish handling and sorting complex. The construction and operation of the facility has no effect on the critical habitat for summer steelhead. The dimensions of the holding pond are 14' wide by 36' long by 3.5' deep (approximately 1,800 cubic feet). The holding pond has a jump screen located at the upper end and jumpout panels located at both upper corners to prevent adults from jumping out of the pond. The holding pond is located above the 100 year flood level. The water supply for the holding pond is pumped directly from the Umatilla River at a rate of 1,450 gpm. A low water discharge alarm is located on the pond supply line to signal any loss of flow to the holding pond. No backup pumps or emergency generator system are located at the site. In case of water loss to the pond, two options are available to on-site personnel. During power outages or other short term losses of flow, the outlet

gate from the pond can be closed to maintain water depth. For pump failures or other long term losses of water supply, adults can be dip netted out of the pond and returned to the river.

Priest Rapids Hatchery--

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

Priest Rapids Hatchery--

Three Mile Falls Dam--None used, fish held on site for spawning.

5.3) Broodstock holding and spawning facilities.

Priest Rapids Hatchery--

Three Mile Falls Dam-- Since 1997, all fall chinook spawning for the yearling program has occurred at Three Mile Dam. The facility includes a water intake system with automatic screen cleaning, pump station having a nominal pumping capacity of 8,000 gpm, six adult holding ponds, (each 90 x 10 x 5 foot effective water depth; 4,500 ft^3), mechanical fish crowder, visitor facilities including restrooms, standby generator, chemical storage, bunkhouse and spawning buildings. The bunkhouse includes two bunkrooms, kitchen area, office space, conference room, shop, and restrooms. The spawning building includes a fish lift, electroshock anesthesia system, sorting and spawning facilities, wet and dry storage rooms, walk-in cooler/freezer, and restroom.

5.4) Incubation facilities.

Umatilla Hatchery—Green eggs are transported from Three Mile dam, in five-gallon buckets with chilled water, and eyed eggs from Priest Rapids hatchery in mesh bags with ice. Umatilla hatchery incubation equipment consists of four separate units of Marisource incubators (Heath tray type). Water can be used directly from wells or mixed with chilled water. Three units can be supplied with well water at 12.2^{o}C (54^{o}F) or mixed with chilled water 7.2^{o}C (45^o F) for any combination of temperatures from 7.2-12.2^{o}C (45-54^o F) provided that 300 gpm of chilled water is not exceeded. The fourth unit can be mixed with water chilled to 3.3^{o}C (38^o F) to achieve any combination of temperatures from 3.3-12.2^{o}C (38–54^o F) provided that 60 gpm of chilled water is not exceeded. Numerous systems continually monitor temperature, mechanical systems, electrical systems, and flow. Alarms sound if any system fails or is out of criteria. Continual monitoring of systems and preventative maintenance is used to prevent system failure. An emergency gas powered pump installed in the aeration tower structure supplies water for incubation in the event of aeration lift pump failure. In the event of total system failure resulting in total loss of water, eggs may be transported to Irrigon hatchery (if they are still operational and have necessary space).

Pathogen free water is used for incubation at Umatilla Hatchery for all programs. This is a direct preventive measure at minimizing the risk of introducing pathogens into the hatchery program, thus minimizing the risks to fish in the natural environment after these fish are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor.

Bonneville Hatchery-- Incubation facilities consist of 8 rows of 19 double heath vertical incubators / 16 trays using 4 gpm of well water.

Priest Rapids Hatchery--

5.5) Rearing facilities.

Umatilla Hatchery-- Umatilla Hatchery has three different types of rearing units. There are eight 21' Canadian style early rearing tanks located in the main building adjacent to incubation. Water is pumped to the aeration tower and gravity fed to the tanks. Fall Chinook Subyearlings are started in one Oregon pond. Umatilla Hatchery has 10 Oregon ponds. Rearing dimensions are 91'X18.75'X3.67'. These ponds are designed for serial reuse in-groups of 2 ponds, upper and lower. They also can be supplied with fresh water individually, if necessary. When densities reach 3,000 pounds these fish are split into two Oregon ponds, just prior to tagging operations. These fish will then be 100% tagged and marked into four equally sized groups, into four Oregon Ponds. Umatilla Hatchery has 24 Michigan style ponds, with rearing dimensions of 91'X9'X2.75'. Water is supplied to these ponds in reuse groups of three ponds each. Each pond has a submersible pump that supplies 950 gpm of water to oxygen contact columns, located at the head of each pond. Oxygen is introduced and unwanted saturated gas is removed from incoming water at this point. Each pond has its own oxygen supply line. Supplemental oxygen is either delivered from oxygen generators, (pressure swing absorption units) or from a bulk liquid tank on site. Chinook can also be reared in these ponds if optimization of water use is necessary.

All ponds have a high-low water level alarm, and for Michigan ponds, pump failure and oxygen flow alarms. In the event of total system failure, fish could be moved to nearby Irrigon Hatchery if pond space is available and all logistics were in place prior to the time of failure. Monitoring and maintenance of the water supply system, and forecasting for contingencies, are the best means for dealing with the possibility of rearing pond system failure.

Pathogen free water is used for rearing the fish at the Umatilla Hatchery for all production. This is a direct preventive measure at minimizing the risk of introducing pathogens into hatchery phase of this program, thus minimizing the risks to fish in the natural environment after these fish are released. Sanitary measures are taken at Umatilla Hatchery to prevent transmission of pathogens from one stock to another by disinfecting equipment in Iodophor. In addition, a fish health program is in place to monitor and evaluate the health status of Fall Chinook juveniles reared at Umatilla Hatchery.

Bonneville Hatchery--Early rearing occurs in modified Burrows concrete ponds (75' x 16.8 x 30") supplied with well water, Fingerlings are then moved to Standard raceways (80'x 20 x 30") and reared on Tanner Cr. water in 10 concrete ponds.

5.6) Acclimation/release facilities.

Thornhollow— The Thornhollow acclimation/release facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage building, two acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. From here, water is supplied to the ponds by gravity at approximately 1,600 gpm per pond. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way. The ponds are thoroughly cleaned prior to fish being received, and ODFW pathology personnel are available to address disease concerns.

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

Umatilla Hatchery—There has been no significant fish loss.

Bonneville Hatchery-- There has been no significant fish loss.

Thornhollow-- There has been no significant fish loss.

Three Mile Facility -- There has been no significant fish loss.

Minthorn Acclimation-- In 1986, one group of fall chinook juveniles was acclimated at Minthorn from July through October. This group suffered significant losses (~78%) due to disease (Columnaris) and pump failure. In 1988, another group of fall chinook was acclimated at Minthorn from September through November. This group also suffered significant juvenile losses (~82%) due to disease (Ich). Since 1988, there have been no significant fish losses.

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.

Umatilla Hatchery--This is covered in section 5.5

Bonneville Hatchery--The hatchery will be staffed full-time, 24 hrs a day, 365 days a year, and equipped with low water alarm system to help prevent catastrophic fish loss resulting from water system failure.

Three Mile Dam --Since 1997, all fall chinook spawning for the yearling program has occurred at Three Mile Dam. The facility includes a water intake system with automatic screen cleaning, pump station having a nominal pumping capacity of 8,000 gpm, six adult holding ponds, standby generator, and bunkhouse building for night watch personnel. In the event of power failure, an audio alarm will sound; the standby generator will start automatically, and in turn, the primary pump will restart. If for some reason the primary pump does not start or fails for any reason, one of two backup pumps will start automatically. In addition, a low water level alarm in the water distribution headbox will sound in case of low flow. The audio alarm will alert the facility night watch personnel who will respond to the emergency. If one of the pumps will not run, the effluent standpipes to the individual ponds can be quickly raised, maintaining existing water levels in the ponds. This will keep the fish alive for a period of time. The project leader, maintenance supervisor, and technicians are also on call 24 hours per day for emergency response.

Thornhollow Acclimation --The Thornhollow acclimation/release facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, and two acclimation ponds. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. From here, water is supplied to the ponds by gravity at approximately 1,600 gpm per pond. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way

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.

List all historical sources of broodstock for the program. Be specific (e.g., natural spawners from Bear Creek, fish returning to the Loon Creek Hatchery trap, etc.).

Umatilla --

Priest Rapids Hatchery--

6.2) Supporting information.

6.2.1) History.

Umatilla—

Priest Rapids Hatchery--

Provide a brief narrative history of the broodstock sources. For listed natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.2 if appropriate). For existing hatchery stocks, include information on how and when they were founded, sources of broodstock since founding, and any purposeful or inadvertent selection applied that changed characteristics of the founding broodstock.

6.2.2) Annual size.

Umatilla—

Priest Rapids Hatchery--

Provide estimates of the proportion of the natural population that will be collected for broodstock. Specify number of each sex, or total number and sex ratio, if known. For broodstocks originating from natural populations, explain how their use will affect their population status relative to critical and viable thresholds.

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

Umatilla—

Priest Rapids Hatchery--

If using an existing hatchery stock, include specific information on how many natural fish were incorporated into the broodstock annually.

6.2.4) Genetic or ecological differences.

Umatilla—

Priest Rapids Hatchery--

Describe any known genotypic, phenotypic, or behavioral differences between current or proposed hatchery stocks and natural stocks in the target area.

6.2.5) Reasons for choosing.

Umatilla—

Priest Rapids Hatchery--

Describe any special traits or characteristics for which broodstock was selected.

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.

Umatilla River--Adults are being monitored for hatchery marked versus unmarked hatchery/wild abundance. Brood Year 2003 proposed trapping rate of 100% of the return, up to December 1, or until 380 adults are captured.

Priest Rapids Hatchery--

SECTION 7. BROODSTOCK COLLECTION

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

Umatilla River—Adults

Priest Rapids Hatchery--Adults

7.2) Collection or sampling design.

Umatilla--Preston??

Priest Rapids Hatchery--

Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source.

7.3) Identity.

Umatilla--Adults

Priest Rapids Hatchery--

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

7.4) Proposed number to be collected:

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

The number of fall chinook broodstock collected for holding/spawning at Three Mile Dam since 1996 has varied from 199 in 1998 to 603 in 2000 (Table 9). The collection goal for 2003 was 380 adults (190 pairs), and 19 jacks. The collection goal in following years is anticipated to be similar.

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

Year	Adults			Eggs	Juveniles
	Females	Males	Jacks		
1996	272	267	25	778,028	unknown
1997	186	102	11	641,861	unknown
1998	90	93	16	257,311	unknown
1999	246	189	29	541,821	401,900
2000	290	269	44	1,081,481	unknown
2001	213	246	27	732,205	509,816
2002	262	263	34	678,122	477,306
2003	195	196	18	681,595	unknown

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

??

7.6) Fish transportation and holding methods.

Three mile Dam—No transportation occurs.

Priest Rapids Hatchery-- No transportation occurs.

7.7) Describe fish health maintenance and sanitation procedures applied.

Three Mile Dam --Collection--Adults retained for broodstock are injected with

oxytetracycline (10mg/kg) and erythromycin (20mg/Kg) at the collection site (Three Mile Dam).

Holding--At Three Mile Dam adult facility, hydrogen peroxide is dripped into the inflowing water to achieve a maximum concentration of 100 ppm. The treatment is applied for one hour to control fungus and parasites three times per week.

Priest Rapids Hatchery--

7.8) Disposition of carcasses.

Three Mile Dam--

Priest Rapids Hatchery--

Include information for spawned and unspawned carcasses, sale or other disposal methods, and use for stream reseeding.

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.

Three Mile Dam--

Priest Rapids Hatchery--

SECTION 8. MATING

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

8.1) Selection method.

Three Mile Dam--

Priest Rapids Hatchery--

Specify how spawners are chosen (e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, or prioritized based on hatchery or natural origin).

8.2) Males.

Three Mile Dam--

Priest Rapids Hatchery--

Specify expected use of backup males, precocious males (jacks), and repeat spawners.

8.3) Fertilization.

Three Mile Dam—Spawning is accomplished by mating at sex ratio's 1:1.

Priest Rapids Hatchery--

8.4) Cryopreserved gametes.

Three Mile Dam—None used

Priest Rapids Hatchery—None used

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

Three Mile Dam--

Priest Rapids Hatchery--

(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program"*.).

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. Egg take and survival of Fall Chinook taken from Three Mile Holding Facility (Umatilla R. Stock) and reared @ Bonneville. Brood Years 97-98 & 2001-2003

Brood Year	Number Eggs taken	Green / Eyed Survival %	Eyed/Smolt Survival %
1997	515,281	70	
1998	256,511	69	
a.			
2000	1,081,481	71	*b.*
2001	716,549	82	
2002	678,122	75	

a. Egg's were shipped green to Bonneville in BY 1999.

b. 171,000 fry incorporated in Umatilla hatchery sub-yearling program.

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

Three Mile Dam Holding/Spawning—In brood year 2000, excess adults were captured and spawned, resulting in 171,000 being incorporated in Umatilla Hatchery sub-yearling program.

Priest Rapids Hatchery—There are no surpluses, eyed eggs are shipped to Umatilla Hatchery.

9.1.3) Loading densities applied during incubation.

Umatilla Hatchery-- *Umatilla Hatchery*--Hatchery incubation consists of four isolated units or sections of Marisource (Heath tray type) incubators as described in section 5.4.1 Loading densities do not exceed 8,000 eggs/tray green, and 7,300 eggs/tray eyed stage.

Bonneville Hatchery-- Eggs are received from Umatilla hatchery eyed; they are put down 5500 eggs per Marisource (Heath) tray with 4 gpm flow.

9.1.4) Incubation conditions.

Umatilla Hatchery-- Oxygen saturation levels average 10 ppm influent and 9 ppm effluent. Water flows are regulated to a minimum of 4 gal. /min, with individual egg take temperatures ranging from 38^0F to 54^0F.

Bonneville Hatchery-- As eggs incubate they are visually monitored until hatching begins, at this time the tray lids are lightly brushed each day to clear dissolving shell. Eggs are incubated in 50 degree well water, with a running total of TU's recorded daily. DO's and silt management is of no concern.

9.1.4.5) Egg Transfers

Umatilla Hatchery—Transfer of eyed eggs to Bonneville Hatchery for the Yearling program, occurs in early January. Transfer is done with Burlap and egg baskets @ 21K/basket.

9.1.5) Ponding.

Umatilla Hatchery—Fall Chinook are ponded mid-February at 1,850 temperature units @ approximately 1,000 fish to the pound, and 100% button-up. (Section 5.5)

Bonneville Hatchery-- Ponding is considered when the fry accumulate between 1800 – 1850 temperature units. At this time a sample of fry is removed from individual trays and viewed under light to determine degree of button up. Degree of button up desired is 99.9%.

9.1.6) Fish health maintenance and monitoring.

Umatilla Hatchery--Eggs brought to Umatilla Hatchery are disinfected in 75 ppm iodophor for 15 minutes. Fungus is controlled with formalin treatments at a concentration of 1,667 ppm (1:600). Treatments are scheduled seven times per week for 15 minutes. Little mortality has been attributed to yolk-sac malformation. After eyeing, dead eggs are hand picked.

Bonneville Hatchery-- Upon arrival, eyed eggs are disinfected in an Argentyne bath at 1/600. No subsequent treatments are performed. Eggs are visually checked for fungus growth activity or other problems that may occur as they complete the incubation process. Before ponding fry are picked to removed dead eggs and malformed fry, loss is enumerated.

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.

Umatilla Hatchery--Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.

Bonneville Hatchery--Each year incubation trays are inspected, and then repaired to prevent any loss of fry into the water way due to equipment failure.

9.2) <u>Rearing</u>:

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

Table 9.2.1.1 Egg take and survival of Priest Rapids Stock for Umatilla Hatchery Sub-yearling program Fall Chinook (brood years 1997-2002) reared at Umatilla Hatchery during 1998-2003.

Brood Year	Number of eggs taken or received	Egg-to-fry survival (%)	Egg-to-smolt survival[a] (%)
1997	3,847,000	82	69
1998	3,400,000	59	54
1999	4,380,000	72	69
2000	1,268,120 [b]	55	44
2001	670,000 [c]	93	93
2002	670,000 [c]	90	93

[a] *Survival estimate is based on eyed egg-to-smolt stage*.
[b] Total includes 205,000 eyed eggs received.

[c] Eyed Eggs received

Table 9.2.1.2 Bonneville reared Umatilla river stock hatchery survival rates.

Brood Yr.	# / Ponded	Fry to Fingerling	Fingerling Smolt
1997	475,000	N/A	N/A
1998	538,400	99.9	98.8
1999	542,000	99.7	98.5
2000	645625	99.9	87.0
2001	549,652	99.7	97.9
2002	499,549	99.4	93.0
2003	557,081	N/A	N/A

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

Umatilla Hatchery—Current sub-yearling production goals are to rear in Oregon style ponds with a final density of 0.5 pound/ft3, loading of 2.67 lbs/gpm, and exchange rates of 2.0X/hour.

Bonneville Hatchery—Loading goals for both Modified Burrows and Standard raceways is fry to fingerling--0 to 4 lbs per gpm inflow, and fingerling to smolt-- 6 to 8 lbs per gpm inflow

9.2.3) Fish rearing conditions

Umatilla Hatchery-- The current program is finally reared exclusively in Oregon style ponds. (Refer to section 5.5) Fish are fed at least once every hour by mechanical feeder. Ponds are cleaned once per week, with waste being flushed to settling ponds and water quality monitored under DEQ permit guidelines. Mortalities are removed once per day. Dissolved oxygen is monitored daily. Water flow rates are monitored weekly and range in temperature from 52^0F to 61^0F. Dissolved oxygen levels are maintained at or above 8ppm. Ammonia and total gas saturation levels have not been a problem. All of our monitoring is recorded as performed. (Table 5, 6 & 10)

Bonneville Hatchery-- After ponding, fry are monitored during feeding and cleaning activities. Mortality is removed daily and ponds cleaned up twice a week in the early stages and then once a week in later stages. Water flows are checked weekly. Fish per pound counts are checked once a week during early rearing, and ounce a month later stages. Water flows are adjusted accordingly (Table 11)

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.**

Umatilla Hatchery average growth for Fall Chinook Subyearlings (Brood year 2002)

Month	Fish/lb	Conversion
February	520	1.1
March	150	1.0
April	79	1.25
May	48	1.1

Bonneville Hatchery—Monthly growth rate for Umatilla stock Fall Chinook Yearlings.

Month	Fish/lb
March	625
April	300
May	150
June	85
July	50
August	35
September	28
October	20
November	17
December	13.5
January	12.5
February	11.5
March	10.5

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

Umatilla Hatchery--Not available

Bonneville Hatchery—Not available

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

Umatilla Hatchery--Fall Chinook are fed Bio-Oregon feed, starter, Bio-moist grower, and Bio-moist feed. Fish are fed hourly up to 12 times per day, by mechanical feeders at rates of 2.8%-6% body weight.

Bonneville Hatchery—Fall Chinook Yearlings are fed Bio-Oregon Bio-diet starter initially, with Silver Cup feeds fed for the remainder of their rearing. Fish are fed 4 to 8 times per day with conversions ranging fro 1.0 to 1.2 pounds feed /weight gain.

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

Umatilla Hatchery-- Monthly monitoring follows specific protocols in the Umatilla Fish Health Monitoring and Evaluation work statement. All raceways of each species and stock at Umatilla Hatchery are monitored monthly for pathogens and parasites. Five moribund or dead fish per raceway are tested for systemic and gill bacteria. Five Chinook per raceway are examined for *R. salmoninarum* by the DFAT or ELISA.
Other Infections - Juvenile fish are treated for bacterial infections if necessary with oxytetracycline under an Investigational New Animal Drug Permit (INAD).
Sanitation procedures - Statewide fish health management policy (September 12, 2003) provides guidelines for preventative and therapeutic fish health strategies that will be followed in this program.

Table 9.2.7 Disease history (1999-2003) of Priest Rapids fall chinook adults at Priest Rapids and juveniles reared at Umatilla Hatchery[a].

Disease or Organism	Adults	Juveniles
IHN Virus	No	No
EIBS Virus		No
Aeromonas salmonicida		No
Aeromonas/Pseudomonas		Yes
Flavobacterium psychrophilum		Yes
Fl. columnare	Yes	No
Renibacterium salmoninarum		Yes
Yersinia ruckeri		Yes
Carnobacterium sp.		No
Ichthyobodo		No
Gyrodactylus		No
Ichthyophthirius multifilis		No
Epistylis		No
Scyphidia		No
Trichodinids		No

Gill Copepods		No
Coagulated Yolk Disease		Yes
External Fungi	Yes	Yes
Internal Fungi		No
Myxobolus cerebralis	No	No
Ceratomyxa shasta		No

[a] "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.

Bonneville Hatchery-- While being reared at Bonneville the Umatilla Chinook program received monthly health exams performed by ODFW Pathology. During rearing the program receives two feedings of Aquamycin; in the Spring at 300 f/lb. and in the fall at 20 f/lb. Sanitation procedures prior to ponding, ponds are pressure washed and lightly disinfected with bleach. During the rearing period mortality is removed daily and ponds are cleaned weekly.

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

Umatilla Hatchery—Table 7 & 8

Bonneville Hatchery—Table 12 & 13

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

Umatilla Hatchery—None used

Bonneville Hatchery—None Used

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.

Umatilla Hatchery— Fish will be reared to a size, and released at a time, to encourage out-migration. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

Bonneville Hatchery— Fish will be reared to a size, and released at a time, to encourage out-migration. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Sub-Yearling (Umatilla Hatchery)	300,000	45	Late May	Thornhollow Acclimation
Sub-Yearling (Umatilla Hatchery)	300,000	35	Late May	Direct Stream release @ Reith Umatilla River Mile 48.
Yearling (Bonneville Hatchery)	480,000	10	Mid-April	Thornhollow Acclimation

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

Stream, river, or watercourse: Umatilla River
Release point: Thornhollow Acclimation (RM 73.5)
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

Stream, river, or watercourse: Umatilla River
Release point: Reith Bridge (Rm48) – Direct Stream
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

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

Release year	Eggs/ Unfed Fry	Avg size	Fall Rel.	Avg size	Subyearling Spring Rel.	Avg size	Yearling	Avg size
1992					**3,190,549**	**60.6**	**220,440**	**7.7**
1993					**2,659,598**	**63.0**	**134,837**	**9.1**
1994					**2,865,386**	**65.4**	**283,453**	**10.0**
1995					**2,466,298**	**63.5**	**227,088**	**8.0**

Release year	Eggs/ Unfed Fry	Avg size	Fall Rel.	Avg size	Subyearling Spring Rel.	Avg size	Yearling	Avg size
1996					**2,960,413**	**65.8**	**564,403**	**6.4**
1997					**2,580,833**	**72.1**	**519,921**	**10.0**
1998					**2,777,442**	**66.7**	**436,010**	**9.3**
1999					**1,842,666**	**55.9**	**449,568**	**9.2**
2000					**3,020,519**	**48.5**	**469,756**	**10.5**
2001					**646,996**	**38.6**	**400,761**	**9.5**
2002					**620,063**	**39.8**	**520,564**	**8.8**
2003					**624,789**	**55.4**	**509,135**	**11.7**
Average					**2,188,213**	**59.8**	**394,661**	**9.0**

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

Umatilla Hatchery --See Table 9

Bonneville Hatchery –See Table 14

10.5) Fish transportation procedures, if applicable.

Umatilla Hatchery--Chinook sub-yearlings are loaded with water using a fish pump. Fish are separated from the water and transferred into insulated liberation tankers ranging in capacity from 2,000 to 5,000-gallons. Fish are loaded at maximum rate of 1.0 lbs/gallon. Transport time from Umatilla Hatchery to acclimation sites is less than two hours. Supplemental oxygen and aeration is provided and temperature is monitored during transport.

Bonneville Hatchery—Fall Chinook smolts are loaded with water using a fish pump. Fish are separated from the water and transferred into insulated liberation tankers ranging in capacity from 2,000 to 5,000-gallons. Fish are loaded at maximum rate of 1.0 lbs/gallon. Transport time from Bonneville Hatchery to Thornhollow acclimation site is approximately three hours. Supplemental oxygen and aeration is provided and temperature is monitored during transport.

10.6) Acclimation procedures

Thornhollow – The Thornhollow acclimation/release facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, storage

building, two acclimation ponds (approximately 13,000 cubic feet each) and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. From here, water is supplied to the ponds by gravity at approximately 1,600 gpm per pond. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way. The ponds are thoroughly cleaned prior to fish being received, and ODFW pathology personnel are available to address disease concerns.

(*methods applied and length of time***).**

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

Umatilla Hatchery –Marks applied to sub-yearling program Fall Chinook.

Mark	# Marked	% Total Population
AD	600,000	100
CWT	600,000	100

Bonneville Hatchery -- Marks applied to yearling program Fall Chinook.

Mark	# Marked	% Total Population
AD	50,000	10.4
CWT	50,000	10.4
BWT	430,000	89.6

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

Umatilla Hatchery --There is no plan for surplus smolt production. Fish surplus to programmed needs would be released at an earlier life stage or culled as eggs.

Bonneville Hatchery --In the early years of this program, ponds were not covered at Bonneville hatchery allowing bird predation to occur. Subsequently eyed egg requests numbers were high to make up for loss and still reach program goals at transfer. Smolts identified as excess were shipped to acclimation sites. In recent years ponds are covered and predation is at a minimum, egg requests numbers have are lower, but excesses still occur, these smolts are shipped to acclimation sites.

10.9) Fish health certification procedures applied pre-release.

Umatilla Hatchery --All monitoring will be consistent with the ODFW fish health policy. Current Umatilla Hatchery Monitoring and Evaluation work statements provide the

following protocol: Within four weeks prior to release grab-sampled fish of each species and stock are examined as follows:
-Gill tissue and body scrapings by microscopy from a minimum of five fish
-Gill/kidney/spleen tissue pools (5 fish per pool) from 10 fish per raceway for culturable viruses.

Bonneville Hatchery -- *All* monitoring will be consistent with the ODFW fish health policy. Current Umatilla Hatchery Monitoring and Evaluation work statements provide the following protocol: Within four weeks prior to release grab-sampled fish of each species and stock are examined as follows:
-Gill tissue and body scrapings by microscopy from a minimum of five fish
-Gill/kidney/spleen tissue pools (5 fish per pool) from 10 fish per raceway for culturable viruses.

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

Thornhollow -- The Thornhollow acclimation/release facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water headbox/distribution system, and two acclimation ponds. Water is supplied by gravity flow to the pump station where it is pumped into the headbox. From here, water is supplied to the ponds by gravity at approximately 1,600 gpm per pond. The ponds are covered with netting to prevent bird predation. In case of power failure, or low water level alarm, a phone dialer will begin calling four telephone numbers repeatedly until someone acknowledges the alarm. Fish are released from the facility by pulling the pond outlet screen and dam boards, lowering the pond, and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Thornhollow –Releases are made high in the basin to minimize straying of adults into the Snake River basin. 100% of subyearling release is CWT so strays into the Snake River can be detected and removed. 50% of subyearling and 100% of yearlings are acclimated to minimize straying of adults. Subyearlings are released during expected natural migration time of subyearlings to encourage outmigration. Subyearlings are released after most natural steelhead smolts have left the subbasin so there is minimal concern with interspecific competition

TABLES AND FIGURES:

Table 1. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for subyearling fall chinook salmon reared in Michigan and Oregon raceways at Umatilla Hatchery and released in the Umatilla River, 1991-95 broods. Out-of-basin data was downloaded from the central database in October 2001. Returns are incomplete for brood years 1996 and 1997.

BY[a]	Rearing system[b]	Release date	Release site[c]	Release size (fish/lb)	No.[d] CWT recoveries	Smolt-to-adult survival (%)	Umatilla River return (%)	No. adults produced	No.[e] adults/gal/h	Out-of-basin exploitation(%)[f]	In-basin exploitation(%)[g]
91	M	5/18/92	RM42.5	61.8	2	0.001	0.001	19	0.6	0.0	0.0
91	O	5/19/92	RM42.5	63.7	3	0.003	0.002	30	0.7	43.3	0.0
92	M	5/24/93	RM73.5	63.9	67	0.068	0.024	1,138	36.4	58.4	0.0
92	O	5/25/93	RM73.5	59.4	49	0.065	0.024	621	14.9	56.2	0.0
93	M	5/23/94	RM73.5	67.6	76	0.079	0.024	1,494	47.8	53.9	0.0
93	O	5/24/94	RM73.5	61.1	50	0.085	0.018	803	19.3	59.9	0.0
94	M	5/31/95	IC+TH	64.7	1	0.001	0.000	9	0.3	100	0.0
94	O	5/31/95	IC	61.1	4	0.006	0.001	50	1.2	78.0	0.0
95	M	5/30/96	IC+TH	68.4	63	0.055	0.022	1,126	36.1	39.4	1.3
95	O	5/30/96	IC	66.2	73	0.104	0.040	935	22.4	41.7	2.4

[a] *BY = brood year*
[b] *M = Michigan raceways, O = Oregon raceways.*
[c] *RM = river mile, IC = Imeques acclimation site TH=Thornhollow acclimation site.*
[d] *Return = number of fish counted at Three Mile Falls Dam plus harvest below Three Mile Falls Dam.*
[e] *Number of adults produced per water use at Umatilla Hatchery (gallons/h).*
[f] *Number of coded-wire tags recovered.*
[g] *Percent of adult production harvested outside of the Umatilla River basin.*
[h] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers*

Table 2. Smolt-to-adult survival, return rate, number of adults produced, out-of basin exploitation and in-basin exploitation for yearling fall chinook salmon reared at Bonneville, Umatilla, and Willard hatcheries and released in the Umatilla River, 1991-96 broods. Out-of-basin data was downloaded from the central database in October 2001. Returns are incomplete for brood year 1996.

Brood year	Hatch-ery	Release date	Release[a] site	Release size (fish/lb)	No.[b] CWT recov-eries	Smolt-to-adult sur-vival (%)	Umatilla River return (%)	No. adults pro-duced	Out-of-[c] basin exploit-ation(%)	In-[d] basin exploit-ation(%)
				March releases						
90	BFH	3/17+19/92	RM70+56	7.5	1	0.002	0.002	4	0.0	0.0
91	BFH	3/18/93	RM73.5	8.9	5	0.032	0.010	43	46.5	0.0
92	BFH	3/23/94	RM73.5	10.4	20	0.149	0.068	347	54.2	0.0
95	UFH	3/25/97	IC+TH	7.9	309	0.451	0.16	1167	55.8	0.0
95	WNFH	3/30/97	TH	13.6	8	0.018	0.008	48	58.3	0.0
96	BFH	3/13/98	TH	10.8	15	0.063	0.063	161	0.0	0.0
				April releases						
92	BFH	4/19/94	RM73.5	8.5	4	0.054	0.012	27	0.0	0.0
93	BFH	4/07/95	TH	8.0	13	0.050	0.033	114	27.2	0.0
94	BFH	4/05/96	TH	7.0	10	0.075	0.024	152	63.8	0.0
94	BFH	4/18/96	IC	7.0	9	0.070	0.024	152	59.9	15.1
94	UFH	4/18/96	IC	5.1	1	0.006	0.001	8	25.0	0.0
96	WNFH	4/17/98	TH	7.8	23	0.065	0.051	116	20.7	0.0

[a] *BFH = Bonneville Fish Hatchery, UFH = Umatilla Fish Hatchery, WNFH = Willard National Fish Hatchery.*
[a] *RM = river mile, IC = Imeques acclimation site, TH = Thornhollow acclimation site.*
[b] *Number of coded-wire tags recovered.*
[c] *Return = number of fish counted at Three Mile Falls Dam plus harvest beolow Three Mile Falls Dam.*
[d] *Percent of adult production harvested outside of the Umatilla River basin.*
[e] *Percent of adult production harvested in the Umatilla River basin by non-tribal and tribal sport anglers.*

Table 3
Fall Chinook Annual Run Counts
To Three Mile Dam

Year	Adults	Jacks	Subjacks	Total
1985	6	79		85
1986	28	407		435
1987	53	47	287	387
1988	94	164	1295	1553
1989	279	247	76	602
1990	333	107	621	1061
1991	522	468	274	1264
1992	239	64	0	303
1993	370	27	15	412
1994	688	236	368	1292
1995	603	288	338	1229
1996	646	80	606	1332
1997	354	207	189	750
1998	286	154	230	670
1999	737	137	152	1026
2000	643	437	4948	6028
2001	1146	1158	970	3274
2002	1716	617	1709	4042
2003	1482	638	2150	4270

Table 4. Hatchery releases of fall chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No. lb.	Stock
1982	Bonneville/SCNFH	3,807,171	79.0-92.0	Tule
1983	Bonneville	100,564	5.9	Bonneville URB
1984	Bonneville	228,412	8.6	Bonneville URB
1984	Bonneville	966,250	85.1	Bonneville URB
1985	Bonneville	3,223,172	92.3	Bonneville URB
1985	Bonneville	198,162	7.8	Bonneville URB
1985	Bonneville	51,000	16.2	Bonneville URB
1986	Irrigon	206,815	4.7-5.0	Bonneville URB
1986	Irrigon	2,029,602	86.0	Bonneville URB
1986	Irrigon	35,574	11.6	Bonneville URB
1987	Irrigon	1,476,830	60.4	Priest Rapids URB
1987	Bonneville	211,506	8.1-8.6	Bonneville URB
1987	Irrigon	2,000	20.0	Priest Rapids URB
1988	Irrigon	1,886,757	68.3	Priest Rapids URB
1988	Irrigon	1,429,250	93.1	Bonneville URB
1988	Irrigon	94,089	8.6-9.8	Priest Rapids URB
1988	Bonneville	200,341	8.8-10.2	Bonneville URB
1989	Bonneville	217,443	8.6	Bonneville URB
1989	Irrigon	2,393,710	66.6	Priest Rapids URB
1989	Irrigon	156,957	10.9-11.1	Priest Rapids URB
1990	Bonneville	255,614	8.2	Bonneville URB
1990	Irrigon	2,425,681	87.5	Bonneville URB
1990	Irrigon	629,800	82.4	Priest Rapids URB
1990	Irrigon	148,510	8.8-9.2	Bonneville URB
1991	Bonneville	194,847	7.8	Bonneville URB
1991	Irrigon	10,462	80.0-194.0	Bonneville URB
1991	Irrigon	3,245,751	80.5-86.0	Bonneville URB
1992	Bonneville	220,440	7.6-7.7	Bonneville URB
1992	Umatilla	2,678,343	62.2	Bonneville URB
1992	Irrigon	504,369	53.4	Umatilla River
1992	Irrigon	5,167	62.8	Umatilla River
1992	Umatilla	2,670	112.0	Bonneville URB
1993	Bonneville	134,837	9.1	Bonneville URB
1993	Umatilla	2,629,917	62.7	Upriver Brights /a
1993	Umatilla	29,681	95.5-142.0	Upriver Brights /a
1994	Bonneville	283,453	8.5-10.4	Bonneville URB
1994	Umatilla	2,843,212	65.2	Upriver Brights /b
1994	Umatilla	22,174	85.0-171.0	Upriver Brights /b
1995	Bonneville	227,088	8.0	Bonneville URB
1995	Umatilla	2,466,298	63.1-64.7	Priest Rapids URB
1996	Bonneville	421,316	7.0-7.1	Bonneville URB
1996	Umatilla	143,087	5.1	Priest Rapids URB
1996	Umatilla	2,960,413	63.9-71.0	Priest Rapids URB
1997	Umatilla	258,953	7.6-8.1	Priest Rapids URB
1997	Willard	260,968	13.6	Upriver Brights /c
1997	Umatilla	2,580,833	66.0-67.3	Upriver Brights /b

Table 4 cont. Hatchery releases of fall chinook in the Umatilla River Basin.

Year of Release	Hatchery	No. Released	No. lb.	Stock
1998	Bonneville	256,910	10.8	Bonneville URB
1998	Willard	179,100	7.8	Upriver Brights /c
1998	Umatilla	2,777,442	64.9-67.7	Priest Rapids URB
1999	Bonneville	449,568	9.0-9.4	Umatilla River
1999	Umatilla	1,842,666	55.9	Upriver Brights /d
2000	Bonneville	235,246	10.9	Umatilla River
2000	Bonneville	234,510	10.1	Umatilla River
2000	Umatilla	975,871	49.0	Priest Rapids URB
2000	Umatilla	2,044,648	48.3	Priest Rapids URB
2001	Bonneville	213,499	9.7	Umatilla River
2001	Bonneville	187,262	9.2	Umatilla River
2001	Umatilla	324,713	45.3	Umatilla River
2001	Umatilla	322,283	33.6	Umatilla River
2002	Bonneville	259,607	9.0	Umatilla River
2002	Bonneville	260,957	8.7	Umatilla River
2002	Umatilla	307,194	40.6	Umatilla River
2002	Umatilla	312,869	39.0	Umatilla River
2003	Bonneville	261,065	13.1	Umatilla River
2003	Bonneville	248,070	10.5	Umatilla River
2003	Umatilla	313,383	54.6	Umatilla River
2003	Umatilla	311,406	56.2	Umatilla River

/a Bonneville, Little White Salmon and Umatilla River broodstock
/b Priest Rapids and Umatilla River broodstock
/c Little White Salmon broodstock
/d Priest Rapids and Little White Salmon broodstock

HGMP: Umatilla River fall chinook salmon subyearlings

Table 5. Water quality in Michigan series used to rear subyearling fall chinook salmon at Umatilla Fish Hatchery from brood years 1995-1997. Years 1996 and 1997 were reared at three different densities.

	Density		
Parameter measured	200K	300K	400K
		1995	
Temperature head (d-C)		12.4	
Temperature tail (d-C)		12.6	
pH head		8.0	
pH tail		7.9	
Oxygen head (ppm)		12.0	
Oxygen tail (ppm)		9.6	
Nitrogen head (mmHg)		565	
Nitrogen tail (mmHg)		571	
Total pressure-head (mmHg)		743	
Total pressure-tail (mmHg)		716	
Unionized ammonia (ug/l)		0.15	
Alkalinity (mg/l CaCO3)		129	
		1996	
Temperature head (d-C)	12.0	11.6	11.8
Temperature tail (d-C)	11.9	11.8	11.7
pH head	7.7	7.7	7.7
pH tail	7.7	7.7	7.7
Oxygen head (ppm)	10.9	11.3	11.6
Oxygen tail (ppm)	8.8	9.3	9.2
Nitrogen head (mmHg)	553	559	582
Nitrogen tail (mmHg)	542	555	596
Total pressure-head (mmHg)	726	732	752
Total pressure-tail (mmHg)	687	704	732
Unionized ammonia (ug/l)	1.49	1.35	1.77
Alkalinity (mg/l CaCO3)	137	140	143
		1997	
Temperature head (d-C)	11.4	11.5	11.7
Temperature tail (d-C)	11.4	11.5	11.8
pH head	7.6	7.6	7.6
pH tail	7.5	7.6	7.5
Oxygen head (ppm)	11.4	11.3	10.2
Oxygen tail (ppm)	9.2	9.0	7.7
Nitrogen head (mmHg)	580	559	589
Nitrogen tail (mmHg)	595	590	598
Total pressure-head (mmHg)	743	749	741

Total pressure-tail (mmHg)	726	720	710
Unionized ammonia (ug/l)	1.45	2.28	N/A
Alkalinity (mg/l CaCO3)	133	134	139

Table 6 Rearing conditions immediately before transfer for subyearling fall chinook salmon reared in Michigan and Oregon series at Umatilla Hatchery in 1991-2001 brood years.

Brood year	Rearing series	Mean number per raceway	Maximum density ($lb/ft^{3)}$	Maximum loading (lb/gal/min)	Number reared per gpm[a]
1991	Michigan		2.0-2.4	5.4-6.6	
	Oregon		0.5-0.7	2.6-3.5	
1992	Michigan		2.0-2.4	5.4-6.6	
	Oregon		0.5-0.7	5.4-6.6	
1993	Michigan		2.2-2.5	4.8-5.5	
	Oregon		0.5-0.8	2.6-3.7	
1994	Michigan		1.5-1.9	3.7-4.5	
	Oregon		0.4-0.6	1.9-2.9	
1995	Michigan		1.5-1.7	3.6-4.0	
	Oregon		0.4-0.7	2.0-3.5	
1996	Michigan	199,540	1.0-1.1	2.3-2.7	617
1996		299,817	1.6-1.7	3.7-3.9	940
1996		366,920	1.7-2.1	4.0-4.9	1,159
1997	Michigan	211,526	1.2-1.4	2.9-3.2	668
1997		308,855	1.6-1.8	3.9-4.3	975
1997		407,367	2.1-2.3	5.0-5.3	1,286
1998	Michigan	187,235	1.1-1.2	2.6-2.7	427
1998		324,797	1.5-1.9	3.7-4.6	651
1998		411,114	1.9-2.6	4.4-6.1	865
1999	Michigan	237,931	2.36	5.6	754
1999		330,938	3.45	8.2	1,049
1999		437,971	4.20	10.0	1,387
2000	Oregon	162,878	0.47	2.2	261
		161,142	0.51	2.5	258

2001	Oregon	153,882	0.51	2.5	246
		156,449	0.70	3.3	250

[a] *Numbers are combined production for three Michigan passes. The 1998 brood was reared in first and second pass raceways only.*

Table 7. Mean length, weight, and condition factor at transfer for subyearling fall chinook salmon reared in Michigan or Oregon raceways at Umatilla Hatchery, 1996-2001 brood years (standard error in parentheses).

Brood year	System	Density (*1000)	Pass	Length (mm)	Weight (g)	Condition factor
1996	Michigan	200	A	75.4	4.9	1.11
			B	77.3	5.3	1.12
			C	79.7	5.9	1.14
		300	A	79.5	5.6	1.06
			B	78.3	5.8	1.16
			C	78.0	5.3	1.08
		400	A	75.5	4.9	1.10
			B	77.9	5.4	1.11
			C	78.1	5.7	1.17
1997	Michigan	200	A	77.9	4.9	1.03
			B	77.3	4.6	0.97
			C	78.5	5.4	1.07
		300	A	77.3	4.8	1.08
			B	79.3	4.4	0.89
			C	77.6	4.7	0.97
		400	A	78.0	4.5	1.00
			B	76.6	3.7	0.82
			C	75.3	4.4	1.00
1998	Michigan	200	A	79.6	5.5	1.07
			B	79.3	5.8	1.20
		300	A	82.5	6.3	1.14
			B	76.9	5.2	1.13
		400	A	75.8	4.6	1.07
			B	77.5	6.4	1.19
1999	Michigan	200	A	88.8	8.1	1.14
			B	86.1	7.3	1.12
			C	87.3	7.7	1.11
		300	A	88.4	8.2	1.17
			B	84.9	7.5	1.20
			C	90.3	8.4	1.12
		400	A	85.1	7.5	1.19
			B	84.0	7.1	1.18
			C	87.0	7.9	1.18
2000	Oregon		A	88.3	7.8	1.20
			B	87.3	7.7	1.20
2001	Oregon		A	87.6	8.0	1.20
			B	87.3	7.5	1.1

Table 8. Mean smoltification and proportion of descaled, partially descaled, and undamaged subyearling fall chinook salmon reared in Michigan and Oregon raceways at Umatilla Hatchery, brood years 1998-2001.

				Smolting			Descaling		
Brood year	System	Density (*1000)	Pass	Smolt	Interme-diate	Parr	Descaled	Partially descaled	Undam -aged
1998	Michigan	200	A				0.00	0.19	0.81
			B				0.00	0.27	0.73
		300	A				0.01	0.27	0.73
			B				0.00	0.18	0.82
		400	A				0.00	0.03	0.97
			B				0.04	0.79	0.17
1999	Michigan	200	A	0.02	0.98	0.00	0.00	0.01	0.99
			B	0.00	1.00	0.00	0.00	0.00	1.00
			C	0.01	0.99	0.01	0.00	0.00	1.00
		300	A	0.00	1.00	0.00	0.00	0.01	0.99
			B	0.00	1.00	0.00	0.00	0.00	1.00
			C	0.00	1.00	0.00	0.00	0.01	0.99
		400	A	0.03	0.97	0.00	0.00	0.00	1.00
			B	0.00	1.00	0.00	0.00	0.04	0.96
			C	0.00	1.00	0.00	0.00	0.00	1.00
2000	Oregon		A	0.00	1.00	0.00	0.00	0.00	1.00
			B	0.00	1.00	0.00	0.00	0.00	1.00
2001	Oregon		A	0.00	1.00	0.00	0.00	0.00	1.00
			B	0.00	1.00	0.00	0.00	0.00	1.00

Table 9. Release data for subyearling fall chinook salmon reared at Umatilla Hatchery and released in the Umatilla River. River mile (RM) 42.5, 48 and 73.5 were direct-stream releases. TH=Thornhollow acclimation facility, RM 73.5; IC=Imeques-C-mem-ini-kem acclimation facility, RM 79.5).

Brood year,Date of CWT code	Race-release	Number way	Number released[a]	brand/paint CWT	Number per or PIT tag[b]	Fish release pound	RM or location
1991							
071433	5/18/1992	M2A	303,878	29,066	7,445	61.0	42.5
071434	5/18/1992	M3A	306,802	31,224	6,917	65.7	42.5
071435	5/18/1992	M2B	297,331	30,326	9,643	60.9	42.5
071436	5/18/1992	M3B	302,555	30,365	7,049	61.9	42.5
071437	5/18/1992	M2C	223,830	30,508	7,526	55.2	42.5
071438	5/18/1992	M3C	301,831	30,924	7,656	64.5	42.5
subtotal			1,736,227	182,413	46,236	61.8	
071430	5/19/1992	O2A	281,350	32,287	9,174	65.1	42.5
071429	5/20/1992	O3A	286,578	31,892	6,272	70.6	42.5
071432	5/19/1992	O2B	191,257	29,425	8,558	58.3	42.5
071431	5/19/1992	O3B	182,931	28,951	8,863	56.2	42.5
subtotal			942,116	122,555	32,867	63.7	
Total			2,678,343	304,968	79,103	62.2	
1992							
076330	5/24/1993	M2A	292,895	28,964	10,027	63.0	73.5
076331	5/24/1993	M3A	282,125	29,537	10,053	67.0	73.5
070127	5/24/1993	M2B	269,336	27,092	10,150	63.4	73.5
076333	5/24/1993	M3B	273,662	29,718	10,020	60.3	73.5
076334	5/24/1993	M2C	282,175	29,958	9,434	68.0	73.5
076332	5/24/1993	M3C	277,931	29,451	9,894	61.5	73.5
subtotal			1,678,124	174,720	59,578	63.9	
070126	5/25/1993	O2A	268,001	29,594	10,458	59.3	73.5
070125	5/25/1993	O3A	272,496	29,360	9,828	59.4	73.5
076329	5/25/1993	O2B	203,731	30,706	10,278	59.4	73.5
076335	5/25/1993	O3B	207,565	30,462	10,547	59.4	73.5
subtotal			951,793	120,122	41,173	59.4	
Total			2,629,917	294,842	101,361	62.7	
1993							
070663	5/23/1994	M2A	322,867	31,162	10,171	63.0	73.5
070719	5/23/1994	M3A	327,700	31,658	9,725	72.4	73.5
070720	5/23/1994	M2B	314,518	30,528	10,008	65.4	73.5
070723	5/23/1994	M3B	326,408	30,447	10,217	68.2	73.5
070722	5/23/1994	M2C	303,843	30,950	9,769	68.0	73.5
070721	5/23/1994	M3C	306,105	28,474	9,373	68.7	73.5
subtotal			1,901,441	183,219	59,263	67.6	

[a] *All coded-wire tagged fish were adipose fin-clipped. Fish from the 1991-97 broods were also RV-clipped. Beginning with the 1993 brood, all non coded-wire tagged fish were blank-wire tagged.*
[b] *Fish from 1991-95 broods were branded.*

Table 9 (continued)

Brood year, CWT code	Date of release	Race-way	Number released	Number CWT	Number brand/paint or PIT tag[b]	Fish per pound	RM or release location
1993							
070662	5/24/1994	O2A	280,046	31,239	10,158	60.1	73.5
070718	5/24/1994	O3A	279,965	31,040	10,220	64.2	73.5
070716	5/24/1994	O2B	191,321	30,502	10,906	59.1	73.5
070717	5/24/1994	O3B	190,439	32,481	10,260	60.0	73.5
subtotal			941,771	125,262	41,544	61.1	
Total			2,843,212	308,481	103,331	65.2	
1994							
071019	5/31/1995	M2A	286,459	29,353	10,665	62.7	IC
071017	5/31/1995	M3A	271,129	29,736	10,172	67.8	IC
071022	5/31/1995	M2B	280,406	28,472	10,323	63.0	IC
071020	5/31/1995	M3B	275,613	29,460	10,183	65.6	IC
071025	5/31/1995	M2C	274,110	29,784	10,176	66.5	TH
071023	5/31/1995	M3C	287,313	28,623	10,249	63.0	TH
subtotal			1,675,030	175,428	61,768	64.7	
071026	5/31/1995	O1A	245,885	30,106	10,374	58.0	IC
071018	5/31/1995	O3A	241,342	29,132	10,438	65.1	IC
071024	5/31/1995	O1B	151,943	30,204	10,248	62.3	IC
071021	5/31/1995	O3B	152,098	29,327	11,104	58.7	IC
subtotal			791,268	118,769	42,167	61.1	
Total			2,466,298	294,197	103,946	63.4	
1995							
071320	5/30/1996	M2A	303,803	30,015	10,557	69.5	IC
071321	5/30/1996	M3A	299,233	28,997	9,407	68.4	IC
071323	5/30/1996	M2B	300,377	29,914	9,965	62.8	IC
071325	5/30/1996	M3B	300,895	30,220	10,389	67.4	IC
071157	5/31/1996	M2C	393,339	29,852	10,316	72.8	TH
071327	5/31/1996	M3C	460,259	28,476	10,378	69.5	TH
subtotal			2,057,906	177,474	61,012	68.3	
071322	5/30/1996	O2A	266,913	29,646	10,252	57.2	IC
071324	5/30/1996	O3A	272,594	30,243	10,420	66.4	IC
071326	5/30/1996	O2B	181,291	30,238	10,237	56.5	IC
071328	5/30/1996	O3B	181,709	30,455	9,980	60.3	IC
subtotal			902,507	120,582	40,889	60.5	
Total			2,960,413	298,056	101,901	65.8	

Table 9 (continued)

Brood year, CWT code	Date of release	Race-way	Number released	Number CWT	Number brand/paint or PIT tag[c]	Fish per pound	RM or release location
1996							
092129	5/30/1997	M1A	294,417	33,161	8,469	63.6	IC/TH
092130	5/30/1997	M1B	294,043	32,464		62.4	IC/TH
092132	5/29/1997	M1C	304,993	31,382		66.8	IC
092131	5/30/1997	M2A	395,493	31,844	8,094	67.9	IC/TH
092133	5/29/1997	M2B	394,250	33,273		70.7	IC
092134	5/29/1997	M2C	311,016	33,640		67.6	IC
092126	5/30/1997	M4A	197,028	33,555	9,000	67.2	TH
092127	5/29/1997	M4B	195,031	32,764		70.2	IC
092128	5/29/1997	M4C	194,562	29,732		65.6	IC
Total			2,580,833	291,815	27,238	66.9	
1997							
092404	5/28/1998	M2A	214,521	33,286	520	65.2	TH
092407	6/1/1998	M2B	202,816	33,661	505	66.3	TH
092410	6/1/1998	M2C	215,643	31,820	508	66.7	IC
092403	5/28/1998	M3A	305,038	30,808	493	65.5	TH
092406	6/1/1998	M3B	317,296	30,558	510	67.3	IC
092409	6/1/1998	M3C	302,336	32,219	509	67.1	IC
092402	5/28/1998	M4A	400,614	30,654	504	64.1	TH
092405	5/28/1998	M4B	413,832	30,533	507	67.2	IC
092408	5/28/1998	M4C	405,346	32,322	508	69.8	IC
Total			2,777,442	284,861	4,564	66.7	
1998							
092701	6/3/1999	M2A	201,224	64,881	590	54.5	IC
092663	6/3/1999	M2B	203,951	66,220	592	54.7	IC
092703	6/3/1999	M3A	311,370	65,821	567	54.7	IC
092702	6/3/1999	M3B	305,731	63,127	589	56.7	IC
092705	6/3/1999	M4A	411,966	63,147	589	55.7	IC
092704	6/3/1999	M4B	408,424	63,757	591	57.5	IC
Total			1,842,666	386,953	3,518	55.9	
1999							
093003	5/24/2000	M1A	327,224	67,044	596	48.9	PN
093033	5/24/2000	M1B	371,230	68,834	584	48.0	PN
093036	5/23/2000	M1C	294,359	65,514	591	49.3	TH
093002	5/24/2000	M2A	461,165	66,975	570	48.9	PN
093032	5/24/2000	M2B	422,982	68,418	594	47.6	PN
093035	5/23/2000	M2C	429,765	65,425	595	49.0	TH
093004	5/24/2000	M3A	206,478	60,629	596	48.0	PN
093034	5/24/2000	M3B	255,569	63,593	588	48.3	PN
093037	5/23/2000	M3C	251,747	67,911	591	48.7	TH
Total			3,020,519	594,343	5,288	48.5	

[c] *Fish from 093003, 1996 brood were paint marked on the anal fin, 1997-98 broods were PIT-tagged.*

Table 9 (continued)

Brood year, CWT code	Last date of release	Race-way	Number released	Number CWT	Number brand/paint or PIT tag	Fish per pound	RM or release location
2000							
093255	5/21-24/01	O1A	163,021	158,747	290	45.3	TH
093256	5/21-24/01	O1B	161,692	158,052	292	45.3	TH
093253	5/25/01	O2A	154,438	152,398	289	33.3	48.5
093254	5/24/01	O2B	167,845	165,322	299	33.9	48.5
Total			646,996	634,519	1.16,970	38.6	
2001							
093501	5/17-23/02	O1A	149,453	146,558	288	42.0	TH
093503	5/17-23/02	O1B	157,741	156,097	267	39.3	TH
093502	5/23/02	O2A	149,669	145,816	297	39.0	48.5
093504	5/23/02	O2B	163,200	158,572	299	39.0	48.5
Total			620,063	607,044	1,151	39.8	

HGMP: Umatilla River fall chinook salmon yearlings

Table 10. Water quality comparisons between Michigan and Oregon raceways during production 1992-1995 Table 11. Water quality in first and second pass Michigan and Oregon raceways used to rear yearling fall chinook salmon in 1996-97, 1995 brood. Means without letters are not significantly different at P>0.05.

		Michigan		Oregon
Parameter measured	N	Mean	N	Mean
Sampling period	Jul 24 - Feb 15		Jul 24 - Feb 15	
Temperature head (°C)	58	13.4	63	13.3
Temperature tail (°C)	58	13.4	63	13.5
pH head	56	7.8	61	7.8
pH tail	56	7.8	61	7.8
Oxygen head (ppm)	56	11.1a	61	10.1b
Oxygen tail (ppm)	56	9.4a	61	8.5b
Nitrogen head (mmHg)	56	590a	61	601b
Nitrogen tail (mmHg)	56	604a	61	619b
Total pressure-head (mmHg)	56	756	61	752
Total pressure-tail (mmHg)	56	747	61	748
Unionized ammonia (µg/l)	26	0.68	30	0.61
Alkalinity (mg/l $CaCO_3$)	28	132	32	134

Table 11. Rearing conditions for yearling fall chinook salmon reared in raceways at Bonneville Fish Hatchery, 1998-2000 broods.

Brood year	Raceway	Maximum density (lb/ft^3)	Maximum loading (lb/gal/min)	Number reared per gpm
		Bonneville Hatchery		
1998	A6-A11	0.82	5.6	71
	A1-A5	0.89	6.1	68
1999	A7-A11	0.81	5.6	65
	A2-A6	0.96	6.6	68
2000	A7-A11	1.08	7.4	74
	A2-A6	1.13	7.7	77

Table 12. Mean length, weight, and condition factor for yearling fall chinook salmon, brood years 1998-2001 reared at Bonneville Fish Hatchery and transferred to Thornhollow Acclimation facility in the Umatilla River.

Brood		Length(mm)		Weight(g)		Condition Factor	
Year	Date	N	Mean(SE)	N	Mean(SE)	N	Mean(SE)
1998	2/15/00	392	148.8(0.8)	103	39.2(1.0)	103	1.18(0.01)
	3/13/00	406	150.4(0.8)	106	40.5(1.2)	106	1.19(0.01)
1999	2/13/01	293	147.3(0.7)	94	37.6(1.1)	94	1.18(0.01)
	3/20/01	298	154.6(0.7)	108	43.8(1.1)	108	1.20(0.01)
2000	2/14/02	299	156.7(0.9)	95	43.3(1.2)	95	1.16(0.01)
	3/18/02	298	157.0(1.3)	98	42.4(1.2)	98	1.11(0.01)
2001	1/30/03	300	148.0(1.2)	99	40.0(1.8)	99	1.21(0.01)
	3/18/03	300	152.6(1.3)	104	41.9(1.6)	104	1.14(0.01)

Table 13. Mean smoltification and proportion of descaled, partially descaled, and undamaged scaling of yearling fall chinook salmon at transfer from Bonneville Fish Hatchery, brood years 1998-2001.

Brood			Smolting			Descaling		
Year	Date	Raceway	Smolt	Intermediate	Parr	Descaled	Partial	None
1998	2/15/00	A6-10	0.11	0.89	0.00	0.00	0.23	0.77
	3/13/00	A1-5	0.18	0.82	0.00	0.09	0.29	0.61

1999	2/13/01	A7-11	0.01	0.99	0.00	0.08	0.40	0.52
	3/20/01	A1-6	0.00	1.00	0.00	0.00	0.18	0.82
2000	2/12/02	A7-11	0.98	0.02	0.00	0.02	0.02	0.96
	3/13/02	A2-6	0.80	0.20	0.00	0.01	0.02	0.97
2001	1/30/03	D8-D12, A2	0.00	1.00	0.00	0.00	0.02	0.98
	3/18/03	A2-A6	0.00	1.00	0.00	0.02	0.00	0.98

Table 14. Release data for yearling fall chinook salmon reared at Bonneville Fish Hatchery and released from Thornhollow acclimation facility into the Umatilla River.

Brood year	CWT code	Release date	Number released	Number CWT	Number brand/paint or PIT-tag[b]	Fish per pound
1998	092925	3/9/00	235,246	26,956	286	10.9
	092926	4/13/00	234,510	28,223	289	10.1
1999	093206	3/16/01	213,499	17,993	271	9.8
	093207	4/19/01	187,262	24,962	295	9.6
2000	093346	3/7/02	259,607	26,355	287	9.0
	093347	4/11/02	260,957	27,838	286	8.7
2001	093627	3/7/03	261,065	27,105	242	13.1
	093628	4/15/03	248,070	28,175	292	10.5

Table 15.
Disposition and Spawning Ground Data of Natural and Hatchery Summer Steelhead (STS) Returning to the Umatilla River above Three Mile Falls Dam, 1988-1999.

RUN YEAR (Fall/Spring)	1987 1988	1988 1989	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	1994 1995	1995 1996	1996 1997	1997 1998	1998 1999
Natural STS Enumerated at TMD	2315	2104	1422	724	2247	1298	945	875	1299	1014	862	1134
Hatchery STS Enumerated at TMD	165	370	245	387	522	616	345	656	782	1463	903	740
Natural and Hatchery STS Enumerated at TMD	2480	2474	1667	1111	2769	1914	1290	1531	2081	2477	1765	1874
Natural STS Sacrificed or Mortalities at TMD	20	12	40	2	3	4	0	0	8	5	2	1
Hatchery STS Sacrificed or Mortalities at TMD	5	17	143	50	112	69	51	33	73	95	70	74

Natural STS Taken for Brood Stock	151	158	92	99	237	129	93	86	107	100	86	110
Natural STS Spawned	31F	42F	25F	78	172	95	79	59	63	75	68	76
Hatchery STS Taken for Brood Stock	0	0	0	103	95	91	42	68	26	10	30	15
Hatchery STS Spawned	0	0	0	49	0	3	17	22	21	3	21	4
Natural Females Released above TMD	1436	1232			1193	875	642	602	863	689	550	716
Natural Males Released above TMD	708	702			814	290	210	187	321	220	224	308
Natural STS Released above TMD	2144	1934	1290	623	2007	1165	852	789	1184	909	774	1024
Hatchery Females Released above TMD	114	216			161	266	186	274	371	666	476	425
Hatchery Males Released above TMD	46	137			154	190	66	281	312	692	327	236
Hatchery STS Released above TMD	160	353	102	234	315	456	252	555	683	1358	803	661
Natural STS Harvested above TMD-CTUIR						5	5	5	0	0	5	5
Hatchery STS Harvested above TMD-CTUIR						25	20	20	39	33	33	39
Natural STS Harvested above TMD-ODFW								0	0	0	0	0
Hatchery STS Harvested above TMD-ODFW						22	5	21	25	24	12	47
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548	713
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221	306
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769	1019
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454	382
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305	193
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759	575
Total STS Available for Spawning	2304	2287	1392	857	2322	1569	1074	1298	1803	2210	1528	1594
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002	1095
STS Redds Observed in Index Reaches	138	77	H W.	H W	135	H W.	64	74	119	138	126	218
Total STS Redds Observed	275	128	H W.	H W	300	H W.	224	126	150	149	217	270
Index Reaches Miles Surveyed	18.5	20	H W.	H W	21.4	H W.	21.4	21.4	21.4	21.4	21.4	21.4
Redds Per Mile in Index Reaches	7.5	3.9	H W.	H W	6.3	H W.	3.0	3.5	5.6	6.4	5.9	10.2
Total Miles Surveyed in Umatilla River	61.0	50.2	H W.	H W	67.2	H W.	65.8	35.0	34.4	24.6	38.0	35.0
Redds Per Mile in all Areas	4.5	2.5	H W.	H W	4.5	H W.	3.4	3.6	4.4	6.1	5.7	7.7

Harvest not determined and not subtracted from estimates of spawners, 1988-1982. H. W. = high water.
Assumes that harvest steelhead were 50% females and 50% males. No adjustments made for hook and release mortality.
Index reaches are in Squaw, NF Meacham, Buckaroo, Camp, and Boston Canyon Creeks and the SF Umatilla River.

Table 16
Summer Steelhead Annual Run Counts
To Three Mile Falls Dam

Year	Hatchery	Wild	Total
1966-67		1778	1778
1967-68		930	930
1968-69		1917	1917
1969-70		2298	2298

1970-71			
1971-72			
1972-73		2057	2057
1973-74		2640	2640
1974-75		2171	2171
1975-76		2534	2534
1976-77		1258	1258
1977-78		3080	3080
1978-79			
1979-80		2367	2367
1980-81		1298	1298
1981-82		768	768
1982-83		1264	1264
1983-84		2314	2314
1984-85		3197	3197
1985-86		2885	2885
1986-87		3444	3444
1987-88	166	2316	2482
1988-89	371	2104	2475
1989-90	246	1422	1668
1990-91	387	725	1112
1991-92	523	2246	2769
1992-93	616	1297	1913
1993-94	345	945	1290
1994-95	656	875	1531
1995-96	785	1296	2081
1996-97	1463	1014	2477
1997-98	903	862	1765
1998-99	751	1135	1886
1999-00	739	2153	2892
2000-01	1089	2573	3662
2001-02	1860	3659	5519
2002-03	960	2120	3080

Table 17. Total smolt-to-adult survival, parent:progeny, and parent:spawning escapement data for summer steelhead reared at Umatilla Hatchery, brood years 1991-1995.

Brood year	Race-way	Release location	Release date	Percent smolt-to-adult survival	Adult progeny produced	Spawning escapement	Parent-progeny ratio	Parent-Escapement ratio
91	M5A	Meacham Cr	050192	0.01	7	0	0.1	0.0
91	M5B	Meacham Cr	043092	0.02	13	13	0.3	0.3

91	M5C	Bon./Min.	032992	0.21	138	95	3.2	2.2
92	M5A	Bonifer	051393	0.08	52	38	1.4	1.0
92	M5B	Minthorn	041693	0.64	305	253	11.4	8.8
92	M5C	Bonifer	041893	0.63	284	217	11.4	8.1
93	M5A	Bonifer	051294	0.04	18	16	0.5	0.5
93	M5B	Minthorn	041494	0.47	234	195	7.1	5.9
93	M5C	Bonifer	041194	0.64	330	276	10.4	8.7
94	M8A	Bonifer	051295	0.27	131	113	4.2	3.6
94	M8B	Minthorn	041395	0.69	343	249	10.5	7.6
94	M8C	Bonifer	041195	1.20	581	505	18.3	15.9
95	M8A	Thornhollow	050996	0.14	68	58	2.5	2.1
95	M8B	Minthorn	041296	0.68	323	264	12.3	10.2
95	M8C	Bonifer	042496	0.30	149	128	5.5	4.7

Table 18. Age summary of natural summer steelhead from the Umatilla River.

Return Year		Age 1.1	Age 1.2	Age 2.1	Age 2.2	Age 2.3	Age 3.1	Age 3.2	Age 4.1	Total
1994	n=	0	2	24	26	0	5	6	0	63
	%=	0	3.2	38.1	41.3	0	7.9	9.5	0	100
1995	n=	0	0	19	17	0	9	11	0	56
	%	0	0	33.9	30.4	0	16.1	19.6	0	100
1996	n=	0	0	28	8	0	7	1	0	44
	%	0	0	63.6	18.2	0	15.9	2.3	0	100
1997	n=	0	0	19	17	0	5	10	0	51
	%	0	0	37.3	33.3	0	9.8	19.6	0	100
1998	n=	1	1	33	11	1	4	0	1	52
	%	1.9	1.9	63.5	21.2	1.9	7.7	0	1.9	100

Juvenile years of freshwater growth from scales of adult steelhead returning to the Umatilla River.

Return Year		Age 1	Age 2	Age 3	Age 4	Total
1994	n=	2	50	11	0	63
	%=	3.2	79.4	17.4	0	100
1995	n=	0	36	20	0	56
	%	0	64.3	35.7	0	100
1996	n=	0	36	8	0	44
	%	0	81.8	18.2	0	100
1997	n=	0	37	15	0	51
	%	0	70.6	29.4	0	100
1998	n=	2	45	4	1	52
	%	3.8	86.5	7.7	1.9	99.9

Table 20. Life History table of steelhead

Mouth of the Umatilla to the mouth of McKay Creek (RM 0-50.5)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding												
Spawning												
Incubation												
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x	x		

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Mouth of McKay Creek to the mouth of Meacham Creek (RM 50.5-79) and mid-basin streams

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Mouth of Meacham Creek to the forks (RM 79-89 and headwater streams)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Table 21. The Number and Percent of Steelhead (STS) Available to Spawn Naturally that were of Hatchery Origin; Umatilla River, 1988-1999.

BROOD YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002
Percent Spawners of Hatchery Origin	6.9	15.4	7.3	27.3	13.6	26.1	21.1	39.6	34.3	58.9	49.7
Percent Females Spawners of Hatchery Origin	7.4	14.9			11.9	21.7	21.3	29.7	28.2	48.0	45.3

Harvest not estimated 1988-1992. 1993-1999, Harvest estimate subtracted from total, assumes harvest of 50% females and 50% males

No adjustments made for catch and release mortality.

Table 22. Umatilla River summer steelhead broodstock collection

Run	Number Collected								
	Marked			Unmarked			Total		
Year	Males	Females	Total	Males	Females	Total	Males	Females	Total
82-83	0	0	0	unk	unk	161	unk	unk	161
83-84	0	0	0	20	32	52	20	32	52
84-85	0	0	0	25	79	104	25	79	104
85-86	0	0	0	11	58	69	11	58	69
86-87	0	0	0	57	91	148	57	91	148
87-88	0	0	0	73	78	151	73	78	151
88-89	0	0	0	72	88	160	72	88	160
89-90	0	0	0	49	57	106	49	57	106
90-91	47	56	103	46	53	99	93	109	202
91-92	49	46	95	109	116	225	109	116	225
92-93	1	2	3	64	61	125	65	63	128
93-94	18	25	43	47	45	92	65	70	135
94-95	35	33	68	38	48	86	73	81	154
95-96	16	12	28	56	49	105	72	61	133
96-97	12	1	13	48	49	97	60	50	110
97-98	19	11	30	42	44	86	61	55	116
98-99	17	0	17	52	59	111	69	59	128

2004 DRAFT

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Umatilla River Coho
Species or Hatchery Stock:	Umatilla River Coho,Tanner Creek stock
Agency/Operator:	Oregon Department of Fish & Wildlife /Confederated Tribes of the Umatilla Indian Reservation
Watershed and Region:	Umatilla/Columbia/Oregon
Date Submitted:	2004
Date Last Updated:	May 4, 2004

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Umatilla River Coho Program

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

Coho (Oncorhynchus kisutch) Tanner creek stock .

1.3) Responsible organization and individuals

Name (and title): Scott Patterson – Hatchery Coordinator
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 107 Twentieth Street, La Grande, OR 97850
Telephone: 541-963-2138
Fax: 541-963-6670
Email: Scott.D.Patterson@state.or.us

Name (and title): Gary James – Fisheries Program Manager
Agency or Tribe: Confederated Tribes of the Umatilla Indian Reservation
Address: P.O. Box 638, Pendleton, OR 97801
Telephone: 541-276-4109
Fax: 541-276-4348
Email: garyjames@ctuir.com

Name (and title): Tim Bailey – District Fish Biologist
Agency or Tribe: Oregon Department of Fish & Wildlife
Address: 73471 Mytinger Lane, Pendleton, OR 97801
Telephone: 541-276-2344
Fax: 541-276-4414
Email: umatfish@oregontrail.net

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

Confederated Tribes of the Umatilla Indian Reservation –Co-managers – Operators of acclimation and adult collection facilities.

Mitchell Act Hatcheries (ODFW)—Bonneville, Oxbow, Cascade

Bonneville Power Administration-- Funding for acclimation and monitoring and evaluation.

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

Funding for the Umatilla Coho program is provided by Mitchell Act. The Umatilla River coho production goal is 1,000,000 smolts; an additional 500,000 smolts are also being released in the Umatilla for a total production of 1,500,000 smolts. Production is divided between two facilities; one million smolts are produced at Cascade Hatchery. Cascade Hatchery is staffed with five full time permanent positions, plus one nine-month seasonal position. The budget for the Cascade Hatchery portion of the production is $350,000. The additional half million smolts are produced at Oxbow Hatchery. Oxbow Hatchery is staffed with 4 permanent full time positions and one nine-month seasonal position. The budget for the Oxbow Hatchery portion of the production is $106,700. Broodstock for the coho program are collected and spawned at Bonneville Hatchery, the hatchery is staffed with fourteen permanent full time positions and 3 seasonal positions.

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

Adult Collection-- Coho broodstock are collected and spawned at Bonneville Hatchery, which is located on Tanner creek, near its confluence with the Columbia River in Multnomah County, Oregon.

Holding and Spawning--Coho broodstock are held and spawned at Bonneville hatchery.

Incubation and rearing (from green egg to smolt)-- Green eggs are transferred to Cascade and Oxbow Hatcheries for incubation and rearing. Cascade Hatchery is located on Eagle creek, approximately two and a half miles west of Cascade Locks, the main facility is located in Multnomah County and the intake structure is located in Hood River County, Oregon. Oxbow Hatchery is located on Herman creek and is approximately one mile East of Cascade Locks in Hood River County, Oregon.

Acclimation to release-- Juvenile coho are transferred to the Pendleton acclimation facility for acclimation and release into the Umatilla River. The Pendleton acclimation facility is located on the Umatilla River at RM 56 in Umatilla County, Oregon.

1.8) Type of program.

The Umatilla Coho program is a reintroduction program.

1.9) Purpose (Goal) of program.

The goal of the Umatilla River Coho Program is to provide ocean and in river harvest opportunities.

1.8) Justification for the program.

The Umatilla River hatchery coho program is intended to re-introduce coho to the Umatilla River and to provide harvest opportunities, while rebuilding and maintaining adequate hatchery and natural production.

1.9) List of program "Performance Standards"

The Performance Standards for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed.

1.18) List of program "Performance Indicators", designated by "benefits" and "risks"

The Performance indicators for the program are currently under revision in the Sub-Basin planning process and will submitted when the process is completed

1.10.1) "Performance Indicators" addressing benefits.

1.10.2) "Performance Indicators" addressing risks.

1.11) Expected size of program.

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

All broodstock for the program are collected at Bonneville Hatchery.

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

Life Stage	Release Location	Annual Release Level
Eyed Eggs		0
Unfed Fry		0
Fry		0
Fingerling		0
Yearling	Pendleton (RM56)	1,500,000

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

Total adult coho returns to Three Mile Falls Dam since 1987 have ranged from 29 to 22,872 (Table 1).

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

The Coho program was initially started in 1966 and was abandoned in 1970. The program resumed in 1987 with approximately 1 million smolts released per year until 1996 when the program was increased to 1.5 million smolts released per year (Table 2).

1.14) Expected duration of program.

This is an on-going program.

1.15) Watersheds targeted by program.

The Umatilla Coho Program targets hatchery releases in the mainstem of the Umatilla River.

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

Managers are currently reassessing hatchery performance goals in the subbasin planning process. When this process is completed, the revised goals and alternative actions will be submitted. Current actions are mandated by US vs Oregon.

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

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

4d rule research permit applications have been submitted to NMFS for the following:

- The Umatilla River Outmigration and Survival Study operates under permit # OR2004-1408.

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.

:

Adult age class structure: See Table 6
Sex ratio: See Table 5
Size range:
Migrational timing: See Table 7
Spawning range:
Spawn timing: See Table 7
Juvenile life history strategy, including smolt emigration timing: See Table 7

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

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

Umatilla River Summer Steelhead (stock 091) – included as part of the Mid-Columbia ESU - listed as "Threatened" under the federal ESA.
Umatilla River bull trout are included as part of the Columbia distinct population segment listed as Threatened under the federal ESA.

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.**

Chilcote (Unpublished draft) identifies the wild Umatilla summer steelhead viable population threshold at 333. Since 1988, wild adults available for spawning have exceeded 600.
The U.S Fish and Wildlife Service bull trout recovery plan for the Umatilla/Walla Walla Recovery Unit (2002) list recovery criteria for the Umatilla River. Recovery criteria for the Umatilla River core area are to maintain 500 to 1,000 spawning adults annually for at least two generations (i.e.,10 to 14 years) The redd count average for the last four years (1999-2002) in the North Fork Umatilla River equates to a population estimate of 281 spawning adults.

- **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.**

Adult returns to Three Mile Dam and smolt outmigrant estimates of naturally produced steelhead are the primary measurement of productivity used (see Table 3). Other measures of productivity (monitoring and enumeration of redd counts, and juvenile abundance estimates) have been examined without acceptable results.

- 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.

The number and percent of adult steelhead available to spawn of wild and hatchery origin since 1988 is presented in Table 5. Total natural adult return numbers to Three Falls Mile

Dam have ranged from 725 in 1990-91 to 3,659 in 2001-02 (Table 3).

- **Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

The percent of adults available to spawn that were of hatchery origin has ranged from 6.9% of the total run in 1988, to a high of 58.9% in 1997 with a mean of 27.2% (1988-1998; Table 8).

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

The Umatilla Summer Steelhead program currently collects 100 unmarked steelhead to provide the egg needs for the hatchery program.
Operation of the adult collection and enumeration facility, may lead the incidental of listed fish.

- **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**.

The Three Mile Falls Dam adult collection facility is operated on a daily basis from August 16 until December 1st. During this time period the facility is being operated to collect fall chinook and summer steelhead broodstock and to enumerate and record biological data on all returning salmonids including coho. All adults collected are anesthetized with CO2, fish not collected for broodstock are transferred to recovery tanks prior to release back into the Umatilla River. Beginning December 1st the trapping facility is operated for five days open the trapping facility is then closed for nine days. Returning adults are allowed to volitional migrate upstream when the trap is not being operated and adults returns are video enumerated. During this time period the trap is operated to collect summer steelhead and spring chinook broodstock, and to collect biological data. Trapping and transportation of all salmonids is implemented when the passage flow criteria of 150cfs for 30 days after release cannot be met. Adults are transported as high in the basin as possible within a 10-degree water temperature differential. The ladder and trap are not operated from July 15 to August 16. This time period has been given the lowest priority for stored water in McKay Reservoir designated for fish flow augmentation and made available through the Umatilla Basin Water exchange project, which results in the river being dewatered during this time period during most years.

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

Table 10 provides the numbers of Umatilla summer steelhead collected and spawned for

broodstock needs for the program.

- 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).

- 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.

- Outmigration and Survival Study - As per the 4d rule research application, we will reduce numbers collected by adjusting the sample times and avoid sampling when large numbers of natural steelhead are passing through the sampling facility. To reduce the number of mortalities from fish jumping out of the sample tank or from other areas, we will apply covers and screens to prevent escape and monitor the facility closely. Monitoring information is mostly obtained through remote interrogation of tags, without any handling.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.8) 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.

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

1) CTUIR. 1994. Wildlife Mitigation Plan (Draft) May 1996, Columbia Basin Salmon Policy. 1995 pg 9-10, and Water Assessment Report;
2) NMFS - Salmon & Steelhead Enhancement Plan for the Washington and Columbia River Conservation areas.Vol 1. chpt 4, 37pgs;
3) Reeve, R. 1988. Umatilla River Drainage Anadromous Fish Habitat Improvement Plan; 4)CTUIR/ODFW. 1990. Umatilla Hatchery Master Plan;
5) OWRD. 1988. Umatilla Basin Report;
6) BOR. 1988. Umatilla basin Project Planning Report,
7) Umatilla County - Comprehensive Plan. 1983, chpt 8;
8) USNF - Umatilla National Forest Land & Resource Management Plan. 1990, chpt 2, pg 13. and Final EIS. 1990, chpt III, pgs 59-62;
9) CTUIR/ODFW. 1990. Umatilla River Subbasin Salmon and Steelhead Production Plan;
10) Boyce, R. 1986. A Comprehensive Plan for Rehabilitation of Anadromous Fish Stocks in the Umatilla River Basin; 11)USFWS & NMFS. 1982. Umatilla R. Planning

Aid Report.
11) USBR and BPA. 1989. Umatilla Basin Project. Initial project workplan presented to the NWPPC, May 1989.

This HGMP is consistent with these plans and commitments.

3.10) Relationship to harvest objectives.

3.3.3 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 Umatilla River coho program contributes to fisheries in the Columbia and Umatilla Rivers. Current ocean fisheries only allow for retention of adipose fin clipped fish and 95% of the Umatilla releases are unmarked.

3.11) **Relationship to habitat protection and recovery strategies.**

The Umatilla coho Program is a part of an overall Umatilla Basin Salmon and Steelhead Restoration Program. In addition to on-going passage and hatchery operations, restoration efforts include ongoing projects that enhance stream and riparian habitat as well as monitor and evaluate the hatchery and natural components of the restoration program.
Factors limiting the natural production of coho in the Umatilla River Basin include channelization, low or no summer flows, warm water temperatures, sediment, and poor habitat diversity caused by urban and rural development/land management practices. Ocean conditions and the mortalities and stress from the operation of hydropower projects on the mainstem Columbia River are important factors outside the basin. There continues to be degradation to fish habitat in these areas that hampers improvement efforts.

3.7) Ecological interactions.

- Interactions with species that could negatively impact program: a) bird predation during peak smolt migration periods each spring; and b) Northern Pikeminnow and smallmouth bass - predation during smolt migration periods.

Interactions with species that could be negatively impacted by program: Large numbers of hatchery coho smolts tend to not migrate out of the system immediately after acclimation and release, potential competing with wild juvenile *O. mykiss.* Naturally produced coho juveniles have the potential to compete with native Umatilla river species(*O. mykiss*, bull trout, margined sculpin, mountain whitefish and other non-game fish)for rearing space.

Interactions with species that could positively impact program: Carcasses from returning coho salmon add to the Umatilla River subbasin's nutrient recharge cycle. Hatchery coho smolts could add to the food base for bull trout.

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.

Cascade Hatchery – Water rights for Cascade Hatchery total 45 CFS from two separate locations on Eagle Creek. The first location is the hatchery intake which accounts for 35 CFS and the second location is the hatchery emergency pump which accounts for the remaining 10 CFS.

During normal operations, all raceways are supplied with single-pass water. During periods of extreme low water flow in Eagle Creek, a re-use pump is activated that recycles approximately 3500 gpm from the rearing pond discharge and mixes it with available water from the main hatchery intake. The recycled water accounts for about one third of the water entering the ponds. Creek flows are rarely encountered that require the use of the re-use pump. The pump was utilized in the summer of 2003 and previous to that in 1983.

Water quality remains high throughout the year with problems only during flood events. Water temperatures range from 32 to 45 during the winter and spring and 45 to 69 degrees Fahrenheit during the fall and summer.

Small mesh screens are placed in the intake from May 1st to Oct 1st of each year. Large mesh screens are used the remainder of the years. Compliance with NMFS screening criteria needs to be addressed when funds are available.

Spring water is also plumbed to the hatch house and is capable of providing up to 100 gpm for incubation purposes. The water quality from the spring is consistently high with temperatures throughout the year ranging from 45 to 49 degrees Fahrenheit. This spring is shared with the US Forest Service for domestic drinking water to campgrounds and public restrooms. The spring also provides drinking water to the hatchery and hatchery residences.

During cleaning operations, pond effluent is diverted to a pollution abatement pond. All hatchery effluent is monitored and reported quarterly under a National Pollutant Discharge Elimination System (0300J) permit. All conditions of the permit are administered within ODFW and regulated by the Oregon Department of Environmental Quality.

Oxbow Hatchery – Hatchery has water rights to 10 CFS of pathogen free spring water and Lower Herman Cr. (LHC) rearing site has a total of total 100 CFS combined use of Herman Cr. water with our Upper Herman Cr. rearing site.
During normal operations at both sites, all raceways are supplied with single-pass water that runs through two ponds in a series.

Water quality is high in both sites throughout the year with some minor problems at the LHC site during winter flood events. The Oxbow site water temperature is a constant 45 degrees and LHC water fluctuates between 38 degrees for a low in the winter and 54 degrees Fahrenheit for a high in the summer. The limitation to Oxbow Hatchery water is that the springs are seasonally tied to the rain water year and consequently can have summer flows as low as 300 gpm. LHC's limitations are that we pass adult fish above our intake to spawn; these fish carry pathogens that are transmitted to the juvenile fish at our rearing sites. Oxbow Hatchery and LHC neither one have NPDES permits because each site raises less than 20K pounds of fish each year.

Bonneville Hatchery -- Bonneville Hatchery has water rights to 50 CFS of water from Tanner Cr. Water quality is high. Temperatures range from 32 to 55 degrees, September recording the highest temperature and February the lowest. Limitations are as follows; Tanner Cr. water is dependent on rainfall and snowpack which effects water temperature and available CFS. During high water adult salmon and steelhead can pass above the Tanner Cr. intake to spawn. These fish have been known to carry IHN and have infected programs at Bonneville. Tanner Cr. location subjects itself to very cold weather which results in minus 32 degree temperatures and intake problems resulting from anchor ice and slush build up and potential loss of flow. A secondary source of water for Bonneville hatchery is a well field located Robbins Island within the confines of the Bonneville Dam / Corp of Engineers Project. Originally seven wells operated to produce 18,000 GPM. In recent years the well field has become depleted and now can only produce approximately 14,000 GPM. Plans are in effect for funding and surveys to resurrect these wells. Bonneville Hatchery operates under NPDES permit # 300J which allows treated
discharge from aquatic animal facilities which produce at least 20,000 pounds of fish per year, but have less than 300,000 pounds on hand at anyone time.

Pendleton Acclimation -- Water for the Pendleton juvenile acclimation and release facility is pumped directly from the Umatilla River. Water flow is approximately 1,600 gpm per pond. During the juvenile acclimation period (April), daily temperatures range from approximately 4.5 to 13.0^{o}C (40.0 to 55^{o}C). High sediment loads are experienced in some years during high flow conditions.

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.

Bonneville Hatchery --Intake at this time is not NOAA fisheries screen compliant, but Oregon Dept. Fish and wildlife Fish Passage and Screening section is currently reviewing the work necessary to bring it into compliance.

Cascade Hatchery -- Eagle Creek is located in the Columbia River Gorge and has numerous waterfalls, impassible by migratory fish. A fish passage facility is not provided

at the hatchery intake due to the limited spawning grounds available above the intake. This reduces exposure of natural fish to the hatchery intake screens.

Small mesh screens are placed in the intake from May 1st to Oct 1st of each year. Compliance with NMFS screening criteria needs to be addressed when funds are available.

Oxbow Hatchery -- Oxbow Hatchery spring water is the head waters of Little Herman Cr. and there are no fish that can get into the source water. Also the portion of Little Herman Cr. that runs from the hatchery and meets with Herman Cr. has an impassable falls to adult fish.

LHC intake at this time is not NOAA fisheries screen compliant, but Oregon Dept. of Fish & Wildlife's Fish Passage and Screening section is currently working to bring this intake into compliance.

Pendleton Acclimation -- Acclimation facility intake screens conform to NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Bonneville Hatchery – Brood stock collection is conducted solely at Bonneville Hatchery. The facility consists of a vertical slot fish ladder, 2 adult holding ponds and a fish handling and sorting complex.
The water supply for the holding pond can be either well water or Tanner Creek. A low water alarm is located in the aeration channel where loss of flow from either source would be indicated.

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

Bonneville Hatchery – Bonneville Hatchery is equipped with a 1000 gallon fiberglass tank which can be used both for adult and smolt transfers or releases. Two-200 gallon portable tanks are used for onsite transfers.

5.3) Broodstock holding and spawning facilities.

Bonneville Hatchery – The dimensions of the holding pond are 38' wide by 123.25 ' long by 8.0' deep (approximately 32,785 cubic feet).

5.4) Incubation facilities.

Oxbow Hatchery -- Incubation facilities consist of thirteen double Marisource vertical incubator stacks using 4 gpm of spring water.

Cascade Hatchery -- Incubation facilities consist of 44 full stacks of vertical tray incubators (660 usable trays). Dual water supplies are available from Eagle Creek and hatchery spring water.

5.5) Rearing facilities.

Oxbow Hatchery – Early rearing (swim-up fry to 45 f/lb.) occurs at Oxbow Hatchery in concrete ponds (80` x 20` x 30") supplied with spring water, the fish are than moved to LHC and reared (45 f/lb. to 17f/lb.) on Herman Cr. water in two concrete ponds (110` x 36.75` x 2.75") that are in a series

Cascade Hatchery -- Rearing facilities at Cascade Hatchery consist of 30 concrete raceways with a volume of 3,200 cubic feet each.

5.6) Acclimation/release facilities.

Pendleton Acclimation -- Facility includes a water intake structure with automatic screen cleaner, pump station, standby generator, water head box/distribution system, storage building, four acclimation ponds (approximately 13,000 cubic feet each; one of which is used for acclimating summer steelhead), settling pond for pond cleaning, and water outlet and fish release structure. Water is supplied by gravity flow to the pump station where is pumped into the head distribution box. Water is then supplied by gravity from the head distribution box to the individual ponds. Water flow is approximately 1,600 gpm per pond. The operation of the facility has no effect on the critical habitat for summer steelhead.

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

Oxbow Hatchery – The only significant fish losses that occur are due to diseases: (Cold-water disease and Bacterial Kidney disease) carried by adult fish spawning above the intake and transmitted to fingerlings in the (LHC) rearing ponds.

Cascade Hatchery – Flood events can cause operational difficulties due to debris damage to intake facilities and by causing heavy silt loads in the water supply. Flood events cause increased monitoring of the water supply, rearing ponds and incubation facilities. Normally flood events do not result in significant fish mortality.

Severe cold weather can cause operational difficulties due to ice formation at key water passageways like the hatchery intake, rearing pond headbox and rearing ponds. Severe cold weather requires increased monitoring of the water supply, rearing ponds and incubation facilities. Normally, severe cold weather does not result in significant fish mortality.
Severe snow events can cause operational difficulties due to slush buildup at key water passageways like the hatchery intake, rearing pond head box and rearing ponds. Severe snow events require increased monitoring of the water supply, rearing ponds and incubation facilities. Severe snow events also greatly impair mobility and chances for outside assistance due to closed roads and treacherous conditions. In 1980 and 1996, severe snow events caused significant fish mortality at Cascade Hatchery.

Pendleton Acclimation -- There have been no operational difficulties or disasters at that have led to significant fish mortality.

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.

Oxbow Hatchery – The hatchery will be staffed full-time, 24 hrs a day, 365 days a year, and equipped with low-water alarm system to help prevent catastrophic fish loss resulting from water system failure.

Cascade Hatchery – The hatchery is staffed full-time, 24hrs a day, 365 days a year. The water system is equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure. Back up pumps are available for incubation and rearing. A 125kw generator is on site and available during power failures. Monthly fish health exams are conducted by ODFW fish health staff and necessary treatments are administered at their direction.

Pendleton Acclimation -- The Pendleton acclimation/release facility includes three vertical turbine pumps (two primary and one backup), standby generator, four acclimation ponds and outlet pipes on each pond for releasing fish. In case of power failure, a standby generator provides emergency power to the pump(s). If one of the two primary pumps fails, the backup pump will automatically start. In the event of a power or pump failure, a phone dialer will begin calling up to 10 telephone numbers (stating there is an alarm condition at the facility) until the alarm is acknowledged. Fish are released from the facility by pulling the dam boards, lowering the pond and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Bonneville Hatchery – The following are Coho transfers into Bonneville by year:

From	***Region***	***Year***
Trask	(coast)	1911, 57
Alsea	(coast)	1922
Coos	(coast)	1925
Ten-mile Lake	(coast)	1930, 34, 35, 40, 43
Lewis River	(Washington)	1933
Yaquina	(Coast)	1939
Klaskanine	(Columbia)	1941, 44, 45, 46, 48, 49
Big Creek	(Columbia)	1942, 54, 58, 60, 61, 71
Oxbow	(Columbia)	1942, 68, 77
Sandy	(Columbia)	1945, 57, 58, 59, 70
Toutle	(Washington)	1955, 56
Eagle Creek	(Clackamas)	1959
Cascade	(Columbia)	1970, 71, 73

6.2) Supporting information.

6.2.1) History

Bonneville Hatchery – Bonneville Hatchery started operations in 1909 on Tanner Creek. Fall Chinook being the major species present, Coho operations were inconsistent, substantial numbers did returned but not each year, causing propagation to be inconsistent.

Their was no concentrated effort to maintain a run of coho. Coho were transferred in from the Oregon coast in 1911. No data are available regarding other transfers between 1912 and 1921, or regarding on site collections of coho prior to 1924. Coho were collected in Tanner Creek in 1924, 1937, 1939, 1945, 1947, 1949, 1951, 1952, 1954, 1955, and 1957 through 2004. Early collections probable included wild Tanner Creek Coho.

6.2.2) Annual size.

Bonneville Hatchery – No natural production will be used as brood stock

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

Bonneville Hatchery – No natural fish have been incorporated into the hatchery brood stock.

6.2.4) Genetic or ecological differences.

Bonneville Hatchery – N/A

6.2.5) Reasons for choosing.

Bonneville Hatchery – Endemic to Tanner Cr. and the lower Columbia River stock.

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.

Bonneville Hatchery – All unmarked coho collected at Bonneville are checked for coded wire tag using a hand held detector. When found to be without coded wire tag the adult coho are placed in a 200 gallon portable tank and transported above Bonneville Dam where they are released.

SECTION 7. BROODSTOCK COLLECTION

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

Bonneville Hatchery –Adults

7.2) Collection or sampling design

Bonneville Hatchery – The brood stock collection goal is to collect healthy Tanner Cr. Coho from a cross section of the run based on historic levels per week.
Percentages of adults collected are based on numbers of adults needed to egg collection goals. Collect males and females in sufficient numbers to provide eggs for production and allow for any adult mortality.

7.3) Identity.

Bonneville Hatchery – Hatchery coho returning to Tanner Creek are identified by adipose fin clip. All adipose fin clipped coho are placed through a R8 Detector designed to detect the presence of Coded Wire Tags in large fish. Unmarked coho do stray into the Bonneville trapping facility. These salmon are removed directly after identification and transported above Bonneville Dam then released.

7.4) Proposed number to be collected:

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

Bonneville Hatchery – The 2003 brood stock goal is to collected 2353 females and 2502 males of Tanner Cr. origin.

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

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1992	5599	7486	1493		
1993	4161	4343	205		
1994	12559	14851	362		
1995	2417	2433	234		
1996	7143	7740	264	9,754,000	
1997	6568	8392	363	9,596,000	
1998	3067	2994	312	6,101,000	
1999	2280	2232	163	4,774,000	
2000	8936	9199	1037	5,441,000	
2001	19657	24870	767	6,946,000	
2002	11778	13873	1888	7,477,000	
2003	15417	19444	457	7,199,000	

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

Bonneville Hatchery – Brood stock collected in excess of program are sold to vendor via the State of Oregon bid process.

7.6) Fish transportation and holding methods.

Bonneville Hatchery – There is no transportation of coho adults. Coho return directly to Bonneville's fish ladder via Tanner Cr... Fish ladder is open the fourth week of August. Fish are collected in the sorting channel, moved upstairs where they are sorted male female, jack and enumerated. Electric shock is used as an anesthetic. Coho are placed in one of the two holding ponds, with 5000 gpm flow.
Adult coho at Bonneville hatchery are treated *with* antibiotic erythromycin at a dosage rate of approx. 22 mg/kg body weight for bacterial kidney disease. This prophylactic and / or therapeutic treatment is to be administered by injection .

7.7) Describe fish health maintenance and sanitation procedures applied.

Bonneville Hatchery – The fish health monitoring plan is identical to that developed by the Integrated Hatchery Operations Team for the Columbia Basin anadromous Salmonid hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994.(Bonneville Power Administration). 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. Administration of erythromycin (Erythro 200 or Gallimycin 200) at a dosage rate of approximately 22 mg/kg body weight for treatment of bacterial kidney disease in adult coho salmon (stock #14) is performed at Bonneville Hatchery, Cascade Locks, Oregon. Administration of erythromycin (Erythro 200 or Gallimycin 200) at a dosage rate of approximately 22 mg/kg body weight for treatment of bacterial kidney disease and oxytetracycline HCL (Oxytet 100) at approximately 10 mg/kg for furunculosis in adult fall chinook salmon (stock #95). Adult Coho at Bonneville hatchery are treated with hydrogen peroxide at a ratio of 1 / 3500 for 90 minutes. This prophylactic treatment is administered to control fungus in brood stock held for up to 90 days

7.8) Disposition of carcasses.

Bonneville Hatchery – Spawned carcasses are frozen and transported weekly during the spawning (Oct, Nov.) season to a landfill for burial.
Un-spawned Carcasses are sold to private vendors through the State of Oregon bid process. Fish are sold in the round or with eggs skeins removed.
In recent years carcasses have been donated to the Oregon Food share program. Adult mortality are removed daily, enumerated, frozen, and then shipped to the landfill for burial.

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.

Bonneville Hatchery – Electronic weir is located adjacent the entrance to the Bonneville Fish ladder. It is operated during the spawning season as a means to prevent adults from moving above the ladder entrance.

SECTION 8. MATING

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

8.1) Selection method.

Bonneville Hatchery – Spawners are chosen by collecting a cross section of the run based on historic run time levels per week .Percentages per week of adults collected is based on numbers of adults needed plus mortality to meet egg collection goals. During coho spawning, new fish are brought in to the spawning room and sorted; male or female, ripe or green, green fish are sent to the holding pond while the ripe fish are spawned. Old fish or fish that have been held through the collection period are then spawned randomly as they are processed.

8.2) Males.

Bonneville Hatchery – No repeat spawners are used.

8.3) Fertilization.

Bonneville Hatchery – Jacks are spawned at a ratio 1-10 females, Spawning ratio is one male to one female

Describe spawning protocols applied, including the fertilization scheme used (such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or factorial matings). Explain any fish health and sanitation procedures used for disease prevention.

8.4) Cryopreserved gametes.

Bonneville Hatchery – None are used.

If used, describe number of donors, year of collection, number of times donors were used

in the past, and expected and observed viability.

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.

Bonneville Hatchery –

(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program"*.).

SECTION 9. INCUBATION AND REARING -

9.1) Incubation:

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

Oxbow Hatchery –

Egg & Fry Data

Brood Year	Stock	Green Eggs Received	Eyed Eggs Received	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Fry-Fingerling Survival (%)
2002	1402 CO	1,116,500	0	82.5 *	82.0	98.0
2003	1403 CO	722400	160000	75.6 *	92.0	No Data

- *Eggs destroyed due to BKD culling.
- 2002 is the first year we moved the program from egg to smolt at Oxbow Hatchery.

Cascade Hatchery –

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)
1990	5,845,268	94	96.7
1991	6,673,000	89	98.8
1992	4,368,000	86.5	98.8
1993	5,270,000	90.7	98.6
1994	9,901,000	85.3	99.2
1995	5,448,000	90.1	97.2
1996	10,711,000	78	nya
1997	9,596,000	92.2	94.3
1998	7,099,730	91.9	97.7
1999	2,021,152	71.6	97.9
2000	6,313,210	92.4	97.1

2001	6,946,000	92.9	98.1

Comments:

Data above is combined for Cascade and Bonneville Hatcheries. Prior to 1996, broodstock were collected and spawned at Cascade Hatchery. Broodstock were collected and eggs taken at each hatchery 1996, 1998, 1999, 2000. In 1997 and 2001, broodstock collection and egg take only occurred at Bonneville. Green-eyed egg survival figures are weighted averages of the two hatcheries for 1996, 1997, and 2001.

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

Oxbow Hatchery – As seen by the asterisk in the above chart, we started culling for BKD disease in 2001. As a result of this we are keeping enough extra eggs (12% ave.) to cover the culling process. The eggs that are culled are destroyed, frozen, and disposed of at a landfill. If surplus negative eggs are still on hand at the eyed stage, a percentage from each spawn group is taken to minimize the impact to one group.

Cascade Hatchery – Cascade Hatchery collects surplus eggs to safeguard production due to an aggressive BKD culling program. Our goal is to raise BKD negative coho. When BKD test results are available, the positive eggs are bagged, frozen and sent to a sanitary landfill. If surplus negative eggs are still on hand at the eyed stage, a percentage from each spawn group is taken to minimize the impact to one group.

9.1.3) Loading densities applied during incubation.

Oxbow Hatchery –

Brood Year	Incubator Type	Number of Units	Flow (gpm)	Loading-Eying	Loading-Hatching
2002	Incubator Trays	165	4	5,000	5,000
2003	Incubator Trays	176	4	5,000	5,000

Cascade Hatchery – Egg size – 84 / oz.; Incubator flows – 5 gpm; 10,500 green eggs per tray; 8,250 eyed eggs per tray.

9.1.4) Incubation conditions.

Oxbow Hatchery – Eggs and fry are observed daily during incubation. We have no silt

problems because we use spring water. Temperature units are monitored for development.

Cascade Hatchery – Water temperatures are monitored with thermographs. Silt management is accomplished by visual inspection and rodding of trays when needed. Cumulative temperatures are recorded daily.

9.1.5) Ponding.

Oxbow Hatchery – Button up happens approximately from 1150 to 1250 TU's. A visual check is performed to determine degree of button up. Ponding normally occurs in late January and is a forced ponding. Lengths are not taken at ponding.

Cascade Hatchery – Button up happens approximately from 1150 to 1250 TU's. A visual check is performed to determine degree of button up. Ponding normally occurs in late February through March and is a forced ponding. Once ponded, feeding is held off for up to 4 days for maximum absorption of yolk sac. Lengths are not taken at ponding.

9.1.6) Fish health maintenance and monitoring.

Oxbow Hatchery – Oxbow Hatchery is operated in compliance with ODFW Fish Health Management Policy and the Integrated Hatchery Operations Team (IHOT) fish health guidelines.
Green eggs are water hardened in iodophor, treated with Hydrogen Peroxide for fungus, and incubated at Bonneville Hatchery. They are then shocked and shipped to Oxbow Hatchery.
Eyed eggs are disinfected with iodophor as per label instructions. They are then picked and counted by machine with some hand picking by the crew. Yolk sac malformation is not a problem at Oxbow Hatchery.

Cascade Hatchery – Cascade Hatchery is operated in compliance with ODFW Fish Health Management Policy and the Integrated Hatchery Operations Team (IHOT) fish health guidelines.

Green eggs are water hardened in iodophor as per label. Eyed eggs brought into the facility are disinfected with iodophor as per label. Eggs are treated with formalin three times a week for fungus control using a drip method. Visual monitoring is conducted daily to detect disease or other problems. Eggs are shocked at approximately 450 TU's. Eggs are counted and picked by machine with some hand picking by hatchery crew. Yolk sac malformation is not a problem at Cascade Hatchery.

All family egg groups are numbered and tracked throughout BKD testing and culling phases. An alarm on the water supply and daily monitoring of eggs minimizes

risk. Silt is removed by rodding of the trays. Egg mortality is bagged, frozen and sent to a sanitary landfill.

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.

Oxbow Hatchery – Eggs are incubated on spring water so there are no silt problems and each stack of incubators is individually alarmed for low water. Plus as mentioned earlier the hatchery is manned 24 hrs a day 365 day a year.

Cascade Hatchery – All eggs are handled in a manner to reduce any adverse effects. As mentioned previously, the hatchery is staffed at all hours and alarms systems are in place to reduce the risk of loss due to water flow issues.

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..

Oxbow Hatchery –

Fish Survival Data

YEAR	Fry to Fingerling	Fingerling to Smolt
1994		91.90%
1996		99.40%
1997		95.90%
1998		96.90%
1999		96.50%
2000		102.00%
2001		100.00%
2002*	89.90%	96.90%

* First year the program was moved to Oxbow Hatchery from Cascade Hatchery

Cascade Hatchery –

YEAR	fry to fingerling	fingerling to smolt
1990	92.1 %	99.94%
1991	90.6%	99.89%
1992	91.3%	84.6%
1993	86.0%	99.88%
1994	93.9%	98.75%
1995	70.0%	97.0%
1996	85.3%	96.8%

1997	80.9%	99.25%
1998	90.0%	99.46%
1999	88.8%	99.39%
2000	97.1%	98.05%
2001	88.5%	99.41%

Comments:

Data above is combined for Cascade and Bonneville Hatcheries. Prior to 1996, broodstock were collected and spawned at Cascade Hatchery. Broodstock were collected and eggs taken at each hatchery 1996, 1998, 1999, 2000. In 1997 and 2001, broodstock collection and egg take only occurred at Bonneville. Green-eyed egg survival figures are weighted averages of the two hatcheries for 1996, 1997, and 2001.

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

Oxbow Hatchery – Rearing standard limits for Coho are dependant upon fish size and water temperature. Using Coho at 50 f/lb and a water temp. of 48 degrees, IHOT recommends 8 lbs./gpm. Using lbs. per cubic foot, IHOT recommends a factor ranging from 0.3 to 1.7 depending on fish size.
Rearing densities at Lower Herman Cr site fall between 1.11 lb /ft^3 and 1.38 lb/ft^3 at release. Loading is 7-8.5 pounds/gpm at transfer.

Cascade Hatchery – Rearing standard limits for coho are dependant upon fish size and water temperature. Using coho at 50 f/lb and a water temp of 48 degrees, IHOT recommends 8 lbs./gpm. Using lbs per cubic foot, IHOT recommends a factor ranging from 0.3 to 1.7 depending on fish size. Rearing densities at Cascade Hatchery fall between 1.43 lb/ ft^3 and 1.57 lb/ ft^3 at release. Pounds per gallon per minute ranged from 13.0 to 16.6 at transfer.

9.2.3) Fish rearing conditions

Oxbow Hatchery – Water temperatures are recorded daily by thermograph, loading densities monitored with monthly sampling, weekly pond cleaning, and daily mortality removal.

Cascade Hatchery – Water temperatures are recorded daily by thermograph, loading densities monitored with monthly sampling, ponds cleaned weekly, and mortality removed daily.

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.

Oxbow Hatchery – Fish/lb MM

	Fish/lb	MM
Oct	25.7	117
Nov	22.8	122
Dec	19.8	127
Jan	16.3	136
Feb	16.8	136

Cascade Hatchery –

Month	Fish/pound
March	829
April	392
May	190
June	115
July	75
August	39
September	26.8
October	22.3
November	20.4
December	19.1
January	17.9
February	16.6
March	16.3

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

Oxbow Hatchery – See 9.2.4

Cascade Hatchery – See 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*).

Oxbow Hatchery – Fish are fed a dry diet of Nutra Plus Fry or Clark's Fry throughout the day as needed. When fish are first ponded they are presented with feed every hour. As they grow, rations per interval are increased while frequency decreases. Fish are fed according to a growth program to reach production goals. The % body weight/day ranges from 0.3 to 3.0. Average yearly food conversion is 1.07.

Cascade Hatchery – Fish are hand fed a dry diet of either BioVita, Bio Dry 1000, Nutra Fry or Nutra Plus throughout the day as needed. When the fish are first ponded they are presented with feed every hour. As they grow, rations per interval are increased while frequency decreases. Fish are feed to satiation until 300 F/lb, when they are placed on a growth program to reach production goals. %B.W./day range is from 0.3 to 3.6. Average yearly food conversion is 1.05.

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

Oxbow Hatchery – The fish health monitoring plan is identical to that developed by the Integrated Hatchery Operations Team for the Columbia Basin anadromous Salmonid hatcheries (see Policies and Procedures for the Columbia Basin Anadromous Salmonid Hatcheries, Annual Report 1994. (Bonneville Power Administration). Conduct examination of juvenile fish at least monthly and more often as necessary. A representative sample of health 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. 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. Daily fish health observation, daily mortality is removed and recorded, diseases are diagnosed and prescribed a treatment by fish pathology through routine inspections, and equipment is disinfected.

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

Conduct examination of juvenile fish at least monthly and more often as necessary. A representative sample of health 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.

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 Daily fish health observation, daily mortality removal and tracking, prophylactic Aquamycin treatments for BKD, formalin treatments for fungus control, monthly fish health checks by pathology, equipment disinfection.

Disease Treatment Cont. Oxbow & Cascade Hatchery's--Treatment for pathogens at Umatilla Hatchery vary depending on the life stage of the fish and the disease agent being treated. Green eggs are routinely water hardened in diluted buffered iodophor. Flush treatments of 1:600 formalin for 15 minutes are given to eggs three to five times per week for fungus prevention. Static treatments of juvenile fish with formalin for controlling external parasites such at trichodinids or Chilodonella and for fungus can also occur. Juvenile fish are treated for bacterial infections when needed with oxytetracycline of florfenicol medicated feed according to label, under veterinary prescription or under an Investigational New Animal Drug Permit. Juvenile chinook and coho are given prophylactic medicated feedings at a rate of 100 mg erythromycin/kg fish /day for 21 days. Administration of erythromycin appears to control outbreaks of bacterial kidney disease later in the rearing cycle.

Table 9.2.7 Five year disease history[a] (1999 to present) by fish stock at Bonneville, Oxbow and Cascade Fish Hatcheries. ChF = Fall Chinook Salmon, Co = Coho Salmon. Stock codes are 91 = Umatilla River, 14 = Tanner Creek (Columbia River).

Hatchery Programs (stock code and species)

Disease or Organism	91 ChF	14 Coho
IHN Virus	No	No
EIBS Virus	No	Yes
Aeromonas salmonicida	No	No
Aeromonas/Pseudomonas	Yes	Yes
Flavobacterium psychrophilum	Yes	Yes
Fl. columnare	No	No
Fl. branchiophilum	No	No
Renibacterium. salmoninarum	Yes	Yes
Yersinia ruckeri	No	No
Ichthyobodo	No	Yes
Gyrodactylus	No	No
Ichthyophthirius multifilis	No	No
Gill Ameba	No	No

Trichodinids	Yes	Yes
Chilodonella	No	No
Nanophyetus salmincola	No	No
Coagulated Yolk Disease	Yes	Yes
External Fungi.	Yes	Yes
Internal Fungi	Yes	Yes

[a] 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.

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

Oxbow Hatchery – N/A

Cascade Hatchery – N/A

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

Oxbow Hatchery – Fish are reared under natural water temperatures and light conditions.

Cascade Hatchery – Fish are reared under natural water temperatures and light conditions.

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.

Oxbow Hatchery – **F**ish will be reared to a size, and released at a time, to encourage out-migration, and eliminating residualiztion. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

Cascade Hatchery – **F**ish will be reared to a size, and released at a time, to encourage out-migration, and eliminating residualiztion. All fish will be marked 100%. Strict health monitoring, prevention, and treatment protocols will be used.

SECTION 10. RELEASE

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

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling				
Yearling				

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

Stream, river, or watercourse: Umatilla River
Release point: Pendleton Acclimation (RM 56.0)
Major watershed: Umatilla River
Basin or Region: Mid-Columbia River

10.3) Actual numbers and sizes of fish released by age class through the program.
*For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in **Attachment 2**. Cite the data source for this information.*

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988								
1989								
1990								
1991								
1992								
1993								
1994								
1995								
1996								
1997								
1998								
1999								

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
Average								

Data source: (Link to appended Excel spreadsheet using this structure. Include hyperlink to main database)

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

Provide the recent five year release date ranges by life stage produced (mo/day/yr). Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants.

10.5) Fish transportation procedures, if applicable.

Oxbow Hatchery –Fish are transported by truck in insulated and oxygenated tanks ranging in size from 2,000 to 5,000 gallons, at 1 pound of fish /gallon. Transportation time to Pendleton acclimation is approximately 3 ½ hours.

Cascade Hatchery – Fish are transported by truck in insulated and oxygenated tanks ranging in size from 2,000 to 5,000 gallons, at 1 pound of fish /gallon. Transportation time to Pendleton acclimation is approximately 3 ½ hours.

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

Pendleton Acclimation -- At Pendleton, the effluent screen is pulled and the fish are allowed to volitionally swim over a notched dam board and down the outlet channel directly into the Umatilla River. The fish are taken off feed one to two days prior to the remaining fish being released. The effluent dam boards are removed and the pond is lowered. The fish are then crowded out of the pond using a seine.

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

Oxbow Hatchery –All fish marked 100% AD. Two groups of 25,000 ea. Marked and tagged ADCWT.

Cascade Hatchery –All fish marked 100% AD. One groups of 25,000 tagged ADCWT.

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

Pendleton Acclimation –Excess fish at this point in the program will be released.

10.9) Fish health certification procedures applied pre-release.

Pendleton Acclimation – (Fish Sampled at hatchery prior to transfer)

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

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.

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

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.

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

Pendleton Acclimation -- The Pendleton acclimation/release facility includes three vertical turbine pumps (two primary and one backup), standby generator, four acclimation ponds (one of which is used for acclimating summer steelhead), and outlet pipes on each pond for releasing fish. In case of power failure, a standby generator provides emergency power to the pump(s). If one of the two primary pumps fails, the backup pump will automatically start. In the event of a power or pump failure, a phone dialer will begin calling up to 10 telephone numbers (stating there is an alarm condition at the facility) until the alarm is acknowledged. Fish are released from the facility by pulling the dam boards, lowering the pond and crowding out the fish using a seine. The fish then exit the pond through an underground pipe to the Umatilla River. In an extreme emergency, the fish can be released in this way.

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.

Pendleton Acclimation –

Coho are released in area's that are <u>not</u> primary rearing habitat for Steelhead

TABLES AND FIGURES:

Table 1

Coho Annual Run Counts To Three Mile Falls Dam			
Year	Adults	Jacks	Total
1987	0	29	29
1988	923	761	1684
1989	4108	521	4629
1990	410	512	922
1991	1733	187	1920
1992	355	174	529
1993	1531	18	1549
1994	984	62	1046
1995	946	53	999
1996	618	24	642
1997	670	137	807
1998	3081	192	3273
1999	3702	205	3907
2000	4654	1276	5930
2001	22792	80	22872
2002	3820	971	4791
2003	8319	667	8986

Table 2. Hatchery releases of coho salmon in the Umatilla River.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1966	Little White Salmon	500,000	1312.0	Little White Salmon
1967	Little White Salmon	200,000	1087.0	Little White Salmon
1967	Cascade	500,000	Eggs	Tanner Creek
1968	Little White Salmon	750,000	Eggs	Little White Salmon

1969	Carson	200,040	23.0	Little White Salmon
1987	Cascade	948,549	13.5-14.0	Tanner Creek
1988	Cascade	996,433	16.6	Tanner Creek
1989	Cascade	986,906	15.3-18.2	Tanner Creek
1990	Cascade	988,928	11.2-14.7	Tanner Creek
1991	Cascade	955,629	15.4-17.1	Tanner Creek
1992	Cascade	489,165	15.7	Tanner Creek
1992	Cascade	472,221	15.5	Tanner Creek
1993	Cascade	437,884	17.5	Tanner Creek
1993	Cascade	454,794	17.6	Tanner Creek
1994	Cascade	465,883	17.1	Tanner Creek
1994	Cascade	418,222	18.1	Tanner Creek
1995	Cascade	502,105	14.7	Tanner Cr. & Umatilla R
1995	Cascade	497,449	14.5	Tanner Cr. & Umatilla R
1995	Sandy	191,854	13.9	Tanner Creek
1995	Lower Herman Cr.	322,858	20.3	Tanner Creek
1996	Lower Herman Cr.	465,769	17.9	Tanner Creek
1996	Cascade	500,005	18.0	Tanner Creek
1996	Cascade	511,609	18.6	Tanner Creek
1997	Klaskanine	81,445	18.1	Tanner Creek
1997	Gnat Creek	881,341	15.3	Tanner Cr. & Sandy R.
1997	Lower Herman Cr.	438,153	16.0	Umatilla River
1998	Cascade	1,078,436	16.8	Tanner Creek
1998	Lower Herman Cr.	528,350	16.3	Tanner Creek
1999	Cascade	1,010,608	17.9	Tanner Creek
1999	Lower Herman Cr.	465,314	15.8	Tanner Creek
2000	Cascade	249,792	16.8	Tanner Creek
2000	Cascade	798,210	15.2	Tanner Creek
2000	Lower Herman Cr.	513,288	16.8	Tanner Creek
2001	Cascade	745,497	13.7	Tanner Creek
2001	Cascade	250,323	17.5	Tanner Creek
2001	Lower Herman Cr	478,739	17.5	Tanner Creek
2002	Cascade	249,684	14.7	Tanner Creek
2002	Cascade	185,018	14.0	Tanner Creek
2002	Cascade	644,680	14.2	Tanner Creek
2002	Lower Herman Cr.	542,475	15.6	Tanner Creek
2003	Cascade	249,988	16.3	Tanner Creek
2003	Cascade	591,349	15.0	Tanner Creek
2003	Cascade	188,971	15.4	Tanner Creek
2003	Lower Herman Cr	515,859	15.8	Tanner Creek

Table 3
Summer Steelhead Annual Run Counts

Year	Hatchery	Wild	Total
1966-67		1778	1778
1967-68		930	930
1968-69		1917	1917
1969-70		2298	2298

1970-71			
1971-72			
1972-73		2057	2057
1973-74		2640	2640
1974-75		2171	2171
1975-76		2534	2534
1976-77		1258	1258
1977-78		3080	3080
1978-79			
1979-80		2367	2367
1980-81		1298	1298
1981-82		768	768
1982-83		1264	1264
1983-84		2314	2314
1984-85		3197	3197
1985-86		2885	2885
1986-87		3444	3444
1987-88	166	2316	2482
1988-89	371	2104	2475
1989-90	246	1422	1668
1990-91	387	725	1112
1991-92	523	2246	2769
1992-93	616	1297	1913
1993-94	345	945	1290
1994-95	656	875	1531
1995-96	785	1296	2081
1996-97	1463	1014	2477
1997-98	903	862	1765
1998-99	751	1135	1886
1999-00	739	2153	2892
2000-01	1089	2573	3662
2001-02	1860	3659	5519
2002-03	960	2120	3080

Table 4. Total smolt-to-adult survival, parent:progeny, and parent:spawning escapement data for summer steelhead reared at Umatilla Hatchery, brood years 1991-1995.

Brood year	Race-way	Release location	Release date	Percent smolt-to-adult survival	Adult progeny produced	Spawning escapement	Parent-progeny ratio	Parent-Escapement ratio
91	M5A	Meacham Cr	050192	0.01	7	0	0.1	0.0
91	M5B	Meacham Cr	043092	0.02	13	13	0.3	0.3
91	M5C	Bon./Min.	032992	0.21	138	95	3.2	2.2
92	M5A	Bonifer	051393	0.08	52	38	1.4	1.0
92	M5B	Minthorn	041693	0.64	305	253	11.4	8.8
92	M5C	Bonifer	041893	0.63	284	217	11.4	8.1
93	M5A	Bonifer	051294	0.04	18	16	0.5	0.5
93	M5B	Minthorn	041494	0.47	234	195	7.1	5.9
93	M5C	Bonifer	041194	0.64	330	276	10.4	8.7
94	M8A	Bonifer	051295	0.27	131	113	4.2	3.6
94	M8B	Minthorn	041395	0.69	343	249	10.5	7.6
94	M8C	Bonifer	041195	1.20	581	505	18.3	15.9
95	M8A	Thornhollow	050996	0.14	68	58	2.5	2.1
95	M8B	Minthorn	041296	0.68	323	264	12.3	10.2
95	M8C	Bonifer	042496	0.30	149	128	5.5	4.7

Table 5. Disposition and Spawning Ground Data of Natural and Hatchery Summer Steelhead (STS) Returning to the Umatilla River above Three Mile Falls Dam, 1988-1999.

RUN YEAR (Fall/Spring)	1987 1988	1988 1989	1989 1990	1990 1991	1991 1992	1992 1993	1993 1994	1994 1995	1995 1996	1996 1997	1997 1998	1998 1999
Natural STS Enumerated at TMD	2315	2104	1422	724	2247	1298	945	875	1299	1014	862	1134
Hatchery STS Enumerated at TMD	165	370	245	387	522	616	345	656	782	1463	903	740
Natural and Hatchery STS Enumerated at TMD	2480	2474	1667	1111	2769	1914	1290	1531	2081	2477	1765	1874
Natural STS Sacrificed or Mortalities at TMD	20	12	40	2	3	4	0	0	8	5	2	1
Hatchery STS Sacrificed or Mortalities at TMD	5	17	143	50	112	69	51	33	73	95	70	74
Natural STS Taken for Brood Stock	151	158	92	99	237	129	93	86	107	100	86	110
Natural STS Spawned	31F	42F	25F	78	172	95	79	59	63	75	68	76
Hatchery STS Taken for Brood Stock	0	0	0	103	95	91	42	68	26	10	30	15
Hatchery STS Spawned	0	0	0	49	0	3	17	22	21	3	21	4
Natural Females Released above TMD	1436	1232			1193	875	642	602	863	689	550	716
Natural Males Released above TMD	708	702			814	290	210	187	321	220	224	308
Natural STS Released above TMD	2144	1934	1290	623	2007	1165	852	789	1184	909	774	1024
Hatchery Females Released above TMD	114	216			161	266	186	274	371	666	476	425
Hatchery Males Released above TMD	46	137			154	190	66	281	312	692	327	236
Hatchery STS Released above TMD	160	353	102	234	315	456	252	555	683	1358	803	661
Natural STS Harvested above TMD-CTUIR						5	5	5	0	0	5	5
Hatchery STS Harvested above TMD-CTUIR						25	20	20	39	33	33	39
Natural STS Harvested above TMD-ODFW								0	0	0	0	0
Hatchery STS Harvested above TMD-ODFW						22	5	21	25	24	12	47
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548	713
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221	306
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769	1019
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454	382
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305	193
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759	575
Total STS Available for Spawning	2304	2287	1392	857	2322	1569	1074	1298	1803	2210	1528	1594
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002	1095
STS Redds Observed in Index Reaches	138	77	H W.	H W	135	H W.	64	74	119	138	126	218
Total STS Redds Observed	275	128	H W.	H W	300	H W.	224	126	150	149	217	270
Index Reaches Miles Surveyed	18.5	20	H W.	H W	21.4	H W.	21.4	21.4	21.4	21.4	21.4	21.4
Redds Per Mile in Index Reaches	7.5	3.9	H W.	H W	6.3	H W.	3.0	3.5	5.6	6.4	5.9	10.2
Total Miles Surveyed in Umatilla River	61.0	50.2	H W.	H W	67.2	H W.	65.8	35.0	34.4	24.6	38.0	35.0
Redds Per Mile in all Areas	4.5	2.5	H W.	H W	4.5	H W.	3.4	3.6	4.4	6.1	5.7	7.7

Harvest not determined and not subtracted from estimates of spawners, 1988-1982. H. W. = high water.
Assumes that harvest steelhead were 50% females and 50% males. No adjustments made for hook and release mortality.
Index reaches are in Squaw, NF Meacham, Buckaroo, Camp, and Boston Canyon Creeks and the SF Umatilla River.

/b These fish were transferred to Bonifer in November as subyearlings and were released the following spring as yearlings.

Table 6. Age summary of natural summer steelhead from the Umatilla River.

Return Year		Age 1.1	Age 1.2	Age 2.1	Age 2.2	Age 2.3	Age 3.1	Age 3.2	Age 4.1	Total
1994	n=	0	2	24	26	0	5	6	0	63
	%=	0	3.2	38.1	41.3	0	7.9	9.5	0	100
1995	n=	0	0	19	17	0	9	11	0	56
	%	0	0	33.9	30.4	0	16.1	19.6	0	100
1996	n=	0	0	28	8	0	7	1	0	44
	%	0	0	63.6	18.2	0	15.9	2.3	0	100
1997	n=	0	0	19	17	0	5	10	0	51
	%	0	0	37.3	33.3	0	9.8	19.6	0	100
1998	n=	1	1	33	11	1	4	0	1	52
	%	1.9	1.9	63.5	21.2	1.9	7.7	0	1.9	100

Juvenile years of freshwater growth from scales of adult steelhead returning to the Umatilla River.

Return Year		Age 1	Age 2	Age 3	Age 4	Total
1994	n=	2	50	11	0	63
	%=	3.2	79.4	17.4	0	100
1995	n=	0	36	20	0	56
	%	0	64.3	35.7	0	100
1996	n=	0	36	8	0	44
	%	0	81.8	18.2	0	100
1997	n=	0	37	15	0	51
	%	0	70.6	29.4	0	100
1998	n=	2	45	4	1	52
	%	3.8	86.5	7.7	1.9	99.9

Table 7. Life History table of steelhead

Mouth of the Umatilla to the mouth of McKay Creek (RM 0-50.5)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding												
Spawning												
Incubation												
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x	x		

Mouth of McKay Creek to the mouth of Meacham Creek (RM 50.5-79) and mid-basin streams

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Mouth of Meacham Creek to the forks (RM 79-89 and headwater streams)

Life History Stage	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.
Adult Migration	x	x	x	x	x	x	x	x				
Prespawning Holding					x	x	x	x				
Spawning						x	x	x				
Incubation						x	x	x	x			
Rearing	x	x	x	x	x	x	x	x	x	x	x	x
Juvenile Migration	x	x	x	x	x	x	x	x	x			

Table 8. The Number and Percent of Steelhead (STS) Available to Spawn Naturally that were of Hatchery Origin; Umatilla River, 1988-1999.

BROOD YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Natural Female STS Available to Spawn	1436	1232			1193	872	639	599	863	689	548
Natural Male STS Available to Spawn	708	702			814	288	208	185	321	220	221
Natural STS Available to Spawn	2144	1934	1290	623	2007	1160	847	784	1184	909	769
Hatchery Female STS Available to Spawn	114	216			161	242	173	253	339	637	454
Hatchery Male STS Available to Spawn	46	137			154	167	54	261	280	664	305
Hatchery STS Available to Spawn	160	353	102	234	315	409	227	514	619	1301	759
Total Female STS Available to Spawn	1550	1448			1354	1114	812	852	1202	1326	1002
Percent Spawners of Hatchery Origin	6.9	15.4	7.3	27.3	13.6	26.1	21.1	39.6	34.3	58.9	49.7
Percent Females Spawners of Hatchery Origin	7.4	14.9			11.9	21.7	21.3	29.7	28.2	48.0	45.3

Harvest not estimated 1988-1992. 1993-1999, Harvest estimate subtracted from total, assumes harvest of 50% females and 50% males

No adjustments made for catch and release mortality.

Table 9. Descriptive statistics for the steelhead fishery in the Umatilla River, run years 1993-94 through 1998-99. Catch statistics were based on creel surveys conducted in the lower river (Umatilla mouth to Three Mile Falls Dam) and upper river (Barnhart Bluffs to lower boundary of the CTUIR).

		Run year						
Statistic[a]	Fish origin[b] or creel area	93-94	94-95	95-96	96-97	97-98	98-99	Mean
Run size	WSTS	945	875	1296	1014	862	1133	1021
	HSTS	359	696	819	1529	994	739	856
Run composition (%)	WSTS	72	56	61	40	46	61	56
	HSTS	28	44	39	60	54	39	44
Catch composition (%)	WSTS	59	67	70	59	62	65	64
	HSTS	41	33	30	41	38	35	36
Number caught	WSTS	37	172	161	168	239	250	171
	HSTS	26	85	69	115	146	132	96
Percent of run caught	WSTS	3.9	19.6	12.4	16.6	27.7	22.1	17.1
	HSTS	7.2	12.2	8.4	7.5	14.7	17.9	11.3
Percent of run harvested	HSTS	5.3	8.7	7.3	5.9	10.4	13.7	8.6
Composition of lower river catch (%)	WSTS	49	67	64	59	49	50	56
	HSTS	51	33	36	41	51	50	44
Composition of upper river catch (%)	WSTS	71	66	75	60	78	75	71
	HSTS	29	34	25	40	22	25	29
Location of WSTS catch (%)	Lower Rr.	46	70	44	71	44	30	51
	Upper Rr.	54	30	56	29	56	70	49
Location of HSTS catch (%)	Lower Rr.	69	68	56	72	74	56	66
	Upper Rr.	31	32	44	28	26	44	34
Percent of WSTS run caught	Lower Rr.	1.8	13.7	5.4	11.9	12.2	6.6	8.6
	Upper Rr.	2.1	5.9	7.0	4.7	15.5	15.4	8.4
Percent of HSTS run caught	Lower Rr.	5.0	8.3	4.7	5.4	10.9	10.0	7.4
	Upper Rr.	2.2	3.9	3.7	2.1	3.8	7.8	3.9
Percent of HSTS run harvested	Lower Rr.	3.9	5.7	4.2	4.3	9.2	7.3	5.8
	Upper Rr.	1.4	3.0	3.1	1.6	1.2	6.4	2.8

[a] *Hatchery steelhead run = number counted at Three Mile Falls Dam plus harvest below Three Mile Falls Dam; Wild steelhead run = number counted at Three Mile Falls Dam.*

[b] *WSTS = wild steelhead; HSTS = hatchery steelhead; Lower Rr. = lower river creel area; Upper Rr. = upper river creel area.*

Table 10. Umatilla River summer steelhead broodstock collection

Run Year	Number Collected								
	Marked			Unmarked			Total		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
82-83	0	0	0	unk	unk	161	unk	unk	161
83-84	0	0	0	20	32	52	20	32	52
84-85	0	0	0	25	79	104	25	79	104
85-86	0	0	0	11	58	69	11	58	69
86-87	0	0	0	57	91	148	57	91	148
87-88	0	0	0	73	78	151	73	78	151
88-89	0	0	0	72	88	160	72	88	160
89-90	0	0	0	49	57	106	49	57	106
90-91	47	56	103	46	53	99	93	109	202
91-92	49	46	95	109	116	225	109	116	225
92-93	1	2	3	64	61	125	65	63	128
93-94	18	25	43	47	45	92	65	70	135
94-95	35	33	68	38	48	86	73	81	154
95-96	16	12	28	56	49	105	72	61	133
96-97	12	1	13	48	49	97	60	50	110
97-98	19	11	30	42	44	86	61	55	116
98-99	17	0	17	52	59	111	69	59	128