INTEGRATED HATCHERY OPERATIONS TEAM

OPERATION PLANS FOR ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN
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Acronyms or Abbreviations Used in this Report

BPA: Bonneville Power Administration
cfs: Cubic feet per second.
CHF: Fall Chinook
CHS: Spring Chinook
CHR: Summer Chinook
CIS: Coordinated Information System
COH: Coho
CRITFC: Columbia River Inter-Tribal Fish Commission
ESA: Endangered Species Act
FERC: Federal Energy Regulatory Commission
IDFG: Idaho Department of Fish and Game
IHOT: Integrated Hatchery Operations Team
NMFS: National Marine Fisheries Service
ODFW: Oregon Department of Fish and Wildlife
PAC: Production Advisory Committee
PNFHPC: Pacific Northwest Fish Health Protection Committee
PP&L: Pacific Power and Light
PUD: Public Utility District
StS: Summer Steelhead
St W: Winter Steelhead
SOC: Sockeye
TAC: Technical Advisory Committee
USFWS: U.S. Fish and Wildlife Service
WDF: Washington Department of Fisheries
W D W: Washington Department of Wildlife

Hatchery Management Overview

Virtually all fishery resources of the Columbia River Basin are affected by water resource development initiatives. Mitigation is an action taken to lessen or reduce impacts of projects on fishery resources. The Washington Department of Wildlife's (WDW) mitigation goal has been one that replaces in-kind or substitutes fishery resources of equal value for those impacted. WDW mitigation efforts have focused on providing hatchery-reared fish of the proper strains needed to compensate for loss of naturally produced stocks. Stewardship of these resources is based on existing WDW policies.

WDW policies are written statements designed to resolve a recurring management need or problem. They do not include program goals or organization statements. The existing policies which affect fish hatchery operations are detailed below.

Hatcheries

Policy	Beaver Creek	Cowlitz	Chelan	Eastbank	Lyons Ferry	Merwin	Ringold	Skamania	Vancouver	Wells
POL 5101[1]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
POL 5102[2]	No	Yes	No	No	Yes	No	No	No	No	Yes
POL 5103[3]	No	Yes	No	No	Yes	No	No	No	No	Yes
POL 5104[4]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
POL 5105[5]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MOE[6]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[1] POL 5101- Hatchery Releases to Produce Harvestable Steelhead.
[2] POL5102 - Hatchery Releases to Increase Wild Spawning Escapements.
[3] POL5103 - Hatchery Releases to Utilize Unused or Underseeded Rearing Habitat.
[4] POL5104 - Steelhead Marking, Tagging and Branding.
[5] POL 5105- Steelhead Enhancement Coordination.
[6] Memorandum of Endorsement of the Salmon Disease Control Policy of the Fisheries Co-Managers Of Washington State.

Beaver Creek Hatchery/Gobar Pond

INTRODUCTION

Beaver Creek Hatchery is located on the Elochoman River about 10 miles upstream from the river mouth. The Elochoman River is a north bank tributary of the lower Columbia River, just downstream of Cathlamet, Washington.

The facility consists of 10 intermediate raceways, 20 raceways, 1 earthen rearing pond, 2 adult holding ponds, and a hatchery building with 60 troughs. It is staffed with 4.3 FTE's.

Water rights total 16,013 gpm from three sources: Elochoman River, Beaver Creek and a well. Beaver Creek water is gravity flow while the other two sources are pumped. The Elochoman River is used in summer and fall while Beaver Creek water is used from mid-November through mid-May. Filtered well water is used to incubate eggs and for early rearing of fry. Water use in summer is about 5,800 gpm.

Gobar Pond, a 0.93-acre earthen rearing pond located on Gobar Creek (Kalama River tributary), is operated as a satellite facility.

PURPOSE

Beaver Creek Hatchery was authorized under the Mitchell Act and began operating in 1957 as part of the Columbia River Fisheries Development Program-a program to mitigate for fishery losses caused by hydroelectric system development in the Columbia River Basin. The facility is currently used for adult collection, egg incubation and rearing of winter steelhead and sea-run cutthroat trout. It is also used for egg incubation and rearing of summer steelhead (adult collection and spawning occurs at Skamania Hatchery). The National Marine Fisheries Service funds the hatchery operation and maintenance.

Gobar Pond was constructed by Weyerhauser Corporation and began operation in 1975. The pond is used to rear and acclimate summer and winter steelhead pre-smelts prior to smelt release.

GOALS

Produce adult winter steelhead, summer steelhead and sea-run cutthroat for harvest by sport anglers while providing adequate escapement for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead
Produce 260,000 smelts for on-station and off-station release.

Summer Steelhead
Produce 230,000 smelts for on-station and off-station release.

Sea-run Cutthroat
Produce 50,000 smelts for on-station and off-station release.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and differential spawning time from wild fish (winter steelhead).

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

The intent of the adult collection procedures at Beaver Creek Hatchery is to collect enough adults to maintain the hatchery production program.

Winter Steelhead: Entry of adult hatchery fish into the subbasin occurs from mid-November through February, with a peak in December. Adults are captured and spawned at the hatchery.

Summer Steelhead: Summer steelhead are not indigenous to the Elochoman River but were first planted in 1982. Hatchery summer steelhead enter the subbasin from May through August. Broodstock are not captured on the Elochoman; eggs are obtained from Skamania Hatchery on the Washougal River.

Sea-run Cutthroat Adults enter the subbasin from July through October and are captured at the hatchery from October through January.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum

benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Beaver Creek Hatchery/Gobar Pond

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Winter Steelhead: Rear 260,000 fish to a size of 4-8 fish / pound and volitionally release approximately 30 percent on-station between April 15 and May 15. The remaining smelts are released off-station at the following sites:

Kalama River	25,000
Grays River	15,000
Abernathy Creek	15,000
German Creek	15,000
Coweema Creek	15,000
Skamokawa Creek	15,000

In addition, 60,000 pre-smelts are transported to Gobar Pond in February for volitional release between April 15 and May 15. All winter steelhead are marked prior to release.

Summer Steelhead: Rear 230,000 fish to a size of 48 fish / pound and release approximately 10 percent on-station between April 15 and May 15. Remaining smelts are released off-station at the following sites.

East Fork Lewis River	20,000
Kalama River	35,000
North Fork Toutle River	35,000
South Fork Toutle River	35,000
Green River	15,000

Approximately 60,000 pre-smelts are transported to Gobar Pond in February and volitionally released between April 15 and May 15. All summer steelhead are marked prior to release.

Sea-run Cutthroat: Rear 50,000 smelts to a size of 3-5 fish/pound and release 60 percent on-station between April 15 and May 15. The remaining smelts are released off-station at the following sites:

Mill Creek	**5,000**
Abernathy Creek	**5,000**
German Creek	**5,000**
Coweema Creek	**5,000**

All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adult hatchery winter steelhead fish are collected and spawned from December through February. Early spawning fish have historically been selected for hatchery broodstock so that spawning time of returning hatchery fish precedes wild fish. All hatchery spawning is completed by February 1, while most wild fish spawn in April and May.

Sea-run cutthroat broodstock have also been selected for early spawning fish, which inhibits returning hatchery fish from crossbreeding with wild fish. However, in years of low returns, nearly all fish are spawned.

No summer steelhead adults are collected on the Elochoman.

Spawning Protocol

The intent is to utilize a spawning population of at least 200 adults. Fish are usually spawned at a 21 male to female ratio. Most egg-takes are used in hatchery production.

Acceptable Stocks

Importing eggs from other facilities with acceptable stocks is occasionally done when insufficient number of eggs are available at Beaver Creek Hatchery. Eggs from adults returning to the hatchery are always given priority for on-station use. However, if inadequate numbers are available, other lower Columbia River hatchery stocks such as the Cowlitz and Kalama have been used.

Objective 4: **Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.**

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

- Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

- A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Beaver Creek Hatchery

Health Monitoring

- At spawning, a minimum of 60 ovarian fluids, 60 milts and 60 kidney/spleens are examined for viral pathogens from each fish lot.

- Prior to transfer or release, fish are given a health exam.

- Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

- Reporting and control of selected fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor (100 ppm for 60 minutes) as a bacterial and viral disinfectant.

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

- Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

- Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

- Tank trucks are disinfected between the hauling of adult and juvenile fish.

- Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

- *Total* Suspended *Solids (TSS)*—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

- in-hatchery *Water* Temperatures-daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor

regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS—BEAVER CREEK HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	W. Steelhead	1/.200	*854*	414-1,234	1
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	450	681	493-929	
Adult Prespawning Survival	W. Steelhead	95%	97.7%	97.5-97.9%	
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	95%	98.0%	97.5-98.9%	
Egg-take	W. Steelhead	1,000,000	753,839	342K-1,341K	1
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	200,000	163,106	95K-204K	
Green Egg-to-Fry Survival	W. Steelhead	72%	85.9%	73.1-94.8%	
	S. Steelhead	72%	92.2%	72.8-99.9%	
	SR Cutthroat	72%	70.9%	50.2-87.1%	*2*
Fry-to-Smelt Survival	W. Steelhead	83%	81.1%	47.7-99.8%	*2*
	S. Steelhead	83%	89.5%	81.1-93.1%	
	SR Cutthroat	83%	73.4%	0-95.1 %	*2*
Fish Releases	W. Steelhead	360,000	310,529	137K-398K	*2*
	S. Steelhead	31 0,000	252,181	203K-312K	
	SR Cutthroat	80,000	78,665	55K-104K	*2*
Egg Transfers	W. Steelhead	0	--[1]	--[1]	
	S. Steelhead	0	--[1]	.-[1]	
	SR Cutthroat	0	--[1]	--[1]	
Fish Transfers	W. Steelhead	0	--[1]	--[1]	
	S. Steelhead	0	--[1]	--[1]	
	SR Cutthroat	0	--[1]	--[1]	
Adults Back to River	W. Steelhead	--	--	--	
	S. Steelhead	--	--	--	
	SR Cutthroat	--	--	--	
Percent Survival	W. Steelhead	--	3.2%	*1.8-5.8%*	
	S. Steelhead	--	2.7%	*1.5-3.7%*	
	SR Cutthroat	--	2.3%	*1.7-3.1%*	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	All	Yes	No	.-	3
Proper Release Size	All	Yes	Yes	--	
Proper Release Time	All	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	W. Steelhead	Yes	Yes	--	
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	Yes	Yes	--	
Spawning Pop. >200	W. Steelhead	Yes	Yes	--	
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	Yes	Yes	--	
Spawning Ratio Male: Female	W. Steelhead	2:1	1.21:1	0.89:1-1.39:1	
	S. Steelhead	NA	NA	NA	
	SR Cutthroat	2:1	0.93:1	0.77:1-1.07:1	
Acceptable Stocks	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective $

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/l	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constraints/Commen ts—Beaver Creek Hatchery/Gobar Pond

1. Scars on some returning adults indicate predation by seals in the Columbia River estuary.

2. Disease problems with IHN and Ich have limited production.

3. Physical features of the hatchery are not conduave to volitional release. Smelts from Gobar Pond are released volitionally.

Cowlitz Trout Hatchery

INTRODUCTION

The Cowlitz Trout Hatchery is located on the Cowlitz River about 42 miles above the mouth. The Cowlitz River is a north bank tributary of the lower Columbia River, just downstream of Longview, Washington. Site elevation is 157 feet above sea level. The facility is staffed with 6.7 FTE's.

The facility consists of 6 intermediate raceways, 24 raceways, four 5-acre rearing ponds, 3 adult holding raceways, and a hatchery building with 104 troughs.

Water rights total 30,855 gpm from three sources: two well sources and the Cowlitz River. The two well sources provide a combined flow of about 1,500 gpm while the river provides about 24,000 gpm, when production requires such. In 1991, an ozone water treatment system to treat about 10,000 gpm was installed at the hatchery to for control of *Ceratomyxa shasta*.

Currently, well water is used to incubate eggs and early rearing of fry. As fish and water needs increase, ozonated river water is used from June through mid-November on fingerlings. Thereafter, untreated river water is used until smelts are released.

PURPOSE

Cowlitz Hatchery began operation in 1967 as a mitigation facility for dams blocking the Cowlitz River. The facility is currently used for adult collection, egg incubation and rearing of winter steelhead, summer steelhead and sea-run cutthroat. Tacoma City Light funds the hatchery operation and maintenance.

GOALS

Produce adult winter steelhead, summer steelhead and sea-run cutthroat for sport fisheries while providing adequate escapement for hatchery production. The mitigation goal is to return 38,600 adult steelhead and sea-run cutthroat to the river. Washington Department of Wildlife determines the stock composition of hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead
Produce 660,000 smelts for on-station release.

Produce 75,000 fingerlings for upriver release.

Rovide 50,000 eyed eggs to co-op programs.

Summer Steelhead
Produce 400,000 smelts for on-station release.

Sea-Run Cutthroat
Produce 115,000 smelts for on-station release.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Revent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

The intent of the adult collection procedures at Cowlitz Hatchery is to collect enough adults to maintain the hatchery production program.

Winter Steelhead: Entry of adult hatchery fish into the subbasin occurs from mid-November through April with a peak in December and January. Adults are captured and spawned at the hatchery.

Summer Steelhead: Summer steelhead were introduced into the subbasin in 1967. Adults enter the subbasin from June through September. They are captured in summer and fall and spawned at the hatchery from December through February.

Sea-run Cutthroat Cutthroat enter the subbasin from July through October. Adults are captured at the hatchery from October through January.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overvie w

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release: The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Cowlitz Trout Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Winter Steelhead: Rear 660,000 smelts to a size of 4-8 fish / pound and volitionally release approximately 80 percent of the fish on-station between April 15 and May 15. The remaining fish are released upstream at the Barrier Dam on May 1. Approximately 75,000 fish are reared to a size of 50 fish / pound and released in up-river streams to establish runs in streams above Cowlitz Falls Darn. Eyed eggs are provided to the Friends of the Cowlitz sports group for enhancement projects. All fish are marked prior to release.

Summer Steelhead: Rear 400,000 smelts to a size of 48 fish / pound and volitionally release on-station between April 15 and May 15. All fish are marked prior to release.

Sea-run Cutthroat Rear 115,000 smelts to a size of 3.5-5 fish / pound and volitionally release on-station between April 15 and May 15. All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adult hatchery winter steelhead fish are collected and spawned from December through early May. Spawning time has historically been selected for early maturing fish (December/January), but in recent years spawning time has been distributed throughout the entire run.

Sea-run cutthroat broodstock have also been selected for early spawning fish, which inhibits returning hatchery fish from crossbreeding with wild fish. However, in years of low return, nearly all fish are spawned.

Summer steelhead adults are collected at the hatchery in summer and fall and spawned from December through February. Generally, early maturing fish are selected although eggs from later takes are also used. No correlation between arrival in the river and spawning time has been established.

Spawning Protocol

The intent is to utilize a spawning population of at least 200 adults and spawn at a 1:1 male to female ratio for all species. However, with sea-run cutthroat, difficulty in obtaining sperm has sometimes resulted in multiple males being used per female. Most eggtakes are used in hatchery production.

Acceptable Stocks

With the exception of the summer steelhead introduction in 1967, eggs from other sources are not imported to Cowlitz as sufficient Cowlitz broodstock have been available.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

Appropriate treatments are prescribed.

A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

Clinically healthy fish are examined to assess health status.

Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Cowlitz Hatchery

Health Monitoring

At spawning, a minimum of 60 ovarian fluids, 60 milts and 60 kidney/spleens are examined for viral pathogens from each fish lot.

Prior to transfer or release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

At spawning, eggs are water-hardened in iodophor (100 ppm for 60 minutes) as a bacterial and viral disinfectant.

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

- An ozone treatment plant has been installed to kill infectious stage of *Ceratomyxa shasta*. Early results have shown that this treatment significantly reduces mortality caused by this disease.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

Tank trucks are disinfected between the hauling of adult and juvenile fish.

Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended *Solids (TSS)*—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

Settleable Solids (SS)—1 to 2 times per week on effluent and influent samples.

- *In-hatchery Water Temperatures*—daily maximum and minimum readings.

Objective *6:* Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS—COWLITZ HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	W. Steelhead	NA	NA	NA	1
	S. Steelhead	1,000	1,395	707-2,281	1
	SR Cutthroat	5,000	1,500	383-2,947	1
Adult Prespawning Survival	W. Steelhead	--	96.5%	95,4-97.6%	
	S. Steelhead	--	86.1%	84.3-97.8%	
	SR Cutthroat	--	92.8%	91.2-95.3%	
Eggtake	W. Steelhead	1,800,000	1,933,649	1.6-2.1 million	
	S. Steelhead	700,000	710,541	0.57-1.1 million	
	SR Cutthroat	250,000	305,000	0.5-1.1 million	2
Green Egg-to-Fry Survival	W. Steelhead	72%	88.1'%	76-94%	
	S. Steelhead	72%	88.7%	85-92%	
	SR Cutthroat	72%	78.8%	66-89%	
Fry-to-Smelt Survival	W. Steelhead	83%	*42.5%*	36-55%	2,3
	S. Steelhead	83%	*29.2%*	13-45%	2,3
	SR Cutthroat	83%	*37.8%*	3-83%	2,3
Fish Releases	W. Steelhead	735,000	822,071	524K-1,179K	
	S. Steelhead	400,000	255,949	82K-451K	
	SR Cutthroat	115,000	76,888	10K-11OK	
Egg Transfers	W. Steelhead	50,000	--[1]	--[1]	
	S. Steelhead	0	--[1]	--[1]	
	SR Cutthroat	0	.-[1]	--[1]	
Fish Transfers	W. Steelhead	0	--[1]	--[1]	
	S. Steelhead	0	--[1]	--[1]	
	SR Cutthroat	0	--[1]	..-[1]	
Adults Back to River	W. Steelhead	--	--	--	1
	S. Steelhead	NA	NA	NA	1
	SR Cutthroat	--	--	--	1
Percent Survival	W. Steelhead	4.0%	2.66%	1.41-4.06%	
	S. Steelhead	4.0'%	5.64%	3.52-7.93%	
	SR Cutthroat	11.5%	9.38%	4.30-14.34%	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	All	No	No	--	
Proper Release Size	All	Yes	Yes	--	
Proper Release Time	All	Yes	Yes	--	

Objective ?

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	
Spawning Pop. >200	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	
Spawning Ratio Male: Female	W. Steelhead	1:1	1.26:1	1.04:1-1.82:1	
	S. Steelhead	1:1	1.04:1	0.62:1-1.58:1	
	SR Cutthroat	1:1	1.23:1	1.13:1-1.371	
Acceptable Stocks	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent	All	5 X @	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constraints/Comments—Cowlitz Hatchery

1. Only a portion of the winter steelhead are retained for spawning. Fish are recycled back to the river and many fish enter the trap repeatedly. In addition, summer steelhead, winter steelhead and sea-run cutthroat are live-spawned and returned to the river.

2. Fry-to-smelt survival and number of eggs taken have been altered since the 1991 completion of the ozone water treatment system.

3. Fry-to-smelt survival reduced because of bird predation.

Chelan PUD Hatchery/Turtle Rock

INTRODUCTION

Chelan PUD Hatchery is located on the Columbia River above Rocky Reach Dam near Chelan Falls, Washington. Site elevation is 750 feet above sea level. The hatchery is located adjacent to WDW's Chelan Trout Hatchery. These two facilities are operated as a complex by the same staff. The Chelan complex is staffed with 4.5 FTE's.

Facility rearing units include 2 portable vinyl raceways, 16 standard raceways, 8 intermediate raceways, 1 adult holding raceway and a hatchery building with 80 troughs. The Turtle Rock rearing facility, located on an island in the Columbia River near Wenatchee, Washington, is operated as satellite.

Water rights total 14,812 gpm from three sources: a well field, the Columbia River and springs. Columbia River water is no longer used due to concern over IHN contamination. Spring water averages about 500 gpm and is the surplus left over from the state trout hatchery program and local orchard needs. Average total water use is about 3,000 gpm, of which 2,500 gpm is well water (50-57°F). About 4,980 gpm is pumped from the Columbia River at the Turtle Rock facility.

PURPOSE

Chelan PUD Hatchery began operation in 1965 as a mitigation facility for Rocky Reach Dam. Chelan PUD owns the hatchery and funds its operation and maintenance. Washington Department of Wildlife operates the facility. The facility is used for egg incubation and early rearing of summer steelhead. Fish are transferred to the Turtle Rock facility for final rearing and release. Chelan PUD Hatchery is also used for rearing resident trout and kokanee.

GOALS

Produce summer steelhead, resident trout and kokanee to compensate for lost fish production and recreational and tribal fishing opportunities caused by construction and operation of the Rocky Reach and Chelan hydroelectric projects.

OBJECTIVES

Objective 1: Hatchery Reduction

Summer Steelhead
Produce 200,000 smelts for off-station release from the Turtle Rock rearing facility.

Trout
Produce 200,000 legal-sized rainbow trout for a variety of off-station releases (paid by reimbursable funds).

Produce 1,070,000 fish of various size and species (paid with state funds).

Kokanee
Reduce 2,000,000 fry for release into Lake Chelan.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4 Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Only practices associated with anadromous fish production are summarized in this portion of the report.

Objective 1: Hatchery Production

Adult Collection

Adult steelhead are not captured at Chelan PUD Hatchery. Eggs from mid-Columbia steelhead stock are collected and incubated to the eyed stage at Wells Hatchery (located 12 miles upstream) and then transferred to the Chelan PUD Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overvie w

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release: Smelts are released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Chelan PUD Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Summer Steelhead: Rear 200,000 summer steelhead smelts to a size of 4-8 fish/pound at the Turtle Rock rearing facility and release into the Entiat River (40,000) and Wenatchee River (160,000) from April 15 to May 15.

Objective *3:* Maintain stock integrity and genetic diversity.

Broodstock Selection

No adults are collected at this facility (see Wells Hatchery Plan).

Spawning Protocol

Summer steelhead are not spawned at this facility (see Wells Hatchery Plan).

Acceptable Stocks

Eggs are imported from Wells Hatchery so that regional genetic integrity can be maintained.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

- Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

- A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Clinically healthy fish are examined to assess health status.

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Chelan PUD Hatchery

Health Monitoring

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

- Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

- Tank trucks are disinfected between the hauling of adult and juvenile fish.

- Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

- *in-hatchery Water Temperatures*—daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the *U.S.* v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-CHELAN PUD HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Green Egg-to-Fry Survival	S. Steelhead	90%	94.5%	89.9-97.6%	
Fry-to-Smelt Survival	S. Steelhead	90%	92.6%	89.4-93.5%	
Fish Releases	S. Steelhead	200,000	217,300	167-245K	
Egg Transfers	S. Steelhead	0	--[1]	--[1]	
Fish Transfers	S. Steelhead	0	--[1]	--[1]	
Adults Back to River	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	--	Unknown	unknown	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	No	No	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	NA	NA	NA	
Spawning Pop. >200	S. Steelhead	NA	NA	NA	
Spawning Ratio Male: Female	S. Steelhead	NA	NA	NA	
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Eastbank Hatchery

INTRODUCTION

Eastbank Hatchery is located on the east side of the Columbia River near Rocky Reach Dam, 7 miles north of Wenatchee, Washington. The hatchery is staffed with 2 FTE's.

The facility is shared cooperatively with Washington Department of Fisheries. The WDW portion of the hatchery consists of one raceway, two 1/2-acre rearing ponds, and a hatchery building with six fiberglass troughs. Eastbank Hatchery uses well water and the WDW portion of the hatchery uses up to 10 cfs.

PURPOSE

Eastbank Hatchery began operation in 1989 as mitigation for lost steelhead production caused by Rock Island Dam. It is funded by the Chelan County PUD. The facility is used for egg incubation and rearing of summer steelhead.

GOALS

Produce adult summer steelhead to replace lost steelhead production caused by the construction and operation of Rock Island Hydroelectric Project.

OBJECTIVES

Objective 1: Hatchery Production

Produce 200,000 summer steelhead smelts for off-station release.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of. genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

No adult steelhead are collected at Eastbank Hatchery. Eggs are shipped in from Wells Hatchery.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Eastbank Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Summer Steelhead: Summer steelhead is the only fish stock reared at this hatchery. The current strategy is to rear 200,000 fish to a size of 48 fish/pound and release in the Wenatchee and Entiat rivers from April 15 to May 15.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

No adults are collected at this facility (see Wells Hatchery Plan).

Spawning Protocol

No steelhead are spawned at this facility (see Wells Hatchery Plan).

Acceptable Stocks

Eggs are obtained from steelhead returning to Wells Hatchery, an upper Columbia River facility. This egg source is thought to be appropriate for adult steelhead returning to the upper Columbia River.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

- Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

- A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Eastbank Hatchery

Health Monitoring

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

  Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

  Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

In-hatchery Water Temperatures—daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the *U.S.* v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals, This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-EASTBANK HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Green Egg-to-Fry Survival	S. Steelhead	90%	91.4%	82.6-98.8%	
Fry-to-Smelt Survival	S. Steelhead	90%	90.1%	81.0-99.2'%	
Fish Releases	S. Steelhead	200,000	186,143	167K-200K	
Egg Transfers	S. Steelhead	0	--[1]	--[1]	
Fish Transfers	S. Steelhead	0	--[1]	--[1]	
Adults Back to River	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	--	unknown	unknown	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	No	No	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	NA	NA	NA	
Spawning Pop. >200	S. Steelhead	NA	NA	NA	
Spawning Ratio Male: Female	S. Steelhead	NA	NA	NA	
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objecti e 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/l	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constrain ts/Comments—Eastbank Hatchery

1. Inability to cool water during the early rearing period results in a wide range of smelt sizes at release and a high percentage (up to 20 percent) of precocious males.

Lyons Ferry Hatchery

INTRODUCTION

Lyons Ferry Hatchery is located on the Snake River above Lower Monumental Dam near Starbuck, Washington. Site elevation is 526 feet above sea level. A separate hatchery operated by Washington Department of Fisheries is also located at this site. The WDW hatchery is staffed with 6.5 FTE's.

Rearing facilities at Lyons Ferry Hatchery include 19 raceways, 3 earthen rearing ponds, adult holding ponds, and a hatchery building with 60 troughs. Water rights total 53,200 gpm from wells, which includes 27,000 gpm for Washington Department of Fisheries. A constant 22,100 gpm is available for use at the WDW hatchery.

Four satellite facilities are operated as part of the Lyons Ferry Hatchery complex: Tucannon Hatchery, Curl Lake Rearing Pond, Cottonwood Rearing Pond and Dayton Rearing Pond.

Tucannon Hatchery is located on the Tucannon River, 2 miles east of Dayton, Washington. This hatchery rears resident rainbow trout.

Cottonwood Rearing Pond is located at river mile 28 on the Grande Ronde River. This 1.25-acre pond was constructed in 1984. Water rights total 2,693 gpm from Cottonwood Creek and ranges from 2,693 gpm in March to 1,795 gpm in May.

Curl Lake Rearing Pond is located on the Tucannon River. This 2.8-acre pond was constructed in 1984. Water rights total 2,693 gpm from the Tucannon River, but up to 4,488 gpm have been used.

Dayton Rearing Pond is located on the Touchet River (Walla Walla River tributary) in Dayton, Washington. This 0.8-acre pond began operation 1987. Water rights total 2,693 gpm from the Touchet River, which is the amount used.

PURPOSE

Lyons Ferry Hatchery was built by the U.S. Army Corps of Engineers in 1982 as part of the Lower Snake River Compensation Program-a program to mitigate for fishery losses caused by the four dams constructed on the lower Snake River. The USFWS provides operating funds to the hatchery, while WDW operates the facility. Lyons Ferry is used for rearing rainbow trout and for adult collection, egg incubation and rearing of summer steelhead. The satellite facilities are used to acclimate pre-smelts to the parent river water for several weeks prior to their release.

GOALS

Summer Steelhead: Produce fish for sport and tribal fisheries while providing adequate escapement for hatchery production.

Rainbow Trout: Produce fish for sport fisheries.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Produce 875,000 summer steelhead smelts for on-station release and for release from satellite facilities.

Rainbow Trout
Produce 253,000 legal-sized fish and 200,000 sub-legal fish for release into numerous lakes, ponds and streams.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Only practices associated with anadromous fish production are summarized in this portion of the report.

Objective 1: Hatchery Production

Adult Collection

The intent of the adult collection procedures at Lyons Ferry Hatchery is to collect enough adults to maintain the hatchery production program. Hatchery steelhead enter the hatchery trap from August through mid-December with a peak in late September. Fish are spawned from late January through mid-March with over 90 percent of the spawning completed by early March.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release: The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also

benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies-Lyons Ferry Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Summer Steelhead: The current strategy is to rear 70,000 summer steelhead smelts to a size of 48 fish/pound and release on-station between April 15 and May 15. The remaining fish are released off-station at the following sites:

Tucannon River	80,000
Walla Walla River	200,000
Mill Creek	30,000
Wildcat Creek	50,000

In addition, satellite facilities are used to acclimate smelts for a period of two months prior to release. The fish releases from these acclimation sites are as follows:

Curl Lake Rearing Pond	120,000
Dayton Pond	150,000
Cottonwood Pond	175,000

All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adult summer steelhead are collected from August through mid-November and spawned between February and early March. Two and sometimes three stocks are used-Lyons Ferry, Wallowa and Oxbow. Lyons Ferry broodstock is collected at the hatchery while Wallowa is collected on the Grande Ronde. Oxbow fish originate from the Touchet/Walla Walla system. Progeny from the above are returned to the system of origin.

Spawning Protocol

The intent is to utilize a spawning population of at least 200 adults and spawn fish at a 1:1 male to female ratio. Most eggtakes are used in hatchery production.

Acceptable Stocks

Importing eggs from other facilities with acceptable stocks is occasionally done in emergencies when disease epizootics occur. Other stocks used include Pahsimeroy and Wells. Although these latter stocks are less desirable than Lyons Ferry and Wallowa, they are upper Columbia River and Snake River stocks.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

- Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

- A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Lyons Ferry Hatchery

Health Monitoring

At spawning, a minimum of 60 ovarian fluids, 60 milts and 60 kidney/spleens are examined for viral pathogens from each fish lot.

- Prior to transfer or release, fish are given a health exam.

- Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

- Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor (100 ppm for 60 minutes) as a bacterial and viral disinfectant.

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

- Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

- Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

Tank trucks are disinfected between the hauling of adult and juvenile fish.

Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to *2* times per month on composite effluent, maximum effluent and influent samples.

Settleable Solids (SS)—1 to *2* times per week on effluent and influent samples.

In-hatchery Water Temperatures-daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor

regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-LYONS FERRY HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	2,000	2,107	1,081-2S27	
Adult Prespawning Survival	S. Steelhead	--	89.9%	84-96%	
Egg-take	S. Steelhead	2,400,000	1389/500	1.3-1.5 million	
Green Egg-to-Fry Survival	S. Steelhead	90%	75.3%	57.4-87.8%	1
Fry-to-Smelt Survival	S. Steelhead	90%	91.8%	86.5-95.1%	2
Fish Releases	S. Steelhead	875,000	837,782	61 OK-97OK	
Egg Transfers	S. Steelhead	0	--[1]	--[1]	
Fish Transfers	S. Steelhead	0	--[1]	--[1]	
Adults Back to River	S. Steelhead	--	978	500-1,400	
Percent Survival	S. Steelhead	--	0.5%	0.05-1 .03%	3

NA=Not applicable.
[1] Not estimated for this report.

Ob ec ve 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	Yes	Yes	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes		

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	Yes	Yes	.-	
Spawning Pop. >200	S. Steelhead	Yes	Yes	.-	
Spawning Ratio Male: Female	S. Steelhead	1:1	2.1:1	2.03:1-2.18:1	4
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constraints/Comments—Lyons Ferry Hatchery

1. The IHN virus is sometimes found in the broodstock, resulting in the destruction of eggs.

2. The IHN virus is sometimes found in fingerlings, resulting in the destruction of fish. This makes the fingerling-to-smolt survival difficult to estimate.

3. The percent survival estimate does not include naturally spawning fish.

4. Many males produce inadequate sperm so additional males are used.

Merwin Dam Hatchery

INTRODUCTION

Merwin Dam Hatchery is located on the North Fork Lewis River downstream of Merwin Darn near Ariel, Washington. The proposed staffing level is 4.0 FTE's.

The facility, as designed, will consist of 10 standard raceways, 4 adult holding ponds, 4 rearing ponds and 2 smelt ponds for volitional outmigration. The hatchery building with contain 4 fry troughs, 6 intermediate raceways and 30 eight-tray-stack vertical flow incubators.

The water supply will be from Lake Merwin "using a 5,000 gpm pump station provided on the dam face. Two intakes will be used at depths of 15 and 110 feet. The intake to be used will be based on the time of year and temperature needs of the hatchery. Water entering the adult holding ponds, incubators, fry troughs and intermediate raceways will be disinfected with an ozone system. In addition, ozone disinfection of all water to the fingerling raceways and rearing ponds will be available from June 1 through the end of December.

PURPOSE

Merwin Dam Hatchery will begin operation in September 1993. It was constructed by PacificCorp to mitigate for losses of resident and anadromous trout resulting from construction and operation of the Merwin Project on the North Fork Lewis River. The facility will be used for rearing resident and anadromous trout. Steelhead and sea-run cutthroat will primarily be released in the Lewis River. Rainbow trout will be used for lake management programs. PacificCorp will fund the hatchery operation and maintenance.

GOALS

Produce winter and summer steelhead and sea-run cutthroat and rainbow trout for harvest by sport anglers while providing adequate escapement for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead
Produce 100,000 smelts for release in the Lewis River.

Summer Steelhead
Produce 150,000 smelts for release in the Lewis River.

Sea-Run Cutthroat
Produce 25,000 smelts for release in the Lewis River.

Rainbow Trout
Produce 1,000,000 fingerlings for release into area lakes.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4 Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

PLANNED PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the proposed hatchery practices to be used at this facility. Only practices associated with anadromous fish production are summarized in this portion of the report.

Objective 1: Hatchery Production

Adult Collection

Adult steelhead and sea-run cutthroat trout broodstock will be collected at Merwin Dam, Merwin Hatchery and at the Lewis River Salmon Hatchery located 4 miles downstream. Fish will be held at Merwin Hatchery for spawning.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release: Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the

stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Merwin Hatchery

The specific fish rearing and release strategies to be used at this hatchery are detailed below.

Winter Steelhead; Rear 100,000 smelts to a size of 6 fish/pound and release in the Lewis River between April 15 and May 15.

Summer Steelhead; Rear 150,000 smelts to a size of 6 fish/pound and release in the Lewis River between April 15 and May 15.

Sea-Run Cutthroat; Rear 25,000 smelts to a size of 4 fish/pound and release in the Lewis River between April 15 and May 15.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adults will be collected at Merwin Dam, Merwin Hatchery and Lewis River Hatchery throughout the duration of the run. Fish will be held at Merwin Hatchery for spawning.

Adult hatchery winter steelhead will be collected and spawned from December through February. Early spawning fish will be selected for hatchery broodstock so that spawning time of returning hatchery fish precedes wild fish. Approximately 80 percent of the winter steelhead spawning will be completed by February 1, while a majority of wild fish spawn in April and May.

Sea-run cutthroat broodstock will also be selected for early spawning fish, which will inhibit returning hatchery fish from crossbreeding with wild fish. However, in years of low return, nearly all fish will be spawned.

Summer steelhead adults will be collected at the WDF hatchery trap and the fish trap located in Merwin Darn.

Spawning Protocol

Each of the three anadromous stocks will be held in separate facilities at Merwin Hatchery. The intent is to utilize a spawning population of at least 200 adults. Eggs will be held in the smallest possible lots until they have tested negative for IHN and other diseases.

Acceptable Stocks

Steelhead and sea-run cutthroat trout eggs will be obtained from adults returning to the Lewis River at Merwin Dam, Merwin Hatchery and the Lewis River Salmon Hatchery. However, if adequate numbers of adults are not available, other lower Columbia River hatchery stocks of similar genetic lineage maybe used.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Merwin Hatchery

Under an agreement between WDW and the Washington Department of Fisheries, disease control measures will be developed to 1) reduce fish disease outbreaks at Merwin Hatchery, and 2) minimize the discharge of pathogens into the Lewis River above the Lewis River Salmon Hatchery. The control measures will include the following elements:

A year-round supply of disinfected water will be available to the hatchery by disinfecting incoming reservoir waters. The hatchery design will provide disinfected water for all fish from June through December, and for eggs and fry from November through May.

A system for treating all hatchery effluent water will be installed for use during an occurrence of an emergency or certifiable disease.

The water supply to the broodstock holding ponds and egg incubation system will be isolated, and the effluent from these facilities will be treated continuously.

Health Monitoring

- Prior to release, fish are given a health exam.

- Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

- Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (7'SS)-1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

- *In-hatchery Water Temperatures*—daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

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In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. *v. Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS—MERWIN HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	W. Steelhead	200	NA	NA	
	S. Steelhead	300	NA	NA	
	SR Cutthroat	200	NA	NA	
Adult Prespawning Survival	W. Steelhead	50%	NA	NA	
	S. Steelhead	50%	NA	NA	
	SR Cutthroat	50%	NA	NA	
Egg-take	W. Steelhead	165,000	NA	NA	
	S. Steelhead	250,000	NA	NA	
	SR Cutthroat	42,000	NA	NA	
Green Egg-to-Fry Survival	W. Steelhead	72%	NA	NA	
	S. Steelhead	72%	NA	NA	
	SR Cutthroat	72%	NA	NA	
Fry-to-Smelt Survival	W. Steelhead	83%	NA	NA	
	S. Steelhead	83%	NA	NA	
	SR Cutthroat	83%	NA	NA	
Fish Releases	W. Steelhead	100,000	NA	NA	
	S. Steelhead	150,000	NA	NA	
	SR Cutthroat	25,000	NA	NA	
Egg Transfers	W. Steelhead	0	NA	NA	
	S. Steelhead	0	NA	NA	
	SR Cutthroat	0	NA	NA	
Fish Transfers	W. Steelhead	0	NA	NA	
	S. Steelhead	0	NA	NA	
	SR Cutthroat	0	NA	NA	
Adults Back to River	W. Steelhead	--	NA	NA	
	S. Steelhead	--	NA	NA	
	SR Cutthroat	--	NA	NA	
Percent Survival	W. Steelhead	--	NA	NA	
	S. Steelhead	--	NA	NA	
	SR Cutthroat	--	NA	NA	

NA=Not applicable.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	All	Yes	NA	NA	
Proper Release Size	All	Yes	NA	NA	
Proper Release Time	All	Yes	NA	NA	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	W. Steelhead	Yes	NA	NA	
	S. Steelhead	Yes	NA	NA	
	SR Cutthroat	Yes	NA	NA	
Spawning Pop. >200	W. Steelhead	No	NA	NA	
	S. Steelhead	No	NA	NA	
	SR Cutthroat	No	NA	NA	
Spawning Ratio Male: Female	W. Steelhead	1:1	NA	NA	
	S. Steelhead	1:1	NA	NA	
	SR Cutthroat	1:1	NA	NA	
Acceptable Stocks	W. Steelhead	Yes	NA	NA	
	S. Steelhead	Yes	NA	NA	
	SR Cutthroat	Yes	NA	NA	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	constraints
Adhere to Disease Policy	W. Steelhead	Yes	NA	NA	
	S. Steelhead	Yes	NA	NA	
	SR Cutthroat	Yes	NA	NA	

Objec ve 5

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/l	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	NA	NA	
Develop and Review Equil. Brood Dec.	All	Yes	NA	NA	
Develop and Review Future Brood Dec.	All	Yes	NA	NA	
Develop and Review Current Brood Dec.	All	Yes	NA	NA	

Constrain ts/Comments—Merwin Hatchery

Constraints to reaching the hatchery goals will not be apparent until the hatchery is operated for at least five years.

Ringold Rearing Pond

INTRODUCTION

Ringold Rearing Pond is located on the east bank of the Columbia River about 20 miles north of Richland, Washington. Site elevation is 275 feet above sea level. The facility is staffed with 1.3 FTE's.

The facility consists of a 4.8-acre earthen rearing pond. Water rights, held jointly with Washington Department of Fisheries, total 26,929 gpm from springs. Average water use at the WDW facility is about 1,400 gpm.

PURPOSE

Ringold Rearing Pond was authorized under the Mitchell Act and began operating in 1962 as part of the Columbia River Fisheries Development Program-a program to mitigate for fishery losses caused by hydroelectric system development in the Columbia River Basin. This facility is currently used for rearing summer steelhead. Adult fish are not usually trapped or spawned at this facility. Fingerlings are normally transferred in from the state-funded Columbia Basin Hatchery. The National Marine Fisheries Service funds the hatchery operation and maintenance.

GOALS

Produce adult summer steelhead for sport and tribal fisheries.

OBJECTIVES

Objective 1: Hatchery Reduction

Produce 180,000 summer steelhead smelts for on-station release.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of. genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Revent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

No adult collection occurs at this facility. Fingerlings are transferred in from Wells Hatchery and reared until their release in the spring.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Over view

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Ringold Rearing Pond

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Summer Steelhead: Rear 180,000 summer steelhead to a size of 4-8 fish/pound and volitionally release on-station into the Columbia River between April 15 and May 15. All fish are marked prior to release.

Objective *3:* Maintain stock integrity and genetic diversity.

Broodstock Selection

No adults are collected at this facility.

Spawning Protocol

No spawning occurs at this facility.

Acceptable Stocks

Skamania stock summer steelhead are reared and released at this facility. This stock is though to be appropriate for this section of the Columbia River. It is also believed that this stock provides more angler benefits than the Wells stock because of the fish age at maturity and return timing of adults.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Ringold Rearing Pond

Health Monitoring

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

  Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

Tank trucks are disinfected between the hauling of adult and juvenile fish.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

Settleable Solids (SS)—1 to 2 times per week on effluent and influent samples.

- *In-hatchery Water Temperatures*—daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-RINGOLD REARING POND

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Green Egg-to-Fry Survival	S. Steelhead	NA	NA	NA	
Fry-to-Smelt Survival	S. Steelhead	90%	89.1%	79-94%	
Fish Releases	S. Steelhead	180,000	193,371	172K-214K	
Egg Transfers	S. Steelhead	0	--[1]	--[1]	
Fish Transfers	S. Steelhead	0	.-[1]	--[1]	
Adults Back to River	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	--	unknown	unknown	

NA=Not applicable.
[1] Not estimated for this report.

Objec ve 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	Yes	Yes	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	NA	NA	NA	
Spawning Pop. >200	S. Steelhead	NA	NA	NA	
Spawning Ratio Male: Female	S. Steelhead	NA	NA	NA	
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective $

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constraints/Comments—Ringold Rearing Pond

1. Fry-to-smelt survival reduced because of bird predation.

Skamania Hatchery

INTRODUCTION

Skamania Hatchery is located on the North Fork Washougal River about 0.5 miles above the Washougal River. The Washougal River is a north bank tributary of the lower Columbia River, just downstream of Washougal, Washington. The hatchery is staffed with 5 FTE's.

The facility consists of 10 intermediate raceways, 32 raceways, 3 adult holding ponds, and a hatchery building with 80 troughs.

Water rights total 11,670 gpm from two sources: North Fork Washougal River and Vogel Creek. The Washougal River provides most water used. Actual water use averages 9,800 gpm and ranges from 6,650 to 11,460 gpm. Vogel Creek water is used for incubation and early rearing, while Washougal River water is used thereafter until spring release.

PURPOSE

Skamania Hatchery was authorized under the Mitchell Act and began operating in 1956 as part of the Columbia River Fisheries Development Program-a program to mitigate for fishery losses caused by hydroelectric system development in the Columbia River Basin. The facility is used for adult collection, egg incubation and rearing of winter steelhead, summer steelhead and sea-run cutthroat. The National Marine Fisheries Service funds the hatchery operation and maintenance.

GOALS

Produce adult winter steelhead, summer steelhead and sea-run cutthroat for harvest by sport anglers while providing adequate escapement for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead
Produce 375,000 smelts for on-station and off-station releases.

Provide 400,000 eyed eggs to Vancouver Hatchery.

Summer Steelhead
Produce 320,000 smelts for on-station and off-station release.

Provide 400,000 eyed eggs to Beaver Creek Hatchery, 400,000 eyed eggs to Vancouver Hatchery, and 300,000 eyed eggs to Ringold Hatchery.

Sea-Run Cutthroat
Produce 50,000 sea-run cutthroat smelts for on-station and off-station release.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and differential spawning time from wild fish (winter steelhead).

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

The intent of the adult collection procedures at Skamania Hatchery is to collect enough adults to maintain the hatchery production program.

Winter Steelhead: Entry of adult hatchery fish into the subbasin occurs from mid-November through February, with a peak in December. Adults are captured and spawned at the hatchery.

Summer Steelhead: Adult hatchery fish enter the subbasin from April through September with a peak in June/July. Adults are captured and spawned at the hatchery.

Sea-run Cutthroat Cutthroat enter the subbasin from July through October. Adults are captured at the hatchery from October through January.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overvie w

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release: Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Skamania Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Winter Steelhead: Rear 375,000 smelts to a size of 4-8 fish/pound and release approximately 60 percent of the fish on-station between April 15 and May 15. The remaining smelts are released off-station at the following sites:

East Fork Lewis River (Lewisville Park)	55,000
East Fork Lewis River (Daybreak Park)	50,000
North Fork Lewis River	25,000
Salmon Creek	16,000
Hamilton Creek	5,000
Merwin Dam (net pens)	45,000
Northwestern Lake (net pens)	50,000

All fish are marked prior to release.

Summer Steelhead: Rear 320,000 smelts to a size of 48 fish/pound and release approximately 75 percent on-station between April 15 and May 15. The remaining smelts are released off-station at the following sites:

East Fork Lewis River (Lewisville Park)	30,000
East Fork Lewis River (Daybreak Park)	10,000
North Fork Lewis River	85,000
White Salmon River	31,000
Klickitat River	66,000
Merwin Dam (net pens)	20,000

All fish are marked prior to release.

Sea-run Cutthroat: Rear 50,000 smelts to a size of 3-5 fish/pound and release 80 percent on-station between April 15 and May 15. Remaining smelts are released off-station at the following sites:

North Fork Lewis River	1,500
Hamilton Creek	2,500
Salmon Creek	5,000

All fish are marked prior to release.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adult hatchery winter steelhead are collected and spawned from December through February. Early spawning fish have historically been selected for hatchery broodstock so that spawning time of returning hatchery fish precedes wild fish. Nearly all hatchery spawning is completed by March 1, while most wild fish spawn in April and May.

Sea-run cutthroat broodstock have also been selected for early spawning fish, which inhibits returning hatchery fish from crossbreeding with wild fish. However, in years of low returns, nearly all fish are spawned.

Summer steelhead are collected from April through fall and spawned from December through February. Most spawning (an average of 92 percent) is completed by February 1.

Spawning Protocol

The intent is to utilize a spawning population of at least 200 adults and spawn fish at a 1:1 male to female ratio. However, difficulty in obtaining sea-run cutthroat sperm has sometimes resulted in using two males per female. Most egg-takes are used in hatchery production.

Acceptable Stocks

Importing eggs from other facilities with acceptable stocks is occasionally done when insufficient number of eggs are available at Skarnania Hatchery. Eggs from adults returning to the hatchery are always given priority for on-station use. The sea-run cutthroat stock was started with Cowlitz eggs in the 1980s.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

Appropriate treatments are prescribed.

A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Skamania Hatchery

Health Monitoring

At spawning, a minimum of 60 ovarian fluids, 60 milts and 60 kidney/spleens are examined for viral pathogens from each fish lot.

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

At spawning, eggs are water-hardened in iodophor (100 ppm for 60 minutes) as a bacterial and viral disinfectant.

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

- Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

Tank trucks are disinfected between the hauling of adult and juvenile fish.

Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

- *In-hatchery Water Temperatures*—daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisorv Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest techniaans. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatcherv Operations Team (IHOT): This group is comprised of representatives from fish management agenaes and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agenaes, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-SKAMANIA HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	W. Steelhead	600	559	*392-662*	1
	S. Steelhead	1,500	3,473	*1,671-8,244*	
	SR Cutthroat	400	428	*193-841*	
Adult Prespawning Survival	W. Steelhead	--	100%	100%	
	S. Steelhead	--	100%	100%	
	SR Cutthroat	--	94.6%	87.8-98.5%	
Egg-take	W. Steelhead	500,000	515,870	211 K-978K	
	S. Steelhead	*2,000,000*	2,365,337	1.7-2.6 million	
	SR Cutthroat	*75,000*	75,199	14K-142K	
Green Egg-to-Fry Survival	W. Steelhead	90%	83.1%	27.6-96.7%	*2*
	S. Steelhead	90%	85.2%	69.1-96.6%	*2*
	SR Cutthroat	90%	94.8%	89.9-98.2%	*2*
Fry-to-Smelt Survival	W. Steelhead	90%	92.0%	53.9-98.2%	*2*
	S. Steelhead	90%	94.6%	78.9-99.2%	*2*
	SR Cutthroat	90%	75.0%	15.1-97.8%	*2*
Fish Releases	W. Steelhead	375,000	241,000	119K-345K	*2*
	S. Steelhead	320,000	286,936	176K-360K	*2*
	SR Cutthroat	50,000	37,346	30K-44K	*2*
Egg Transfers	W. Steelhead	400,000	--[1]	--[1]	
	S. Steelhead	1,1 00,000	--[1]	--[1]	
	SR Cutthroat	0	--[1]	--[1]	
Fish Transfers	W. Steelhead	0	--[1]	--[1]	
	S. Steelhead	*300,000*	--[1]	--[1]	
	SR Cutthroat	0	--[1]	--[1]	
Adults Back to River	W. Steelhead	--	0	0	
	S. Steelhead	--	1,318	0-2,556	
	SR Cutthroat	--	0	0	
Percent Survival	W. Steelhead	--	3.5%	1.9-5.7%	
	S. Steelhead	--	2.6%	2.0-3.3%	
	SR Cutthroat	--	1.4%	0.5-2.7%	

NA=Not applicable.
[1] Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	" Constraints
Volitional Release	All	No	No	.-	3
Proper Release Size	All	Yes	Yes	--	
Proper Release Time	All	Yes	Yes	--	

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	
Spawning Pop. >200	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	
Spawning Ratio Male: Female	W. Steelhead	1:1	2.171	1.261-3.36:1	
	S. Steelhead	1:1	0.77:1	0.51:1-0.871	
	SR Cutthroat	1:1	1.36:1	0.95:1-2.17:1	1
Acceptable Stocks	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	constraints
Adhere to Disease Policy	W. Steelhead	Yes	Yes	--	
	S. Steelhead	Yes	Yes	--	
	SR Cutthroat	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Doc.	All	Yes	No	--	

Constrain ts/Comments—Skamania Hatchery

1. At certain river flows, an impassable barrier limits adult upstream migration to the hatchery.

2. Some fish have had to be destroyed because of IHN virus.

3. Facility design precludes volitional release.

Vancouver Hatchery

INTRODUCTION

Vancouver Hatchery is located along the lower Columbia River near Vancouver, Washington. Site elevation is 100 feet above sea level. The hatchery is staffed with 3 FTE's.

The facility consists of 4 raceways, 12 circular raceways, 3 earthen rearing ponds, and a hatchery building with % troughs. Water rights total 3,927 gpm from one well and several springs.

PURPOSE

Vancouver Hatchery began operation in the 1930s to produce steelhead and resident trout for sport and tribal fisheries. Steelhead eggs are transferred in from Beaver Creek and Skarnania hatcheries. After hatching, most fish are transferred back to these facilities as fry or fingerlings. One rearing pond at Vancouver Hatchery is used to rear steelhead smelts which are trucked for off-station releases. Vancouver Hatchery is also used for rearing resident trout and channel catfish.

GOALS

Produce adult summer steelhead for harvest by sport and tribal anglers.

OBJECTIVES

Objective 1: Hatchery Production

Winter Steelhead
Produce 120,000 fry for transfer to Skamania Hatchery (eggs obtained from Skamania Hatchery).

Summer Steelhead
Produce 110,000 smelts for off-station release.

Reduce 200,000 fingerlings for transfer to Skamania Hatchery (eggs received from Skamania Hatchery).

Rainbow Trout
Produce 600,000 fingerlings for release into Swift Reservoir.

Brown Trout
Produce 40,000 legal-sized fish for release into Kress, Lacamas and Ice House lakes.

Channel Catfish
Produce 7,000 fingerlings for release into local lakes.

Objective 2 Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Only practices associated with anadromous fish production are summarized in this portion of the report.

Objective 1: Hatchery Production

Adult Collection

No adult steelhead are collected at this facility. Eggs are transferred in from Skarnania and Beaver Creek hatcheries.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release: Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release: The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Vancouver Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Winter Steelhead: Incubate 200,000 eyed eggs from Skamania Hatchery and return 120,000 fry back to Skamania Hatchery.

Summer Steelhead: Rear 110,000 summer steelhead to a size of 4-8 fish/pound and release off-station between April 15 and May 15 at the following sites:

Wind River	25,000
North Fork Lewis River	25,000
East Fork Lewis River	25,000
Klickitat River	35,000

All fish are acclimated prior to release.

In addition, eggs from Skamania Hatchery are incubated and hatched at Vancouver Hatchery. Approximately 200,000 fingerlings are then returned to Skamania Hatchery.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

No adult collection occurs at Vancouver Hatchery.

Spawning Protocol

No spawning occurs at Vancouver Hatchery.

Acceptable Stocks

Skamania stock summer steelhead are reared at this facility. This stock is thought to be appropriate for the off-station releases in this area of the Columbia River.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs-All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its facilities to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

- **Necropsies** of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

- A disease control policy is used to determine how specific disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Vancouver Hatchery

Health Monitoring

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

- Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

  Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

  Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

  Tank trucks are disinfected between the hauling of adult and juvenile fish.

- Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

> *Total Suspended Solids (TSS)*—1 to 2 times per month on composite effluent, maximum effluent and influent samples.
>
> *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.
>
> *In-hatchery Water Temperatures-daily* maximum and minimum readings.

Objective 6: Communicate effectively with other steel head producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agenaes and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the *U.S.* v. Oregon Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-VANCOUVER HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	S. Steelhead	NA	NA	NA	
Adult Prespawning Survival	S. Steelhead	NA	NA	NA	
Egg-take	S. Steelhead	NA	NA	NA	
Green Egg-to-Fry Survival	S. Steelhead	90%	93.9%	88.1-99.1%	
Fry-to-Smelt Survival	S. Steelhead	90%	88.4%	80.6-99.8%	
Fish Releases	S. Steelhead	11 0,000	127,000	116K-140K	1
Egg Transfers	S. Steelhead	0	.-[1]	--[1]	
Fish Transfers	S. Steelhead	0	--[1]	--[1]	
Adults Back to River	S. Steelhead	NA	NA	NA	
Percent Survival	S. Steelhead	--	unknown	unhewn	

NA=Not applicable,
[1]Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	No	--	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	NA	NA	NA	
Spawning Pop. >200	S. Steelhead	NA	NA	NA	
Spawning Ratio Male: Female	S. Steelhead	NA	NA	NA	
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 X @	NA	NA	
Settleable Solids	All	0.1 ml/1	NA	NA	
In-hatchery Water Temperatures	All	50°-56°F	NA	NA	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	constraints
Check Hatchery Records for Accuracy and Completeness	All	Yes	Yes	--	
Develop and Review Equil. Brood Dec.	All	Yes	No	--	
Develop and Review Future Brood Dec.	All	Yes	No	--	
Develop and Review Current Brood Dec.	All	Yes	No	--	

Constraints/Comments— Vancouver Hatchery

1. Available water supply is decreasing due to extensive development of houses and industry in the vicinity of the hatchery.

Wells Hatchery

INTRODUCTION

Wells Hatchery is located along the upper Columbia River near Wells Dam. Site elevation is 750 feet above sea level. This facility is shared with Washington Department of Fisheries. The WDW facility is staffed with 4 FTE's.

Facility rearing units include a 5-acre pond (which was subsequently divided into 4 ponds of various sizes), 10 raceways, and a hatchery building with 40 troughs.

Water for the facility is supplied from 13 wells (13,000 gpm) and the Columbia River (10,722 gpm gravity flow), both shared with the Washington Department of Fisheries. Well water is used to rear eggs and fry through the summer and Columbia River water is used from November until spring release.

PURPOSE

Wells Hatchery is owned and funded by Douglas County PUD and operated by WDW. It was constructed in 1967 as mitigation for fishery losses caused by the construction and operation of Wells Dam. It is used for adult collection, egg incubation and rearing of summer steelhead and chinook. It is also used for rearing rainbow trout. Only the steelhead and rainbow trout production is addressed in this report (chinook production is managed by the Washington Department of Fisheries).

GOALS

Produce adult summer steelhead for sport and tribal fisheries while providing adequate escapement for hatchery production.

OBJECTIVES

Objective 1: Hatchery Production

Summer Steelhead
Produce 450,000 smelts for off-station release.

Rainbow Trout
Produce 30,000 rainbow trout for release in local lakes.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Objective 3: Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 5: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 6: Communicate effectively with other steelhead producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Only practices associated with anadromous fish production are summarized in this portion of the report.

Objective 1: Hatchery Production

Adult Collection

The intent of the adult collection procedures at Wells Hatchery is to collect enough adults to maintain the hatchery production program. Hatchery summer steelhead enter the hatchery from August through November. About 10 percent of the adults retained for broodstock are wild fish. Fish are spawned in January and early February.

Objective 2: Minimize interactions with other fish populations through proper rearing and release strategies.

Rearing and Release Strategies—Overview

Interactions between hatchery fish and other fish populations can have a negative effect on both total production from a watershed (through competition with naturally produced fish) and genetic integrity of wild fish (through crossbreeding). Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release can all play a role in minimizing these interactions.

Size at Release: One important strategy for minimizing interactions is to ensure that all fish are released so they will promptly migrate from the subbasin. To accomplish this, fish should be released at a size and condition factor to indicate a smelt condition. For steelhead, a release size of 4.0-8.0 fish per pound with a condition factor of less than 1.0 is considered appropriate. For cutthroat, the release size should be between 3.5 and 5 fish/pound with a condition factor of less than 1.0.

Time of Release Smelts should be released between April 15 and May 15, the time period that research has indicated that optimum returns be expected.

Acclimation: Acclimating smelts to the parent stream water prior to their release can help reduce straying when they return as adults as well as increase survival to adulthood. Acclimation periods from 4 to 6 weeks are required to get maximum benefits from this technique. Current investigations are underway to more closely define these requirements.

Volitional Release The use of volitional release ensures that only actively migrating fish are released from the hatchery pond. The removal of the migrating fish also benefits the remaining population by allowing them more time to feed, reducing the

stress on the remaining population by reducing loadings, and may decrease the likelihood of disease occurrence during final rearing.

Marking Programs: All hatchery smelts stocked in systems where they will co-mingle as adults with an underescaped wild run are marked with an adipose clip to allow for selective fishery regulations.

Rearing and Release Strategies—Wells Hatchery

The specific fish rearing and release strategies currently used at this hatchery are detailed below.

Summer Steelhead: Rear 450,000 summer steelhead smelts to a size of 4-8 fish/pound and release off-station into the Okanogan, Methow, Similkameen, Twist and Chiwawa rivers between April 15 and May 15. Fish numbers released into these rivers vary from year to year.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adult steelhead retained for broodstock are selected by proportional return time (e.g., 20 percent August fish, 30 percent September fish, etc.). To accelerate spawning time, adult fish are held under lighted conditions and reared on warmer well water. Steelhead are spawned at the hatchery from January through early February. In comparison, wild fish spawn in May. An average of 7.5 percent of the females spawned are wild fish.

Spawning Protocol

The intent is to utilize a spawning population of at least 200 adults. Most eggtakes are used in hatchery production. Approximately 3 to 4 males are spawned with 5 females.

Acceptable Stocks

Only eggs from hatchery and wild summer steelhead adults returning to Wells Dam are used for hatchery production. This helps retain the genetic integrity of upper Columbia River steelhead. Approximately 10 percent of the fish spawned are wild fish.

Objective 4: Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Fish Health Management Programs—All Stocks

The primary objective of fish health management programs at WDW hatcheries is to produce healthy smelts that will survive well and contribute to the sport fishery. The fish health programs also seek to prevent the introduction, amplification or spread of certain fish pathogens detrimental to hatchery or wild fish.

WDW has implemented both disease control and disease prevention programs at all of its **facilities** to try and achieve these objectives. The standard elements of these programs are outlined below.

Disease Control

Necropsies of diseased and dead fish are conducted to diagnose the cause of loss.

- Appropriate treatments are prescribed.

A disease control policy is used to determine how **specific** disease problems will be addressed and what restrictions maybe placed on movements of diseased stocks.

Disease Prevention

- Disease preventative strategies have been implemented, including the use of quality feeds and rearing fish in environmental conditions appropriate to avoid disease events. In addition, antibiotics maybe used prophylactically to avoid disease problems.

- A disease prevention policy has been implemented which restricts the introduction of stocks into a facility which may result in the introduction of a new pathogen.

- Sanitation procedures are used which prevent introduction of pathogens into or within a facility.

- Applied research is conducted on new and existing disease prevention techniques.

Fish Health Activities at Wells Hatchery

Health Monitoring

At spawning, a minimum of 60 ovarian fluids, 60 milts and all kidney/spleens are examined for viral pathogens. This protocol was adopted because of the previous presence of IPN virus. This virus has only been isolated from adult summer steelhead.

Prior to release, fish are given a health exam.

Whenever abnormal behavior or mortality is observed, the fish health specialist examines the affected fish, makes a diagnosis and recommends the appropriate treatment.

Reporting and control of selected fish pathogens are done in accordance with the Co-Managers Fish Disease Control Policy.

Fish and Egg Movements

- Fish and eggs are moved in accordance with the Co-Managers Fish Disease Control Policy.

Therapeutic and Prophylactic Treatments

At spawning, eggs are water-hardened in iodophor (100 ppm for 60 minutes) as a bacterial and viral disinfectant.

- Juvenile fish are administered antibiotics orally when needed to control bacterial infections.

Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs.

- Only therapeutants approved by the U.S. Food and Drug Administration are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy).

- All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots.

Different fish / egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water.

Tank trucks are disinfected between the hauling of adult and juvenile fish.

Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at WDW facilities to ensure that these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Washington Department of Ecology. Discharges from the cleaning treatment system are monitored as follows:

Total Suspended Solids (TSS)—1 to 2 times per month on composite effluent, maximum effluent and influent samples.

- *Settleable Solids (SS)*—1 to 2 times per week on effluent and influent samples.

In-hatchery Water Temperatures-daily maximum and minimum readings.

Objective 6: Communicate effectively with other steelhead producers and managers.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

Integrated Hatchery Operations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and is currently developing a series of regional hatchery policies.

Pacific Northwest Fish Health Protection Committee (PNFHPC): This group is comprised of representatives from U.S. and Canadian fish management agencies, tribes, universities, and private fish operations. The groups meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

In-River Agreements: State, federal and tribal representatives meet annually to set Columbia River harvests as part of the U.S. v. *Oregon* Agreement. Periodic meetings are also held throughout the year to assess if targets are being met.

Record Keeping

Records are kept in a consistent manner employing standard formats to allow for documentation and monitoring. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. It will be a system to access all necessary databases in the region. It is hoped that coordinated information collection and reporting will result in consistency between the various agencies.

Development and Review of Brood Documents

The three brood documents are reviewed and agreed to annually. The Equilibrium Brood Document for the Columbia River and/or major tributaries has not yet been developed. It would document existing baseline production and current management. The Future Brood Document is a detailed listing of annual production goals. This is reviewed and updated each spring, and is finalized by July. The Current Brood Document reflects actual production relative to the annual production goals. It is developed in the spring after eggs are taken. It is usually finalized by March.

PERFORMANCE STANDARDS-WELLS HATCHERY

Objective 1

Measures	Species	Hatchery Goal	S-Year Average	Range	Constraints
Adult Capture	S. Steelhead	**600**	**670**	603-735	
Adult Prespawning Survival	S. Steelhead	--	**98.3%**	97.1-99.7%	
Egg-take	**S. Steelhead**	**1,500,000**	**1,780,948**	**1.6-1.9 million**	
Green Egg-to-Fry Survival	**S. Steelhead**	**90%**	**84.8%**	**74.1-91.4%**	
Fry-to-Smelt Survival	**S. Steelhead**	**90%**	**98.0%**	**94.1-99.5%**	
Fish Releases	**S. Steelhead**	**600,000**	**690)362**	**652K-826K**	
Egg Transfers	**S. Steelhead**	**1,000,000**	--[1]	--[1]	
Fish Transfers	**S. Steelhead**	**0**	--[1]	--[1]	
Adults Back to River	**S. Steelhead**	**NA**	**NA**	**NA**	
Percent Survival	**S. Steelhead**	--	*unknown*	unknown	

NA=Not applicable.
[1]Not estimated for this report.

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Volitional Release	S. Steelhead	No	No	--	
Proper Release Size	S. Steelhead	Yes	Yes	--	
Proper Release Time	S. Steelhead	Yes	Yes	--	

Objective 3

M ures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	S. Steelhead	Yes	Yes	--	
Spawning Pop. >200	S. Steelhead	Yes	Yes		
Spawning Ratio Male:Female	StS (hatchery)	1:1.2	1:1.2	1:1.15-12.55	
	StS (wild)	1:1.2	1:1.33	1:1.04-1:1.57	
Acceptable Stocks	S. Steelhead	Yes	Yes	--	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	S. Steelhead	Yes	Yes	--	

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
TSS Effluent	All	5 mg/l	NA	NA	
Settleable Solids	**All**	**0.1 ml/l**	**NA**	**NA**	
In-hatchery Water Temperatures	**All**	**50°-56°F**	**NA**	**NA**	

Objective 6

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Check Hatchery Records for Accuracy and Completeness	**All**	**Yes**	**Yes**	--	
Develop and Review Equil. Brood Dec.	**All**	**Yes**	**No**	--	
Develop and Review Future Brood Dec.	**All**	**Yes**	**No**	--	
Develop and Review Current Brood Dec.	**All**	**Yes**	**No**	--	