U.S. Fish and Wildlife Service
Hatchery Operation Plans

Eagle Creek National Fish Hatchery

INTRODUCTION

Eagle Creek NFH is located 40 miles east of Portland, Oregon along Eagle Creek, a tributary of the Clackamas River. The hatchery is situated on about 25 acres of bottomland in a deep canyon. Site elevation is 950 feet above sea level.

The hatchery currently consists of 75 standard raceways divided into upper and lower sections, 1 adult holding pond and 10 starter tanks. The adult holding pond is used for rearing from March 15-May 20. A small hydropower plant has been constructed at the intake on Eagle Creek. Power can only be generated when flows exceed hatchery production requirements. Revenue is used to offset electrical costs.

Water rights total 116,730 gpm (260 cfs), almost all from Eagle Creek. A spring is used for egg incubation and a well for domestic water use. Approximately 67,325 gpm (150 cfs) of the water right is for power generation and is not used for fish culture. There is not enough water during low flow periods to provide the entire water right so power generation only occurs during high flows. Flow from Eagle Creek available for hatchery use ranges from 6,000 gpm to 25,146 gpm. All rearing units are supplied with serial re-use water. The hatchery is staffed with 8 FTE's.

Rearing Facilities at Eagle Creek National Fish Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Conetruction Material	Age	Condition	Comment
Brood pond	144	72	4	41,472	1	41,472	Concrete	39	Poor	Walls/bottom shifting
Lower raceway	60	6	2.5	1,600	39	62,400	Concrete	39	Good	
Upper raceway	80	6	2.5	1,600	36	57,600	Concrete	31	Good	Bottom sags
Heath incubators					43			26	Fair	Stacks/l 6 trays each
Starter tanks	16	3	2	96	10	960	Fiberglass	16	Good	

PURPOSE

Eagle Creek NFH was authorized under the Mitchell Act and currently operates as part of the Columbia River Fisheries Development Program-a program to provide for the conservation of Columbia River fishery resources. Facilities were first constructed in 1956 and expanded in 1964 and 1975. The hatchery is currently used for adult collection, egg incubation and rearing of coho and winter steelhead for on-

station release. It also produces coho salmon for use in Oregon's Youngs Bay Net Pen Program and for restoration goals on Tribal lands.

GOALS

Produce coho and winter steelhead to help compensate for fish losses in the Columbia River Basin caused by mainstem dams.

OBJECTIVES

Objective 1: Hatchery Production

Coho
Produce 1 million smolts for on-station release.

Produce 1 million smolts for transfer to net pens in Youngs Bay.

Produce 1 million fingerlings for transfer to the Yakama Indian Nation.

Winter Steelhead
Produce 200,000 smolts for on-station release.

Produce 20,000 yearlings for transfer to net pens at Oregon City.

Produce 70,000 fry for transfer to Clackamas Hatchery.

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 salmon producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Coho: Adults return to Eagle Creek from September to November. Fish returning directly to the hatchery holding pond are spawned in October and November.

Winter Steelhead: Adults return to Eagle Creek from November to April. Fish returning directly to the hatchery holding pond are spawned from December to mid-March.

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

Rearing and Release Strategies

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. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This will help reduce the retention time in the downstream migration. Rearing smolts on parent river water can help reduce straying when they return as adults as well as increase their survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond. The specific rearing and release strategies used at this hatchery are detailed below.

Coho: Rear 1 million fish to a yearling smolt size of 12 fish / pound and volitional release directly into Eagle Creek from March 15 to May 20. Rear 1 million fish to a yearling smolt size of 12 fish / pound and transfer to net pens in Youngs Bay. Rear 1 million fish to 100/pound for transfer to the Yakama Indian Reservation. There are no fry released directly from this station into Eagle Creek.

Winter Steelhead: Rear 200,000 fish to a yearling smolt size of 5 fish/pound for release directly into Eagle Creek in April. Transfer 14-month-old yearlings (20,000) to net pens in Oregon City. Transfer 70,000 fry at 200/pound in July to ODFW. There are no fry released directly from this station into Eagle Creek.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection-All Stocks

If more fish return to the hatchery than are needed for broodstock, excess fish are randomly selected and removed throughout the run. Carcasses of coho salmon are utilized by the Warm Springs and Yakama Indian Reservations. Steelhead trout are spawned live, tagged, transported and released into the lower Clackamas River. Some steelhead are sacrificed for disease analysis.

Spawning Protocol-All Stocks

Fish are randomly selected and spawned at a 1:1 male-to-female ratio. Jacks are spawned at 1% of the spawning population. When excess eggs are taken, a portion of eggs from each female is kept for on-station rearing. The remaining eggs are either destroyed or transferred for use in other programs where acceptable.

Acceptable Stocks

If numbers of returning broodstock are insufficient to meet the hatchery production goals, the coho production may be achieved using Sandy River, Klaskanine, Big Creek, Bonneville, Toutle River, or Willard stocks, in that order of preference. Steelhead production can be met using Clackamas River stock.

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 USFWS hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

The USFWS has Fish Health Policy and Implementation Guidelines as well as disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies to diagnose the cause of fish loss.
- Prescribe appropriate treatments and remedies to disease.
- Follow USFWS Fish Health Policy and Implementation Guidelines for restrictions on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs and environmental conditions in the hatchery rearing container based on historical disease events. It may also involve the prophylactic use of vaccines in order to prevent a disease problem.
- Follow USFWS Fish Health Policy and Implementation Guidelines on the introduction of stocks into a facility which may result in the introduction of a new disease condition or mortality.
- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index) to help optimize the quality of the aquatic environment and minimize fish stress which can induce infectious and noninfectious diseases. For example, the Density Index is used to estimate the maximum number of fish (of a given length) that can occupy a rearing unit based on the rearing unit's size. The Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Eagle Creek NFH

Health Monitoring

- On at least a monthly basis, both healthy and clinically diseased fish from each fish lot are given a health exam. This sample includes a minimum of 10 fish per month per lot.

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

- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit. This sample consists of a minimum of 60 fish per lot.

- Whenever abnormal behavior or mortality is observed, the fish health specialist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.

- Reporting and control of specific fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor as a disinfectant.

- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections.

- Formalin (37% formaldehyde) is dispensed into water for the control of fungus on eggs and the control of parasites on juvenile salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.

- Only therapeutants approved by the U.S. Food and Drug Administration or those under Investigative New Animal Drug permits are used for treatments.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor as per the USFWS Fish Health Policy.

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

- Different fish lots are physically distinct and kept in separate ponds or incubation units.

- Tank trucks or tagging trailers are disinfected when brought onto the station.

- Foot baths containing iodophor are strategically located on the hatchery grounds (i.e., entrance to hatchery building) to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Primarily, environmental monitoring is conducted at USFWS facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery:

- *Total Suspended Solids (TSS)*—Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.

- *Settleable Solids (SS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.

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

- *In-hatche y Dissolved Oxygen*—as required by steam flow or weather conditions.

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

Coordination/Communication within USFWS

The hatchery holds quarterly hatchery evaluation team meetings involving hatchery, management, and fish health staff. Cooperators and other interested parties are invited to hear reports on the accomplishments, review plans, and present management programs that might affect, or be affected by hatchery operations. The hatchery evaluation team produces broodyear reports to monitor our progress at meeting hatchery objectives. These meetings also serve as a forum to share technical information. Production goals are set by the hatchery evaluation team and coordinated with the co-managers through the Production Advisory Committee, with concurrence of the Regional office.

Interagency Coordination/Communication

The USFWS hatchery managers communicate through the regional "Fishery Resource Offices," and a basin-wide "Columbia River Fisheries Program Office" that participates in the following forums:

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 Ouerations 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

This station reports through the Columbia River Information System (CRIS) of the U.S. Fish and Wildlife Service. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development. The CIS development is being funded by Bonneville Power Administration. 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—EAGLE CREEK NATIONAL FISH HATCHERY

Objective 1

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adult Capture	COH	4,000	2,766	550-5,724	
	STW	500	797	251-I ,346	
Adult Prespawning Survival	COH	95%	95%	93-96%	
	STW	95%	94%	94-95%	
Egg-take	COH	3.6M	2.0M	0.5M-3.2M	
	STW	900K	1.2M	575K-2.1M	2
Green Egg-to-Fry Survival	COH	95%	95%	94-98%	
	STW	95%	95%	94-95%	
Fry-to-Smolt Survival	COH	90%	90%	89-91%	1
	STW	95%	93%	86-96%	
Fish Releases	COH	1 .OM	2.0M	1.8M-3.4M	
	STW	200K	200K	200K	
Egg Transfers	COH	0	--[1]	--[1]	
	STW	0	—[1]	—[1]	
Fish Transfers	COH	2.0M	—[1]		
	STW	90,000	—[1]	—[1]	
Adults Passed Upstream	COH	0	0	0	
	STW	0	0	0	
Percent Survival	COH	N/A	3.63%	0.20-I 2.21%	3
	STW	N/A	0.48%	0.18-0.77%	3

N/A=Not applicable.
[1] Not estimated for this report,

Objective 2

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Smolt Size at Release (fish/lb)	COH	12	4.6	10-15	
	STW	5	6.7	5.4-7.8	
Acclimation	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Volitional Release	COH	Yes	No	--	
	STW	Partial (60%)	No	--	

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Pop. >500	COH	Yes	Yes	--	
	STW	Yes	Yes	--	
Spawning Ratio Male:Female	COH	1:1	2:2	2:2	
	STW	1:1	2:2	2:2	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	COH	Yes	Yes	--	
	STW	Yes	Yes	--	

History of Reportable Pathogens-7990-1995

Species/Stock	Water Supply Inc.	Water Supply Rear.	Virus	BKD	Furunc./ ERM	Other/Comments
Eaale Creek Hatchery	G,SR	SR				
COH/Eagle Creek				+	Furunc. (adult)	CWD *C. shasta* (adult)
COH/Toutle River				+		CWD
COH/Sandy River						CWD from 1990
COH/Clackamas						CWD 1990 only
COH/Klaskanine				+		CWD 1993-95
COH/Kalama						CWD 1991
COH/Cascade-Bonneville						CWD 1994-95
COH/Oxbow					Furunc. (adult)	Not recent
COH/Big Creek						1991 Not recent
STW/Eagle Creek				+		
CHS/Eagle Creek				+	Furunc. (adult)	Until 1992

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the U.S. Fish and Wildlife Service.)

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Meet Requirements of NPDES Permit	All	Yes	Yes	–	

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 Doc.	All	Yes	No		--	4
Develop and Review Future Brood Doc.	All	Yes	Yes		--	
Develop and Review Current Brood Doc.	All	Yes	Yes		--	

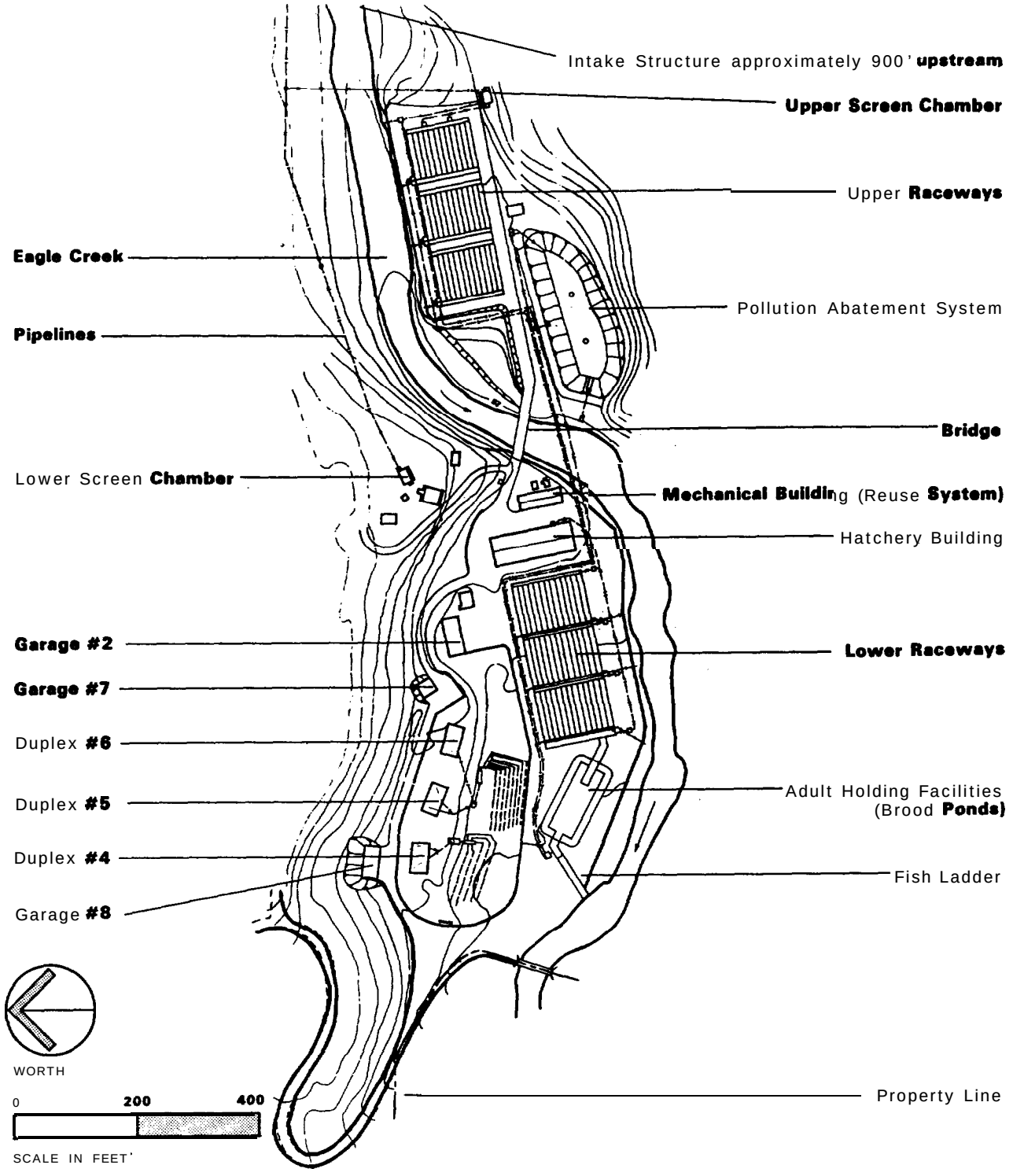
Constraints/Comments-Eagle Creek National Fish Hatchery

1. Poor water quality in some years has decreased fish survival.

2. The amount of incubation water and number of incubators prohibit individual incubation.

3. Tag data for coho salmon from 1980, 1981, 1988, 1989, 1990 broodyears.
   Tag data for winter steelhead trout from 1989 and 1990 broodyears.
   Survival is from juvenile release to total estimated recoveries in fishery and rack returns. Adult recoveries include return of all age classes.

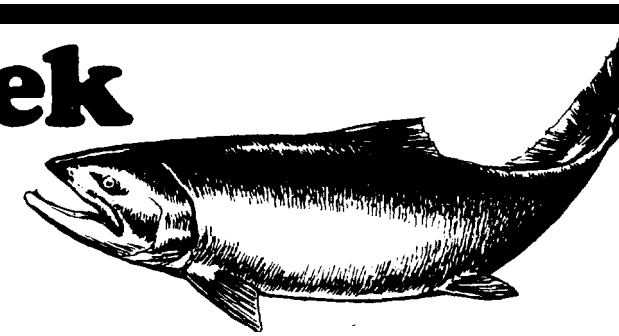
4. The Equilibrium Brood Document has not been completed at this time.



Eagle Creek

NATIONAL FISH HATCHERY
STATION DEVELOPMENT PLAN

EXISTING FACILITIES



REGION ONE U.S. FISH AND WILDLIFE SERVICE

Warm Springs National Fish Hatchery

INTRODUCTION

Warm Springs NFH is located on the north bank of the Warm Springs River, approximately 14 miles north of Warm Springs, Oregon. The hatchery site is leased by the federal government from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO). Site elevation is 1,525 feet above sea level.

Rearing units consist of 2 adult holding ponds, 3 adult catch ponds, 20 Burrows ponds, 20 converted Burrows ponds and 20 starter tanks. The facility is staffed with *6.0* FTE's.

All water rights on the Warm Springs River are the property of the CTWSRO. Nonconsumptive water use is included in the business lease between CTWSRO and the U.S. Fish and Wildlife Service (USFWS). The lease specifies use of approximately 100 cfs (44,883 gpm) from the Warm Springs River. Water is supplied by pumping from the Warm Spring River. Water use ranges from 9,000 gpm to 18,000 gpm. All rearing ponds are supplied with single-pass water. An advance engineering plan is being developed for a re-use/ ozone water supply/disinfection system.

Rearing Facilities at Warm Springs National Fish Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (cu ft)	Number Units	Total Volume (cu ft)	Construction Material	Age	Condition	Comment
Catch pond	28	8	3	672	3	2,016	Concrete	18	Good	1 additional pond occupied by a denil pass and tag detector
Brood pond	48	26	6	4,200	1	4,200	Concrete	15	Good	Oval shape, slanting sides
Brood pond	50	26	6	4,400	1	4,400	Concrete	15	Good	Oval shape, slanting sides
Burrows raceways	75	16	1.7	2,000	20	40,000	Concrete	25	Good	
Converted burrows	75	8	1.7	1,000	20	20,000	Concrete	25	Good	
Heath incubators					16			19	Good	16 stacks of 16 trays each
Starter tanks	13	3	2	78	20	1,560	Fiberglass	15	Good	

PURPOSE

Warm Springs NFH was authorized in 1966 and began operating in 1978. The Confederated Tribes of the Warm Springs Reservation of Oregon entered into an agreement with the U.S. Fish and Wildlife Service to stock the waters of the Warm Springs Indian Reservation with salmon and trout to increase fishing opportunities. The facility is used for adult collection, egg incubation and rearing of spring chinook salmon. The CTWSRO has the sole management responsibility for the fishery resources on the reservation.

GOALS

Produce spring chinook salmon that will contribute to the CTWSRO fishery while providing adequate escapement for hatchery production. The USFWS and CTWSRO have an agreement to assure that hatchery operations are compatible with the CTWSRO's fishery management goals.

OBJECTIVES

Objective 1: Hatchery Production

Produce 750,000 spring chinook smolts 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. 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 salmon producers and managers in the Columbia River Basin.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

Objective 1: Hatchery Production

Adult Collection

Adult spring chinook arrive at the hatchery from mid-April through September. Adults are captured at the hatchery weir. Since 1987, the trap and weir at the hatchery have been operated to allow only wild spring chinook upstream of the weir. Hatchery stock are retained at the hatchery for broodstock or distributed to CTWSRO. In addition, when 1,200 wild adult fish are expected to be passed upstream of the hatchery, a minimum of 70 wild fish are kept for incorporation into the hatchery broodstock. These actions are done to help promote the retention of wild genetic traits in the hatchery broodstock and ensure the genetic integrity of wild fish by allowing sufficient escapement upstream of the hatchery.

In 1995 a passage system was installed to detect coded-wire tagged hatchery fish. Whenoperational, hatchery fish will be shunted into the holding pond. Non-tagged (wild) fish will be monitored by video technology and then directed to the fish ladder to continue their upstream migration. Our goal is to reduce the handling of wild fish, obtain a 95% detection efficiency of tagged fish, and reduce the prespawning mortality observed in the stream.

Typically, only spring chinook endemic to the Warm Springs River are used for broodstock. The only other stock intentionally brought into the hatchery have been eggs and fish from Round Butte State Fish Hatchery located at river mile 100 on the Deschutes River. The Round Butte stock was also derived from spring chinook endemic to the Deschutes River.

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

Rearing and Release Strategies

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. For example, one important strategy for minimizing interactions is to rear fish to sufficient size so that smoltification occurs within nearly the entire population. This

will help reduce the retention time in the downstream migration. Rearing smolts on parent river water can help reduce straying when they return as adults as well as increase their survival to adulthood. The use of volitional release can help ensure that only actively migrating fish are released from the hatchery pond. The specific rearing and release strategies used at this hatchery are detailed below.

Spring Chinook: The, operation plan calls for a total production target of 750,000 spring chinook smolts. Approximately 10 percent of the fish are reared to a yearling size of 12 fish / pound and volitional released in the fall. The remaining fish are released the following spring as 1+ age smolts. All juvenile fish released from the hatchery are marked (coded-wire tagged and adipose fin clipped) to differentiate them from wild fish upon return.

The effect of releases of juveniles from the hatchery on wild fish needs to be closely examined, especially in regards to the fall release program. Our goal is to release functional smolts that emigrate quickly downstream. The fall release program is scheduled to continue, but on a limited scale. Studies being pursued to understand the fate of fall migrants include differential marking, downstream monitoring, and scale analysis projects.

In addition, as budget allows, the hatchery plans on constructing shade structures over the rearing ponds. These structures will diffuse the direct sunlight on the ponds simulating the natural environment as seen in the forested headwater stream sections.

Objective 3: Maintain stock integrity and genetic diversity.

Broodstock Selection

Adults for the hatchery program are collected throughout the entire run to ensure that the run timing for this stock is maintained. When at least 1,200 wild fish are expected to be passed upstream of the hatchery, approximately 10 percent of the broodstock will be of wild fish origin. This practice will help promote the retention of wild genetic traits in the hatchery broodstock and ensure sufficient escapement of wild fish upstream of the hatchery.

Spawning Protocol

The intent is to utilize a spawning population of at least 700 adults and use a 1:1 male-to-female spawning ratio. When numbers of returning males are low, the male-to-female spawning ratio will be 1:2. When less than 500 broodstock are available, in order to increase effective population size, the number of eggs taken from each female is divided in two and fertilized with gametes from unique males. Fish that are 60 centimeters or longer will be considered adults. A minimum of 2 percent of

the broodstock will be fish less than 60 centimeters in length and approximately 10 percent of the broodstock will be wild fish.

Acceptable Stocks

Only spring chinook indigenous to the Warm Springs River are used for broodstock. During low return years to the hatchery, surplus Round Butte stock will be considered for transfer to Warm Springs hatchery. Round Butte stock will be spawned and reared separate from Warm Springs stock.

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 USFWS hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

The USFWS has Fish Health Policy and Implementation Guidelines as well as disease prevention programs at all of its facilities to try and achieve these objectives. These programs include the following standard elements:

Disease Control

- Perform necropsies to diagnose the cause of fish loss.
- Prescribe appropriate treatments and remedies to disease.
- Follow USFWS Fish Health Policy and Implementation Guidelines for restrictions on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely perform necropsies of clinically healthy fish to assess health status and detect problems before they progress to clinical disease or mortality.
- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs

and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the prophylactic use of vaccines in order to prevent a disease problem.

- Follow USFWS Fish Health Policy and Implementation Guidelines on the introduction of stocks into a facility which may result in the introduction of a new disease condition or mortality.

- Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.

- Conduct applied research on new and existing disease prevention techniques.

- Utilize pond management strategies (e.g., Density Index and Flow Index) to help optimize the quality of the aquatic environment and minimize fish stress which can amplify pathogens resulting in disease outbreaks. Note: the Density Index is used to estimate the maximum number of fish (of a given length) that can occupy a rearing unit based on the rearing unit's size. The Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

- An advance engineering plan is being developed to improve the water quality for rearing spring chinook juveniles.

Fish Health Activities at Warm Springs NFH

Health Monitoring

- On at least a monthly basis, both healthy and clinically diseased fish from each fish lot are given a health exam. The sample includes a minimum of 10 fish per lot per month.

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

- Prior to transfer or release, fish are given a health exam. This exam may be in conjunction with the routine monthly visit. This sample consists of a minimum of 60 fish per lot.

- Whenever abnormal behavior or mortality is observed, the fish health specialist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.

- Reporting and control of specific fish pathogens are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Co-Managers Fish Disease Control Policy and the USFWS Fish Health Policy and Implementation Guidelines.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are water-hardened in iodophor as a disinfectant.

- Fertilized eggs from each female are incubated separately until eye-up. After eye-up eggs are segregated based on the females BKD group, as measured by ELISA.

- Juvenile fish are administered antibiotics orally when needed for the control of bacterial infections.

- Formalin (37% formaldehyde) is dispensed into water for the control of fungus on eggs and the control of parasites on juveniles and adult salmon. Treatment dosage and time of exposure varies with species, life-stage and condition being treated.

- Only therapeutants approved by the U.S. Food and Drug Administration or those under Investigative New Animal Drug (INAD) permits are used for treatments.

- An experimental feeding of erythromycin is being coordinated through an INAD permit.

Sanitation

- All eggs brought to the facility are surface-disinfected with iodophor as per the USFWS Fish Health Policy.

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

- Different fish/egg lots are physically distinct and kept in separate ponds or incubation units.

- Tank trucks or tagging trailers are disinfected when brought onto the station.

- Foot baths containing iodophor are strategically located on the hatchery grounds (i.e., entrance to hatchery building) to prevent spread of pathogens.

Objective 5: Conduct environmental monitoring.

Environmental Monitoring

Environmental monitoring is conducted at USFWS facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System Permit. It is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery:

- *Total* Suspended Solids *(TSS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.

- *Settleable Solids (SS)*— Sample effluent once per week during heaviest load months of March, April, September, and October. Sample influent when effluent is out of compliance.

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

- *In-hatche y Dissolved Oxygen, Nitrogen, Ammonia, and pH*—as needed by changes in flow or temperature.

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

Coordination/Communication within USFWS

The hatchery holds quarterly hatchery evaluation team and monthly coordination meetings. These meetings include hatchery, management, fish health and tribal representatives. Cooperators and other interested parties are invited to hear reports on the accomplishments, review plans, and present management programs that might affect, or be affected by hatchery operations. The hatchery evaluation team prepares an annual broodyear report for monitoring our progress at meeting hatchery objectives. These meetings also serve as a forum to share technical information. Production goals are set by the hatchery evaluation team and

coordinated with the co-managers through the Production Advisory Committee, with concurrence of the Regional office.

Interagency Coordination/Communication

The USFWS hatchery managers communicate through the regional "Fishery Resource Offices," and a basin-wide "Columbia River Fisheries Program Office" that participates in the following forums:

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 as part of the Columbia River Fish Management Plan and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of co-managers. This group provides harvest management direction used in establishing hatchery fish production goals as part of the Columbia River Fish Management Plan.

Integrated Hatchery Onerations Team (IHOT): This group is comprised of representatives from fish management agencies and tribes. IHOT meets monthly and develops 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 throughout the year 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.

Oneration Plan Meetings: The USFWS meets with the CTWSRO to develop a hatchery operations plan. This plan is our policy guidance and has the concurrence of the CTWSRO, ODFW, and USFWS. Following the principles of adaptive management, this operations plan is revised periodically (about every 5 years) to reflect changes in technology, philosophy, and operational experience. Monthly coordination meetings are also held with the CTWSRO to discuss hatchery operations.

Record Keeping

This station reports through the Columbia River Information System (CRIS) of the U.S. Fish and Wildlife Service. Future record keeping will be coordinated with the basin-wide Coordinated Information System (CIS) currently under development.

The CIS development is being funded by Bonneville Power Administration. 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 following 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-WARM SPRINGS NATIONAL FISH HATCHERY

Objective 1

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Adult Capture	CHS	*700*	*407*	52-79 1	1
Adult Prespawning Survival	CHS	*90%*	*92%*	89-97%	
Egg-take	CHS	975K	435K	73K-853K	1
Green Egg-to-Fry Survival	CHS	96%	97%	92-99%	*2*
Fry-to-Smolt Survival	CHS	95%	95%	94-97%	
Fish Releases (1989-93 broods)	CHS	750K	652K	404K-1,075K	1
Egg Transfers	CHS	0	0	0	
Fish Transfers	CHS	0	0	0	
Wild Adults Passed Upstream	CHS	1,200	599	237-973	1
Percent Survival, Juvenile to Adult (1986-90 broods)	CHS	*0.5%*	0.12%	0.005-0.28%	*3*

Objective 2

Measures	Species	Hatchery Goal 5-Year Average		Range	Constraints
Smolt Size at Release (fish/lb)	CHS	12	1 2	8 - 2 1	
Acclimation	CHS	Yes	Yes	_	
Volitional Release	CHS	Partial	Partial	_	*4*

N/A=Not applicable.

Objective 3

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Collect Adults Throughout Run	CHS	Yes	Yes	--	
Spawning Pop. >500	CHS	Yes	292	51-572	
Spawning Ratio Male:Female	CHS	1:1	1:1.27	1:1.2-1:1.38	

Objective 4

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Adhere to Disease Policy	CHS	Yes	Yes	--	

History of Reportable Pathogens—1990-1995

Species/Stock	Water Supply Inc.	Water Supply Rear.	Virus	BKD	Furunc./ ERM	Other/Comments
Warm Springs Hatchery	*SA*	*SA*				
CHS/Warm Springs			IHN (adult)	+	Furunc. (adult)	*C. shasta* (adult)
CHS/Round Butte				+		EIBS (adult) *C. shasta* (adult)
CHS/Warm Springs X Carson				+		1994-95 only

(Note: This is only a summary of reportable pathogens at this facility. More detailed information is available from the U.S. Fish and Wildlife Service.)

Objective 5

Measures	Species	Hatchery Goal	5-Year Average	Range	Constraints
Meet Requirements of NPDES Permit	All	Yes	Yes	--	

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 Doc.	All	Yes	No	--	5
Develop and Review Future Brood Doc.	A l l	Yes	Yes	--	
Develop and Review Current Brood Doc.	All	Yes	Yes	--	

Constraints/Comments-Warm Springs National Fish Hatchery

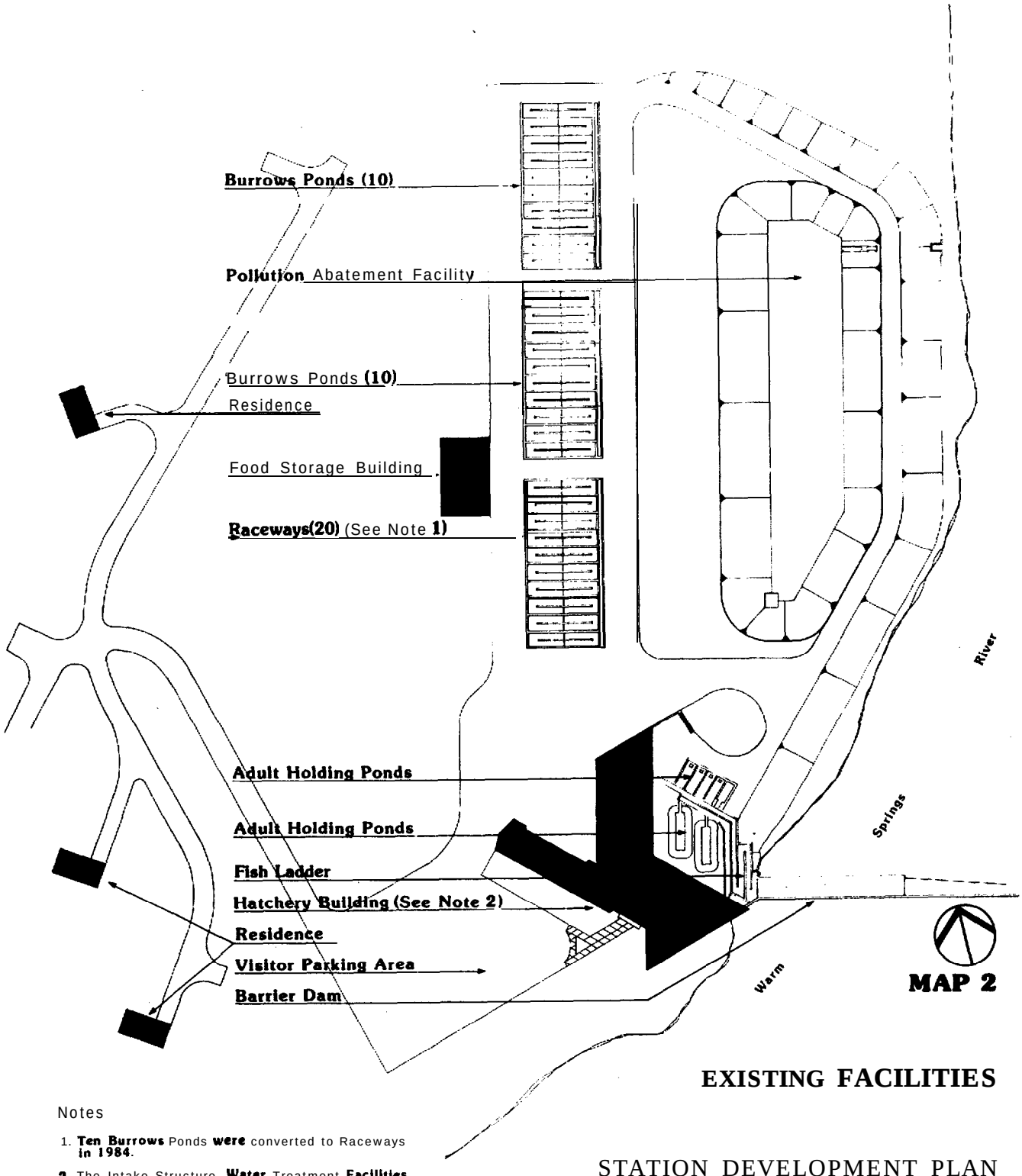
1. Low returns of wild and hatchery fish prevent meeting goals. Adults include three, four, and five-year old fish. Juvenile releases include broodyears 1989-1993.

2. Culling of eggs from high titer, BKD adult carriers reduces egg-take.

3. Low survival is caused by several factors, including high summer water temperatures, untreated water, parasite loads, BKD, and Columbia River passage problems past The Dalles and Bonneville dams. Percent survival is from juvenile release to return to hatchery plus Deschutes River fishery.

4. Concerns over wild fish interactions prevent complete volitional release.

5. The Equilibrium Brood Document has not been completed at this time.



EXISTING FACILITIES

Notes

1. **Ten Burrows** Ponds **were** converted to Raceways **in 1984.**
2. The Intake Structure. **Water** Treatment **Facilities, Tank** Room. **Administrative Area, Shop** and Vehicle **Storage are** located **within the** Hatchery **Building.**

STATION DEVELOPMENT PLAN

WARM SPRINGS
NATIONAL FISH HATCHERY

U.S. FISH AND WILDLIFE SERVICE