

# Warm Springs National Fish Hatchery Operational Plan and Implementation Plan 2007-2011



Developed by  
The Confederated Tribes of the  
Warm Springs Reservation of Oregon  
And  
United States Fish and Wildlife Service



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**WARM SPRINGS NATIONAL FISH HATCHERY**  
**OPERATIONAL PLAN and IMPLEMENTATION PLAN**  
**2007-2011**

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## **Warm Springs National Fish Hatchery Operational Plan 2007-2011**

### **BACKGROUND**

The tribes, states, and federal government share the responsibility to protect and enhance fish runs and fish habitat. The right of the tribes to govern their members and manage their territories and resources flows from tribal sovereignty as recognized by treaty. The federal government and its implementing agencies owe an affirmative duty to use their expertise and authority in meaningful consultation with the tribes to safeguard natural resources that are of crucial importance to self-government and prosperity.

In 1959, The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO) requested that the U.S. Fish and Wildlife Service (USFWS) investigate the possibilities of salmon and steelhead enhancement on the Reservation. It was believed that some potential spawning and rearing areas for anadromous fish in the system were underutilized due to passage problems (Cates 1981). Weir counts of salmon and steelhead entering the Warm Springs River were initiated in 1963. That same year, the CTWSRO requested that the USFWS initiate hatchery feasibility studies on the Reservation.

Construction of Warm Springs National Fish Hatchery (WSNFH) was authorized by an Act of Congress on May 31, 1966 to stock the waters of the Warm Springs Reservation of Oregon. It was expected that the hatchery would produce about 1.0 million salmon and trout annually providing substantial economic benefits to the CTWSRO through the sale of fishing permits and related enterprises, as well as employment and training opportunities (USFWS and CTWSRO 1983). The hatchery was not constructed for mitigation purposes; rather, it was built for supplementation of harvest.

For the tribes, salmon are an integral part of spiritual and cultural identity and an essential aspect of tribal nutritional health. The annual return of the salmon allows the transfer of traditional values from generation to generation. Because the Warm Springs tribal population is growing, the need for salmon is more important than ever.

The operation of WSNFH was considered to be pivotal for the enhancement of the anadromous fish runs as well as for meeting the resident salmonid program needs of the CTWSRO. Among the Tribal priorities was and still is the enhancement of anadromous fish runs in all Reservation waters to meet the future needs of the resource as well as those of the Tribe.

The WSNFH Master Plan was developed in 1971. The first Warm Springs National Fish Hatchery Operational Plan was developed and approved in October, 1977. Full production began in 1978 and included spring Chinook salmon, summer steelhead, and rainbow trout.

The initial spring Chinook salmon program required 355 spawners. Every third fish in the run was to be retained for broodstock. If necessary, no more than 1/2 of the run would be taken for hatchery broodstock. Upon realizing returns from hatchery production, 1/2 of the broodstock needed would be randomly selected from marked fish and 1/2 from unmarked fish (USFWS and CTWSRO 1977). The objectives for hatchery operations were to maintain genetic integrity while enhancing the Warm Springs River stocks by producing and releasing fish indistinguishable from native stocks. Upstream escapement was to be maintained by releasing fish in excess of hatchery needs.

The steelhead program was discontinued in 1981 because of disease and growth problems and physical limitations of the facility. The spring Chinook salmon broodstock need was expanded to 900 adults to better utilize the available space (USFWS and CTWSRO 1983).

In 1984, the CTWSRO asserted that separating the hatchery and natural producing fish would “ultimately best serve the fish and our people into the future”. The CTWSRO proposed a two-stock concept, whereby only wild (unmarked) fish would be passed above the hatchery (Stainbrook and Greene 1984; Jackson 1984). The main goals of this concept are 1) to assure maintenance of genetic integrity within the naturally producing stock, 2) to allow for future management alternatives in the Deschutes River spring Chinook stocks, 3) to evaluate the performance of the WSNFH through positive fish identification, and 4) to provide consistent long term data on the life-history patterns and possible changes which may occur within the stocks.

Beginning with the 1984-1987 Operational Plan, hatchery broodstock was to consist of returning hatchery adults and a number of unmarked native stock not to exceed 10% of the total return to the hatchery weir. The hatchery was to reduce the number of wild adults taken for broodstock when wild returns were low, to ensure that at least 1,000 wild adults were passed above the hatchery. If marked fish returns did not amount to 567 adults, unmarked adults in excess of the 10% limitation were to be retained and utilized to reach the minimum broodstock requirement.

The CTWSRO and the USFWS, with input from the Oregon Department of Fish and Wildlife (ODFW) and the National Marine Fisheries Service (NMFS) has designed recent operational plans to minimize the impacts of the hatchery on the existing wild stocks of spring Chinook salmon spawning in the Warm Springs River by 1) utilizing only Warm Springs River stocks in the hatchery, 2) limiting hatchery take of wild broodstock to a percentage of the total run, 3) retaining broodstock proportionally throughout the run, and 4) annually including up to 10% wild fish in the hatchery broodstock.

The continuing goal of the CTWSRO and USFWS is to cooperatively manage WSNFH in a manner that will protect remaining wild fish populations and preserve their genetic integrity, maintain the existing physical characteristics of Warm Springs anadromous fish stocks and their production above the hatchery, and not impact fish populations below the hatchery while abiding by the goals and objectives of the Integrated Resource Management Plan I for Forested Areas of the Reservation (CTWSRO 2002) and the Deschutes River Subbasin Salmon and Steelhead Plan (ODFW and CTWSRO 2004)

The means for accomplishing this goal are discussed in the enclosed Operational Plan for WSNFH, among which are the following goals and objectives:

- Maintain stock integrity and genetic diversity of the hatchery and wild stocks.
- Produce and maintain self sustaining runs of wild spring Chinook salmon populations that fully seed available habitats to their productive potential, with harvestable surpluses.
- Maintain CTWSRO's minimum escapement objective for wild spring Chinook salmon above WSNFH of 1,000 adults, with a long-term goal of a run of 2,800, similar to runs before the hatchery was constructed.
- Produce up to 750,000 healthy, externally clipped spring Chinook salmon smolts for on-station release.
- 8 to 20% of the hatchery broodstock will be of wild fish origin, but only if wild runs are above 1,000 fish.
- Only wild (unmarked) steelhead will be passed above the hatchery weir.
- Quarterly and annual coordination meetings will be held between the CTWSRO and the USFWS.
- All other native fish entering the trap will be passed upstream or allowed to pass upstream volitionally.

This plan will be revised every five years to meet the changing needs of the resource or operations of the hatchery and to meet management objectives.

## **PACIFIC REGION HATCHERY ASSESSMENT**

In May 2006, the USFWS Columbia River Hatchery Review Team (HRT) published its final report on its assessment of the Warm Springs National Fish Hatchery (USFWS 2006). The HRT is composed of 12 fisheries professionals (10 from USFWS, one from NOAA Fisheries, and one from USGS-Oregon State University Coop Unit), and is tasked with performing assessments of 21 salmon or steelhead hatcheries in the Columbia River Basin that are owned or operated by the USFWS. The assessment of the WSNFH was the first of these assessments, and served as a pilot to help the HRT test and refine the review process. The HRT plans on completing reviews of all these facilities by 2008.

The HRT assessment of the WSNFH includes a description of the watershed, goals, and stock status and hatchery programs in the Deschutes River Basin and a benefit / risk analysis of those programs. Draft documents were submitted for review by co-managers and stakeholders, and their comments are included in the final report.

The HRT found that the WSNFH was a model for an integrated fishery, hatchery, and natural population management. Nevertheless, the HRT found that additional improvements were possible.

The HRT recommends continuing the current program at the WSNFH, and presented a list of 22 specific recommendations addressing potential risks or problems. Briefly, the recommendations include:

1. Revise broodstock "sliding scale" with the goal of ensuring that on average, the percentage of natural-origin broodstock (pNOB) is at least twice the percentage of hatchery-origin spawners (pHOS) allowed to pass upstream of the facility.
2. Continue removal of marked steelhead.
3. Develop and implement a management plan and strategy regarding disposition of coho salmon.
4. Investigate pre-spawning mortality of wild Chinook salmon and take steps to reduce it.
5. Investigate pre-spawning mortality of hatchery (broodstock) adult Chinook salmon and take steps to reduce it.
6. Investigate alternatives to the regularly scheduled use of erythromycin – medicated feed and develop new diagnostic tools/protocols for therapeutic use.
7. Take actions to lower early-rearing densities of juvenile Chinook salmon to not exceed a density index of 0.2 at all life stages.
8. Explore opportunities to simulate natural environments, both in the physical environment of the hatchery ponds and tanks and in feeding and growth strategies.
9. Continue feeding and growth studies.
10. Incorporate studies of the fall volitional releases to evaluate efficacy. Explore the need to improve release methods and to provide protection for outmigrating juveniles at the release outlet
11. Assess the risks and benefits of using Round Butte Hatchery stock to supplement adult return shortfalls.
12. Purchase and install adequate water security alarms.
13. Ensure that the weir / ladder / bypass system safely passes native fish, and initiate studies to assess the effect of the weir on migration and distribution.
14. Ensure conservation objectives are consistent across planning and operational documents.
15. Collect genetic baseline information for hatchery-origin & natural-origin population components.
16. Evaluate the Shitike Creek steelhead kelt reconditioning project in light of other potential priorities at the WSNFH.
17. Assess potential contaminants in salmon that could affect human and ecological health, particularly considering the higher salmon consumption rates of tribal members.

18. Maintain monitoring programs of hatchery and wild fish.
19. Investigate hooking mortality on wild fish to evaluate risks and benefits of selective downstream fishery.
20. Evaluate ecological interactions, specifically predators at release outlet (See #10)
21. Continue efforts to enhance visitor center.
22. Seek opportunities for tribal youth training / education.

These recommendations provided guidance for the development of the 2007-2011 Operation and Implementation Plan.

**Warm Springs National Fish Hatchery  
Operational Plan  
2007-2011**

**INTRODUCTION**

Warm Springs National Fish Hatchery (WSNFH) was authorized by Federal Statute 184 on May 31, 1966 to stock the waters of the Warm Springs Reservation of Oregon with salmon and trout. The hatchery is operated by the United States Fish and Wildlife Service (USFWS) on lands leased from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO).

WSNFH began fish production in 1978 with eggs from spring Chinook salmon and steelhead captured from the existing natural runs passing the hatchery site. The steelhead program was terminated in 1981 because of disease and growth problems and physical limitations of the facility.

The hatchery has the capacity to produce 750,000 spring Chinook salmon smolts resulting in a broodstock requirement of about 630 adults.

The USFWS recognizes that the CTWSRO has the principal management responsibility for fishery resources on the Warm Springs Reservation. The USFWS and the CTWSRO enter into this operational plan with the objective to assure that the operation of the hatchery is compatible with, and compliments the CTWSRO fishery management goals. The steps necessary to meet this objective are outlined in the following portions of this plan. This operational plan shall be flexible, and may be adapted as necessary to adjust to different management strategies or scientific findings.

**SPRING CHINOOK PROGRAM**

The hatchery origin adult production goal from the 750,000 smolts released at WSNFH is at least 2,925 adults returning to the mouth of the Deschutes River. This number is based on the average smolt to adult (SAR) return rate of 0.39% from brood years 1978-2001.

The escapement objective for wild spring Chinook salmon is a minimum 1,000 wild adults released above the hatchery to spawn naturally. The long term goal is to reach a spawning population of 2,800 wild adult Chinook salmon, similar to runs in the system before the hatchery was constructed.

The goal is to have, on a 10 year average, 10% of the hatchery broodstock of wild fish origin. However, no wild fish will be retained for hatchery broodstock when the escapement of wild spring Chinook salmon above WSNFH is less than 1,000. A sliding scale for wild broodstock retention based on projected wild fish returns is presented on page 6 (Table 1). This practice will help promote wild fish escapement and the retention of wild genetic traits in the hatchery broodstock.

A systematic approach to the selection and spawning of spring Chinook salmon broodstock will be used to preserve the natural characteristics inherent to the native run. The total broodstock requirement will normally be 630 adults. If hatchery brood needs are changed from 630, the number of wild fish retained for the hatchery brood will follow the sliding scale, and percentage of wild fish in the brood will vary in proportion to total brood need.

Table 1. Sliding scale for collection of wild - origin broodstock

Wild Escapement	Maximum # wild fish retained for WSNFH broodstock	Percent of hatchery brood contributed by Wild Fish
1000-1099	50	8
1100-1199	55	9
1200-1299	60	10
1300-1399	65	10
1400-1499	70	11
1500-1599	75	12
1600-1699	80	13
1700-1799	85	13
1800-1899	90	14
1900-1999	95	15
2000-2099	100	16
2100-2199	105	17
2200-2299	110	17
2300-2399	115	18
2400-2499	120	19
>2500	125	20

The procedures to be followed in the selection, spawning, and rearing of spring Chinook salmon at WSNFH are listed below:

1. Spring Chinook salmon from the Warm Springs River will be the stock of choice to be used at the hatchery.
2. If the predicted wild run of spring Chinook is more than 1,000, it is the policy that approximately 5% of the total wild escapement will be collected for brood stock each year. Above a wild run of 1,000 fish, a minimum of 8% and as high as 20% of the hatchery broodstock may be of wild origin. This practice will help promote the retention of wild genetic traits in the hatchery broodstock.
3. If the wild run is less than 1,000 fish, no wild fish will be collected for broodstock.
4. On years of extremely low runs of wild fish (a preseason prediction of less than 500 fish) the WSNFH HET will convene to discuss potential emergency conservation measures, including the potential passage of additional hatchery fish upstream.
5. The volitional passage system will be operated as often as possible to minimize the handling of wild fish. However, operation of this system includes the risk of incidental "leakage" of hatchery fish upstream of the facility. All fish passed upstream by the volitional passage system will be monitored via a video camera system. The numbers of hatchery fish escaping upstream will not exceed 5-10% of the wild run.



6. Retrieval of fish for hatchery broodstock shall be random and occur throughout the run. Fish that are 60 cm or longer will be considered adults for the purposes of broodstock collection. In addition, between 2% and 5% of the broodstock will be fish less than 60 cm in length, based on the percentage of jacks in the wild population and their estimated contribution during spawning.
7. If hatchery fish return in numbers above broodstock needs, they will be reserved to meet other Warm Springs Reservation needs as identified by the CTWSRO.
8. Handling of wild fish will be minimized by operation of the fish passage system. Operation of the system will occur as outlined in the attached implementation plan.
9. All fish taken for broodstock purposes at the hatchery will be injected with erythromycin to control prespawning mortality caused by Bacterial Kidney Disease (BKD) and to reduce vertical transmission of the causative agent to the offspring. Fish held for broodstock will be injected twice with a dosage of 10-20 mg drug/kg body weight. Fish will not be injected when water temperatures exceed 60°F or within 30 days of spawning.
10. Adults (wild and hatchery origin) to be held for the hatchery program and for supplementation outplants will be collected proportionately throughout the run based on wild stock run timing to ensure that run timing for both stocks are maintained. The intent is to utilize a spawning population of 630 adults and to use a 1:1 male to female spawning ratio.
11. At spawning, all fish used for brood production will be examined for BKD using the enzyme-linked immunosorbent assay (ELISA) and given a fish health exam as outlined in the USFWS Fish Health Policy and Implementation Guidelines (USFWS 2004). Carcasses of brood fish to be outplanted in Reservation streams for nutrient enrichment will be tagged, gutted and frozen after spawning until disease screening is complete. To minimize risk of transmitting infections to wild populations, only carcasses of low disease risk fish will be outplanted.
12. All juvenile spring Chinook salmon released from the hatchery will be adipose fin clipped to visibly differentiate them from wild fish upon return. Additionally, 100% of hatchery released fish will be coded wire tagged (CWT) which will allow the automated passage system to pass wild (untagged) returning adults upstream of the hatchery without being handled. Other marking may occur to evaluate specific fish cultural practices or for hatchery contribution studies. Such studies may be implemented by the USFWS at no expense to the CTWSRO, but only after discussions with CTWSRO. Ongoing studies will be reviewed annually. A written report of progress and results to date will be completed by the principal investigator and distributed to Hatchery Evaluation Team members, and presented as requested to Tribal Fish and Wildlife Committee and at the annual coordination meeting between CTWSRO and USFWS.
13. All juveniles will be released from the hatchery into the Warm Springs River unless otherwise requested by the Tribe. The CTWSRO will be notified in writing two weeks prior to release. The CTWSRO will notify WSNFH in writing that it has received the release plans.
14. In addition to this Operational Plan, all procedures and policies described in the attached "Warm Springs National Fish Hatchery Implementation Plan 2007-2011" will be adhered to by the Parties to this plan.

### **STEELHEAD PROGRAM**

In 1981, the steelhead hatchery program at WSNFH was discontinued primarily due to disease problems and the apparent physical limitations of the facility in rearing two-year-old steelhead smolts. Using WSNFH to protect wild steelhead is the current goal of the CTWSRO and the USFWS. To meet this goal, only wild steelhead will be passed above WSNFH and all known hatchery origin steelhead will be sacrificed and distributed to the CTWSRO. The heads from stray hatchery steelhead will be tested for the parasite that causes whirling disease (WD).

Additional fish health information may also be collected as deemed reasonable for monitoring and evaluation purposes. All coded-wire tagged fish will be sampled. Tissue samples (partial fin clip) may also be collected from wild and hatchery steelhead. The trap at WSNFH will be operated year round, weather and river conditions permitting. Catch summaries will be submitted to the CTWSRO each month.

### **STEELHEAD KELT RECONDITIONING PROGRAM**

The CTWSRO is currently involved in a project to recondition steelhead kelts from Shitike Creek. The project is funded through CRITFC and will continue for a minimum of three more years (until 2009) at which point the project will be reevaluated. The kelt program includes the following objectives and procedures:

1. Kelts will be captured at a picket weir on Shitike Creek in the late winter and spring (approx. February- May), and transported to a tank in the isolation room at the WSNFH for holding and reconditioning.
2. Steelhead kelts captured in the WSNFH fish ladder will also be transferred to the holding tank.
3. All steelhead kelts will be measured, weighed, tagged with passive integrated transponder (PIT) tags and external tags for identification, and given an injection of Ivermectin<sup>TM</sup> to control parasites. Tissue samples will be taken for genetic pedigree analysis.
4. The kelts will be fed full rations until approximately mid-September, and then feed will be reduced until the time of release.
5. The kelts will be transported and released in the mainstem Deschutes River Below the junction of the Warm Springs River in October, coinciding with the main steelhead run in to the River.

### **COHO SALMON**

The question of the production of coho salmon in the Warm Springs River system generates much debate. It is unknown whether the species is native to the system. Anecdotal evidence suggests that "silvers" were historically harvested in the Sherar's Falls fishery, and the CTWSRO made attempts to establish coho in the system in the early 1980's using hatchboxes, but a naturally spawning run failed to establish. Coho have been captured sporadically, both as migrating adults at the WSNFH fish ladder, and as outmigrating juveniles in the CTWSRO screw traps. Current practice allows the passage of unmarked coho upstream of the hatchery; however, there is concern that these fish may be unmarked hatchery fish, rather than naturally produced fish.

The WSNFH HET decided that more information was necessary to develop a program for coho salmon. To gather this information the following steps will be taken:

1. Scale samples will be collected from all coho salmon captured at the WSNFH, for the purposes of age determination and genetics analysis.
2. All marked coho, and approximately ½ of the unmarked coho (which is about 6 on a normal year), will be removed from the system and transported to the USFWS Fish Health lab for disease inspection.

## **BULL TROUT**

Trapped bull trout will be enumerated and approximate lengths recorded. Additionally, trapped bull trout will be examined for tags and/or marks, and presence of radio tags (antenna protruding from body). The collected data will be submitted to the CTWSRO as requested.

## **TROUT STOCKING PROGRAM**

Originally, WSNFH was expected to provide trout for all programs on the Warm Springs Reservation of Oregon, including Lake Simtustus, and also provide trout for the Umatilla Reservation. Due to disease considerations and changing priorities, the program had been reduced to holding rainbow trout for planting in the Warm Springs River at Kah-Nee-Ta Resort.

Data suggest the stocking of hatchery rainbow trout into the Kah-Nee-Ta stretch of the Warm Springs River may have been limiting the production of native redband trout. Since the cessation of stocking in 1999, and the ensuing closure of the recreational fishery, the numbers of native redband trout and steelhead passing the hatchery has increased. At the present time, the rainbow trout stocking program is not being implemented at WSNFH. However, the CTWSRO reserves the right to reactivate the program if desired.

## **OTHER FISH**

All other native fish species entering the WSNFH fish ladder, including sockeye salmon, redband trout, largescale suckers and mountain whitefish will be passed or allowed to pass upstream.

## **TIME SPAN**

This operational plan shall be in effect from the time of signing until December 31, 2011. At that time, a new agreement will be established for future years. The current operational plan may remain in effect until the signing of the new agreement. Alterations to this plan shall have the mutual agreement of all managing parties.

## **Warm Springs National Fish Hatchery Implementation Plan 2007-2011**

### **INTRODUCTION**

Warm Springs National Fish Hatchery (WSNFH) is located at Rm 9 on the Warm Springs River, approximately 14 mi north of the town of Warm Springs, Oregon. The hatchery is operated by the U.S. Fish and Wildlife Service (USFWS) on lands leased from the Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO).

WSNFH began fish production in 1978 with eggs from spring Chinook salmon and steelhead captured from the existing wild runs passing the hatchery site. Rainbow trout were raised at the hatchery for planting in reservation waters. The steelhead hatchery program was terminated in 1981 and the spring Chinook salmon program was expanded to fully utilize hatchery production potential.

All water rights on the Warm Springs River are the property of the CTWSRO. Non-consumptive water use is included in the business lease between the CTWSRO and the USFWS. The lease specifies use of approximately 100 cfs (44,883 gpm) to be supplied by pumping from the Warm Springs River. Water use currently ranges from 20-40 cfs (9,000 gpm to 18,000 gpm). All rearing ponds are supplied with single-pass water. An advanced engineering plan was developed for a re-use/ozone water supply/disinfection system and is currently on hold because of the high construction and operation costs.

The USFWS recognizes that the CTWSRO has the principal management responsibility for fishery resources on the Warm Springs Reservation. The USFWS and the CTWSRO enter into this operational plan with the objective to assure that the operation of the hatchery is compatible with, and compliments the CTWSRO's management goals as described within. The steps necessary to meet this objective are outlined in the following portions of this plan.

### **PURPOSE**

At the request of the CTWSRO, WSNFH was authorized by Federal Statute 184 on May 31, 1966 to stock the waters of the Warm Springs Reservation with salmon and trout to increase fishing opportunities. The facility is now used for adult collection, egg incubation, and rearing of spring Chinook salmon, and also for enumeration of migrating fish, including wild Chinook salmon, steelhead, rainbow trout, bull trout and other fish species passing the facility.

### **GOALS**

- Produce spring Chinook salmon that will contribute to fisheries in the Deschutes River while providing broodstock for hatchery production.
- Minimize negative effects of production of hatchery spring Chinook salmon on indigenous fish species.
- Monitor and evaluate the health of wild and cultured fish populations.
- Monitor and evaluate the ecological effects attributable to the specific hatchery products following release.
- Monitor and evaluate genetic effects of artificially propagated fish on wild and cultured populations.
- Minimize disease impacts to indigenous fish by releasing healthy smolts.
- Minimize competition/interaction between hatchery fish and indigenous fish.
- Ensure that hatchery operations are compatible with the CTWSRO's fishery management goals.
- Maintain close interagency communication and coordination between the CTWSRO, USFWS, and the Oregon Department of Fish and Wildlife (ODFW).

## OBJECTIVES

Objective 1: Protect indigenous fish populations.

- The goal for the wild spring Chinook populations is to have abundant self sustaining runs that fully seed available habitats to their productive potential, with harvestable surpluses.

- The CTWSRO's minimum escapement objective for wild spring Chinook salmon above WSNFH is a 1,000 adults (60 cm or greater), with a long-term goal of 2,800 adults, similar to run sizes prior to construction of the hatchery.

Objective 2: Hatchery production:

- Produce up to 750,000 healthy, externally clipped and coded wire tagged (CWT), spring Chinook salmon smolts for on-station release.

- Make efforts to rear hatchery juveniles to mimic the growth patterns of wild – origin juveniles.

- Produce a return to the mouth of the Deschutes River of at least 2,925 hatchery-origin adult spring Chinook salmon.

- Provide hatchery-origin Chinook salmon adults surplus to production for tribal subsistence programs.

- Provide hatchery-origin Chinook salmon adults for supplementation / outplanting into Shitike Creek (to be determined annually with consultation of the Tribal Fish and Wildlife Committee).

- Provide hatchery-origin Chinook salmon adults or eggs for Round Butte hatchery as needed (to be determined annually with consultation of the Tribal Fish and Wildlife Committee).

Objective 3: Maintain stock integrity and genetic diversity of the hatchery and wild stocks 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: Minimize interactions with indigenous fish populations through proper rearing and release strategies.

Objective 6: Monitor and evaluate wild and hatchery spring Chinook salmon populations and production.

Objective 7: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Objective 8: Hold catchable sized trout to stock the lower Warm Springs River as requested by CTWSRO.

Objective 9: Design and implement projects to improve quality of production at WSNFH.

Objective 10: Effectively communicate with other salmon producers and managers in the Columbia River Basin.

## **CURRENT PRACTICES TO ACHIEVE OBJECTIVES**

### **Objective 1: Protect indigenous fish populations.**

Only known indigenous fish species will intentionally be passed above WSNFH. The CTWSRO's minimum escapement objective for wild spring Chinook salmon above WSNFH is 1,000 adults. The escapement objective takes into account pre-spawning mortality, and is updated annually by the CTWSRO and USFWS. There is no maximum escapement objective. The goal for the wild spring Chinook populations is to have abundant self-sustaining runs that fully seed available habitats to their production potential, with harvestable surpluses. The long term goal is to reach a spawning population of 2,800 wild adult Chinook salmon, similar to runs in the system before the hatchery was constructed.

WSNFH will be operated to minimize negative impacts of hatchery production on indigenous fish populations. WSNFH will be operated in compliance with all regionally adopted genetics, fish health, ecological interactions, and hatchery performance standards (Integrated Hatchery Operations Team, 1995).

The best available information will be used to determine appropriate operating standards at WSNFH.

### **Objective 2: Hatchery production**

#### ***Adult collection and juvenile release***

The current hatchery broodstock need is 630 adult fish to produce a release of up to 750,000 healthy smolts. This release target is the maximum capacity of the hatchery. A return to the hatchery of 630 fish should result in an egg take of 884,500 eggs based on a 90% prespawning survival, a return that is 60% female, and an average fecundity of 2,600 eggs per female. On average, green egg to eye, eye to fry, and fry to smolt survival is 95% or better for each life stage.

With greater than average egg to smolt survival (85%), the broodstock goal of 630 will produce greater than 750,000 smolts, exceeding the rearing capacity of WSNFH. When rearing capacity is anticipated to be exceeded, eggs will be discarded from females with the highest BKD levels as determined by the ELISA.

Up to 750,000 juvenile fish will be released from the hatchery into the Warm Springs River. Approximately 10% to 30% of this production is volitionally released in the fall, from early October to late November, with most production releases occurring the following spring during March and April. The release is usually completed by mid-April to make room for the next year's brood. Recent returns indicate that the raceways having a spring only release are performing as well as the raceways that have a fall release component. The fall and spring release will be evaluated further to determine overall benefit and risk.

Utilizing 25 raceways at the hatchery equates to raising 30,000 juvenile fish per raceway for release to meet the maximum production of 750,000. Broodstock needs may be adjusted if rearing density studies indicate better returns from smaller release groups reared at lower densities than current production levels. For example, if a rearing density of 24,000 fish per raceway improves survival, then the juvenile production goal could be reduced to 625,000 and the adult brood stock goal reduced to 500.

#### ***Adult returns***

The return goal for WSNFH fish to the mouth of the Deschutes River is 2,925 adults and jacks based on the average smolt-to-adult survival rate (SAR) of 0.39% for brood years 1978-2001.

Returns above production needs will be distributed to the CTWSRO. In years with poor returns to Round Butte Hatchery (RBH), transfer of WSNFH fish to RBH will be considered. Consultation with the CTWSRO on-reservation Fish and Wildlife Committee will be required before the transfer occurs. Additional uses of excess returning hatchery spring Chinook may include outplanting of live adults to supplement or reestablish naturally spawning populations in suitable habitats in Shitike Creek, or outplanting spent carcasses for nutrient enrichment in underseeded stream reaches throughout the reservation. Concerns of disease transmission, genetic impacts to wild Chinook stocks and other species, and carrying capacity of the habitat will be evaluated prior to implementation of adult or carcass outplanting programs.

Pre-season and in-season run predictions and average run timing will be used by WSNFH staff to determine when fish will be distributed.

CTWSRO and USFWS staff will continue looking at available information to determine if return goals are appropriate.

### **Objective 3: Maintain stock integrity and genetic diversity through proper management of genetic resources.**

#### ***Broodstock selection***

The return of wild and WSNFH spring Chinook salmon will be projected preseason and updated in-season using all available information including run timing and returns to date. Wild and hatchery fish return to the Warm Springs River from late April through September, spawning from late August through September. Most wild and hatchery fish return to the Warm Springs River by late June. However, in the early part of the run, hatchery fish typically have a one to two week lag in their return when compared to wild fish (Figure 1). For example, by May 31 of each year, an average 66% of the wild and 55% of the hatchery fish have returned to the Warm Springs River. By June 30 of each year, an average 90% of the wild and 84% of the hatchery fish have returned.

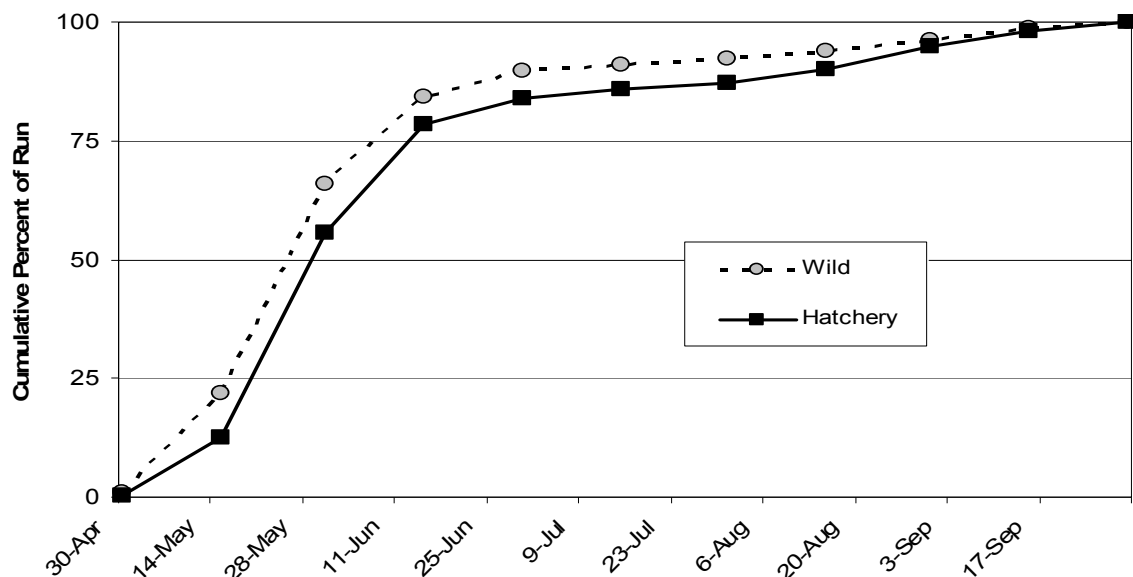


Figure 1. Cumulative run timing (%) of wild and hatchery spring Chinook salmon returning to the Warm Springs River, 1987-2005.

Adults (hatchery and wild origin) to be retained for the hatchery program or for outplants will be collected proportionately throughout the run based on wild stock run timing to ensure that run timing for both stocks are similar. The goal is to have, on a 10 year average, 10% of the hatchery broodstock of wild fish origin. The cumulative percentage of broodstock collected by date is presented in Table 2.

Table 2. Cumulative percentage and numbers of broodstock collection, by date.

Date	Cumulative Percent of Broodstock Collected	Number of Broodstock Collected
May 8	11%	69
May 15	22%	139
May 23	44%	277
May 31	66%	416
June 8	75%	472
June 15	84%	529
June 23	87%	548
June 30	90%	567
July 31	92%	580
Aug 25	100%	630

No wild fish will be retained for hatchery broodstock when the predicted escapement of wild spring Chinook salmon above WSNFH is less than 1,000. In-season adjustments will be made to run predictions and subsequent collection of hatchery and wild fish for brood stock. This practice is intended to promote both wild fish escapement and the retention of wild genetic traits in the hatchery broodstock. If hatchery broodstock needs are changed from 630, the number of wild fish retained for the hatchery brood will follow the sliding scale (Table 1, Page 6), and percent of wild fish in the brood will vary in proportion to total brood need. Wild fish retained for hatchery brood will be selected proportionately based on cumulative run timing.

### ***Spawning protocol***

The intent is to utilize a spawning population of 630 fish and to use a 1:1 male to female spawning ratio. When the number of returning males is low, the male to female spawning ratio will be 1:2. Males will be used with more than one female only as often as necessary to fertilize the eggs of all females. Attempts will be made to include all of the males in the same number of matings.

At the present time, the number of potential factorial matings is limited by the number of egg trays that can be utilized in the facility (approximately 450). At a full broodstock spawning population of 630 fish, the female: male ratio will be approximately 1:1; that is, 1 female will be fertilized by 1 male; no factorial matings will be used. However, if the number of females returning to the hatchery is lower than necessary to fulfill broodstock needs, factorial mating will be used to take full advantage of the available facilities. The numbers of fish used to determine the methods are presented in Table 3.



Table 3. Numbers of females to prompt factorial matings.

Number of Females in Broodstock	Factorial Mating Design
>226	1X1
151-225	2X2
112-150	3X3
90-111	4X4
<90	5X5

Factorial mating is a process in which the eggs and milt from fish are split into groups. For example, in a 2 x 2 design (see table below) the eggs from 2 females are split into two groups (F1 and F2), and milt from 2 males is also split into two portions (M1 and M2). Each of the egg groups from 1 female is fertilized by the milt from 2 males. In a 3 x 3 design, eggs and milt are split into three groups, with the same basic distribution.

Table 4. 2 x 2 and 3 x 3 factorial mating designs.

2 x 2 Design		3 x 3 Design		
F1 x M1	F1 x M2	F1 x M1	F1 x M2	F1 x M3
F2 x M1	F2 x M2	F2 x M1	F2 x M2	F2 x M3
		F3 x M1	F3 x M3	F3 x M3

Chinook salmon less than 60 cm have been considered jacks (3-year olds) in previous years. However, the proper enumeration of jacks is essential in developing preseason run predictions, and there is speculation that this cutoff length may vary between years. Scale samples will be collected randomly throughout the run from as many wild fish as possible (up to 100 fish) to determine age composition, and the determining length may be adjusted on an annual basis, particularly as it pertains to preseason run predictions.

Between 2% and 5% of the broodstock will be fish less than 60 cm in length, based on the percentage of jacks in the wild population and their estimated contribution during spawning. On average, 10% of the broodstock, and as much as 20% will be wild-origin fish when returns allow, according to the sliding scale.

Only spring Chinook salmon indigenous to the Warm Springs River will be used for broodstock. During years of low returns to the hatchery or unexpected losses to production, Round Butte Hatchery (RBH) eggs will be considered for transfer to WSNFH. In this situation, Round Butte stock would be spawned at RBH with eggs transferred to WSNFH. Round Butte stock fish reared at WSNFH would be marked differently from the Warm Springs stock, to distinguish them from WSNFH fish upon return. Round Butte fish returning to WSNFH would be excluded from the broodstock and distributed to the CTWSRO or to RBH if needed. If returns to WSNFH are projected to be below broodstock needs, RBH fish returning to WSNFH may be spawned and their progeny reared and marked separately from WSNFH stock.

To help understand the risks of rearing RBH stock at WSNFH, genetics testing is recommended to determine if WSNFH, RBH, and wild spring Chinook salmon are genetically similar. Both hatchery broodstocks were developed using wild spring Chinook salmon from the Deschutes

River. Sampling protocol for genetic testing will be determined by the USFWS regional geneticist and approved by hatchery evaluation team (HET) and CTWSRO Fish and Wildlife Committee. The harvest benefits will also be considered when evaluating brood stock management.

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

***Disease prevention***

- Hatchery operations will comply with the USFWS Fish Health Policy and Implementation Guidelines and the Integrated Hatchery Operations Team's (IHOT) Fish Health Policy.
- Pond management strategies will be utilized to help optimize the quality of the aquatic environment and to minimize fish stress which can amplify pathogens resulting in disease outbreaks.

***Health monitoring***

- On at least a monthly basis, beginning at two months after starting feed until release, a minimum of 10 fish from each fish lot will be examined to help assess health status and to detect problems before they progress to clinical disease or mortality.
- Three to six weeks prior to release or transfer, 60 fish from each lot will be given a health exam. If fish are held longer than one month from the designated release date, a second exam will be done.
- 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.
- At spawning, all fish used for brood production will be examined for health as outlined in the USFWS Fish Health Policy and Implementation Guidelines. All fish will be tested for bacterial kidney disease (BKD) using the ELISA procedure.
- As needed, additional health testing will be done to evaluate hatchery protocols and procedures or to support special studies.

***Therapeutic and prophylactic treatments***

- At spawning, eggs will be water-hardened in iodophor as a disinfectant. The current protocol uses 75 ppm iodine for 20 minutes which is safe and deemed equivalent to the USFWS Fish Health Policy requirement.
- Fertilized eggs from each female will be incubated separately until eye-up. After eye-up, progeny will be segregated (or culled) based on the females' BKD ranking as measured by ELISA levels. All eggs from females with "high" ELISA levels will be culled, and those with "medium" levels will be culled if there is excess egg production.

Table 5. Low, Medium, and High ELISA values for culling of eggs.

ELISA Values	
Low	0 – 0.199
Medium	0.2 - .499
High	.500 or greater

- Formalin (37% formaldehyde) will be dispensed into water as necessary for the control of fungus on eggs and the control of parasites on juvenile and adult salmon. Treatment dosage and time of exposure will vary with the condition being treated.

- Only therapeutants approved by the U.S. Food and Drug Administration or those under Investigative New Animal Drug (INAD) permits will be used for treatments. In special circumstances, veterinarian prescribed treatments may be used if recommended by the USFWS Fish Health Center.

- Juvenile fish will be administered antibiotics orally in their feed when needed for the therapeutic control of bacterial infections. Under INAD permit, spring and late summer feedings of erythromycin, each at 21 to 28 days, are currently used to control BKD in the subyearlings.

- All spring Chinook salmon held for broodstock and for outplanting will be injected with erythromycin to prevent prespawning mortality by BKD and to reduce vertical transmission of its causative agent to their progeny. Fish will be injected twice with a dosage of 10-20 mg/kg body weight.

### ***Erythromycin***

The managing agencies at WSNFH recognize that there are questions and concerns regarding the prophylactic application of erythromycin, and that it warrants further review and study. The HET recognizes that the risk of regular reliance on antibiotics for the production program may outweigh its benefit in the long-term. By 2010 (within 3 years), the HET will develop a study and implementation plan that is consistent with the goal to phase out the regular use of antibiotics, while still achieving juvenile and adult fish survival production goals.

Potential management application and studies include, but are not limited to:

- The risk and benefits of single vs. double treatment.
- The effects of reduced early rearing density.
- The potential of switching to fall marking of juvenile fish, which in turn could reduce early rearing growth rates, and reduced early rearing densities.
- Propose new protocols for therapeutic use.
- Investigate the environmental fate of erythromycin at the WSNFH and in the Warm Springs River.
- Examine the potential development of antibiotic resistance among fish or other aquatic creatures.
- Explore the efficacy of erythromycin in fish.
- Evaluate coded wire tags (CWT) as possible route of infection.
- Evaluate Polymerase Chain Reaction for detecting BKD in eggs/fry, etc.
- Evaluating more sensitive diagnostic tool for detecting real-life needs for treatment.

### ***Fish and egg movements***

- Movements of fish and eggs will be conducted in accordance with IHOT's Policies and Procedures guidelines and the USFWS Fish Health Policy and Implementation Guidelines. Carcasses outplanted for nutrient enrichment must be certified pathogen-free or of minimum risk for disease transmittance.

### ***Sanitation***

- Sanitation procedures as given in the IHOT Policies and Procedures will be followed at WSNFH to prevent the spread of pathogens. This includes frequent removal and proper disposal of dead fish/eggs, the use of disinfected net/other equipment for each pond or tank, disinfection of equipment, vehicles and facilities after use, and regular pond cleaning.

### **Objective 5: Minimize interactions with indigenous fish populations through proper rearing and release strategies.**

Specific hatchery practices such as fish size at release, time of release, acclimation, and the use of volitional release will be used to minimize interactions between hatchery fish and indigenous populations.

The total production target is up to 750,000 healthy spring Chinook salmon smolts. Approximately 10% to 30% of these fish leave in the fall. The remaining fish are released the following spring as 1+ age smolts.

All juvenile spring Chinook salmon released from WSNFH will be externally marked to differentiate them from wild fish upon return. Additionally, 100% of hatchery released fish will be coded wire tagged (CWT), which will allow the automated passage system to pass wild (untagged) returning adults upstream of the hatchery without being handled. Juvenile hatchery fish will be sampled by the USFWS for mark quality and tag retention prior to release. The goal is to achieve minimum tag retention of 97%. Parties to this plan will make every effort to achieve this tag retention goal.

CTWSRO and USFWS staff will continue looking at available information to determine if juvenile production goals are appropriate, including method, number, size and timing of releases.

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. Differential marking, tagging, downstream monitoring, scale analysis, and other potential projects will be used to determine the fate of fall migrants. PIT tagging studies on both hatchery and / or wild fish may also be implemented, with the approval of the Tribal Fish and Wildlife Committee.

All juveniles will be released at the hatchery except to meet CTWSRO requests. Additional release sites may be used for studies associated with reestablishment of anadromous fish passage above the Pelton/Round Butte hydroelectric facilities. WSNFH will notify the CTWSRO in writing two weeks prior to any releases. The CTWSRO will notify WSNFH in writing after receiving the release notice.

The CTWSRO operates a migrant trap near the mouth of the Warm Springs River. During volitional releases from WSNFH, the CTWSRO will operate this trap to estimate the number of hatchery fish leaving the system and will biosample a representative number of fish. The CTWSRO will remove the trap during forced releases or if fish numbers become unmanageable and pose risk to the survival of juveniles.

**Objective 6: Monitor and evaluate wild and hatchery spring Chinook salmon populations and production.**

***Run size estimates***

Pre-season estimates of wild, WSNFH, and RBH adult returns will be completed prior to returns in April. The CTWSRO and the USFWS will formulate run predictions using the best available information. The CTWSRO and the USFWS will co-author a report detailing pre-season run predictions for Warm Springs River stocks returning to the Deschutes River. The CTWSRO and the USFWS will jointly work with the ODFW to estimate returns of RBH spring Chinook salmon to the Deschutes River. In-season run size estimates will be made throughout the run using all available information. Pre-season and in-season run size estimates will be used for harvest and brood stock management decisions.

***Fish passage system***

Spring Chinook salmon

An automated fish passage facility has been installed for use during the spring Chinook migration time period, April 16 - September 30. The system is designed to minimize handling of the wild fish by separating returning hatchery fish with coded wire tags (CWTs) from other fish attempting to pass the barrier dam. The system detects CWTs in the hatchery fish and diverts these fish into a separate holding area. The system allows wild fish and fish without CWTs to proceed upstream without being handled. Wild fish will be monitored and enumerated using video technology and then directed to the fish ladder to continue their upstream migration without being handled.

The automated passage system at WSNFH may be operated daily from April 16 - September 30. Only wild fish, without CWTs, will be intentionally passed above the hatchery. We realize, however, that hatchery fish missing CWTs and poorly clipped fish may be inadvertently passed above the hatchery. Steelhead may still be passing WSNFH in April. If stray hatchery steelhead are detected passing the hatchery or if the inadvertent passage of hatchery Chinook exceeds the percentage of wild broodstock collected as outlined in the sliding scale, WSNFH staff will inform CTWSRO staff and a decision will be made on whether or not to delay using the automated fish passage system.

The system will be operated to allow volitional upstream migration. Wild fish will not be left overnight in the trap, unless trapping efficiency is being evaluated. During peak returns, checking and working the trap and passage system daily, even during the weekends, may be necessary.

Videotapes will be reviewed by WSNFH staff to estimate wild fish passage above the hatchery. Estimated returns of wild and hatchery fish to WSNFH will be reported to CTWSRO staff on Tuesday of each week.

The minimum operating standards for the system are the removal of 95% of the fish with CWTs and 95% accuracy in counting upstream-bound-fish. With 95% tag retention and 95% removal of fish with CWTs, no more than 10% of the total Chinook passed upstream should be of hatchery origin.

The system must be tested for efficiency of separation and counting at activation and at least one night per month. This should coincide with biosampling. Efficiency testing will require that fish diverted into the wild catch pond be held over night. These fish will be crowded, anesthetized, and examined for fin clips and the presence of CWTs. Wild fish will be released upstream, and hatchery-origin fish will be removed for broodstock of distribution to CTWSRO. Video records will be viewed and verified at this time. If the passage system is not operating within the minimum operating standards, necessary adjustments will be made. If adjustments are not sufficient, the

system will be bypassed and all fish will be taken into the hatchery and sorted by hand. The CTWSRO staff will be notified of the situation and a decision on how to proceed will be negotiated. During the peak of the migration, the trap will be tested daily using a dummy outfitted with a CWT.

Use of the passage system may be curtailed with agreement of the Parties. Potential reasons to curtail use of the system include all Parties agreeing that the wild fish need to be injected with erythromycin, the minimum operating standards are not being met, or other unforeseen circumstances.

Indicators to reinstate injections of erythromycin may include but not be limited to: estimated high pre-spawning mortality in two or more consecutive years ( $>3.1$  fish per redd), low egg to smolt survival, and high levels of *Renibacterium salmoninarum* (the causative pathogen of BKD) found in wild smolts trapped at the mouth of the Warm Springs River.

Minimum operating standards may not be met if the return ratio of wild fish to WSNFH hatchery fish is projected to be low or tag retention of WSNFH fish is poor.

A protocol will be developed detailing operation of the fish passage system. This protocol will continually be updated based on continued testing and updating of the system.

While the automated fish passage system is in operation, wild spring Chinook salmon volitionally passing upstream of the hatchery will not be injected with erythromycin. To monitor the potential effects of stopping the injections, wild smolts emigrating from the Warm Springs River may be sampled for levels of *R. salmoninarum*. Prior to sampling, the USFWS will submit a request to the CTWSRO, detailing the sampling plan, and receive permission from the Fish and Wildlife Committee to proceed.

#### Summer steelhead

The steelhead hatchery program was terminated in 1981, primarily due to disease problems and the physical limitations of the facility to rear two-year-old steelhead smolts. Currently, there are no plans to reinstate this program. This agreement, however, does not prevent a steelhead program from being developed in the future.

The current goal is to use the hatchery to protect wild steelhead. The automated fish passage system will not be used during the steelhead migration (October - April 15). The hatchery trap, however, will be operated and all fish handled in the hatchery. Only wild steelhead will be passed above WSNFH. All known hatchery origin steelhead will be sacrificed and distributed to the CTWSRO. Stray hatchery steelhead may be sampled for pathogens, including whirling disease. Catch summaries will be submitted to the CTWSRO each month. All coded-wire tagged steelhead will be sampled. Wild and hatchery steelhead may be sampled for genetic tissue collection (partial fin clip).

#### Other Fish

The trap at WSNFH will be operated year round. Monthly estimates of passage will be provided to Tribal staff. Rainbow trout and bull trout handled at WSNFH will be enumerated and their lengths recorded. Bull trout will be examined for presence of marks and tags, including antennae of radio tags. A portion of the adult coho run, both marked and unmarked will be sampled to ascertain fish health status and origin (hatchery or wild). The collected data will be submitted to the CTWSRO with the monthly trap summaries. All other fish species will be counted and passed upstream.

### ***Biosampling***

Wild and hatchery salmon will be biosampled by the USFWS and CTWSRO staff. Biosampling is necessary to monitor size, age structure, sex ratios, and mark retention of returning adults. Biosampling of wild salmon will coincide with trap efficiency testing. Approximately 10% of the wild run will be biosampled, up to a maximum of 100 fish. Fish will be anesthetized and measured (cm). Three to four scales will be removed and aged. MS-222 will be used to anesthetize fish when collecting broodstock or processing wild fish and carbon dioxide will be used to anesthetize surplus hatchery fish donated to the tribes for consumption. All hatchery fish and wild fish held for broodstock will be sampled at time of spawning. Hatchery fish will have CWTs removed and read by the USFWS within 30 days from the last day of spawning.

A minimum of 500 hatchery broodstock and up to 50% of surplus hatchery fish may be sampled to recover coded-wire tags. Typically, sampling of surplus hatchery fish will occur on each Monday throughout the run from May through August, sampling about 40% of the return.

A portion of the adult hatchery-origin fish distributed to the tribal membership for consumption will be transported to an offsite laboratory to be sampled for environment contaminants that could potentially affect human and / or ecological health. This sampling will be conducted by USFWS staff.

### ***Hatchery production studies***

The Hatchery Evaluation Team (HET) for WSNFH is composed of representatives from the CTWSRO, WSNFH, and the USFWS Columbia River Fisheries Program Office and Lower Columbia River Fish Health Center. Staff from the Abernathy Fish Technology Center will be available for assistance.

All proposed studies must be approved by the HET. A research proposal, developed following the guidelines outlined in the HET Vision Action Plan (USFWS 1993), must be completed and undergo a peer review prior to initiation of a study. A study will not begin until the proposal has final approval. Each proposal will contain a timeline for completion of the project and reporting.

Ongoing studies will be reviewed annually. A written report of progress and results to date will be completed by the principal investigator and distributed to HET members. These reports will also be provided to and discussed at an annual meeting of the parties in March and posted on the USFWS website (<http://www.fws.gov/Columbiariver>). Investigators are encouraged to involve tribal radio and newspaper media and to present their findings at workshops and conferences.

Marking and tagging of hatchery fish may occur to evaluate specific fish culture practices or for hatchery contribution studies. Such studies may be implemented by the USFWS at no expense to the CTWSRO, but only after approval of the HET.

### ***Natural production studies***

CTWSRO staff will conduct Chinook index area redd counts each September. This data will be used to estimate production and prespawning mortality. Redd count and survival data will be provided to the USFWS in October.

Juvenile production will be estimated by CTWSRO staff through trapping at the mouth of the Warm Springs River. Using mark/recapture and trapping efficiency estimates, tribal staff will estimate the number of wild and in some instances hatchery spring Chinook salmon leaving the Warm Springs River. CTWSRO staff will provide estimates of hatchery fish leaving the Warm Springs River following fall releases.

Other studies to assess abundance, distribution, life history, movements and ecology of fishes in the Deschutes Basin may be conducted by CTWSRO staff or other agencies under contract or through cooperative agreements with CTWSRO. All studies which include trapping, handling or taking of live fishes, collection and incubation of gametes from fish (wild or hatchery), liberation or removal of live fish from waters on or bordering the Warm Springs Reservation must be approved by the HET and by the Fish and Wildlife Committee prior to implementation. A detailed written project proposal shall be submitted which addresses:

Purpose of the work

Project description

Contact person

Number, species, methods of take

Dates, location, personnel, vehicles

Budget summary and funding source identification

Documentation of ESA consultation and compliance (non tribal funded projects)

Completion Date

Investigators may be required to provide progress reports of natural production studies. Ongoing projects will be reviewed annually. A written report of progress and results to date will be completed by the principal investigator and distributed to HET members and the Fish and Wildlife Committee. These reports will also be provided to and discussed at an annual meeting of the parties in March and posted on the USFWS website (<http://www.fws.gov/columbiariver>).

Investigators are encouraged to involve tribal radio and newspaper media and to present their findings at workshops and conferences.

### ***Harvest***

The CTWSRO will work with the ODFW to monitor the tribal fisheries at Sherars Falls and other locations in the Deschutes drainage to provide harvest estimates. CWT recovery data will be used to provide estimates of hatchery contribution to the fishery (RBH and WSNFH).

### **Objective 7: Conduct Environmental Monitoring.**

#### ***Environmental monitoring***

Environmental monitoring will be conducted at WSNFH to ensure that this facility meets the requirements of the National Pollution Discharge Elimination Permit. Environmental monitoring will also be used in managing fish health. At a minimum, the following parameters will be monitored at this hatchery:

- *Total Suspended Solids (TSS)* — Effluent will be sampled once per week during heaviest load months of March, April, September, and October. Influent will be sampled when effluent is out of compliance.
- *Settleable Solids (SS)* — Effluent will be sampled once per week during heaviest load months of March, April, September, and October. Influent will be sampled when effluent is out of compliance.
- *In-hatchery Water Temperatures*—maximum, minimum and average daily.
- *In-hatchery Dissolved Oxygen, Nitrogen, Ammonia, and pH*—as needed by changes in flow or temperature.



### ***Instream monitoring***

Once monthly, CTWSRO staff will monitor conductivity, pH, turbidity, and dissolved oxygen at six sites on the mainstem Warm Springs River. Two Isco samplers will also be operated, one at Culpus Bridge and one at He He, to provide daily sediment load estimates. Flows will be recorded at Culpus Bridge and He He. Temperature will be recorded at a number of sites throughout the mainstem. The CTWSRO will provide this data as requested. The CTWSRO will also monitor stream temperature near the hatchery intake.

### ***Contaminants and Potential Effects of Consumption***

The HRT recommendation WS17 states that the managing agencies of WSNFH should, "assess potential contaminants in salmon that could affect human and ecological health, particularly considering the higher salmon consumption rates of tribal members." In recent years, between 1,100 and 1,500 hatchery origin adult fish have been distributed to the tribal membership for consumption. Concerns about the potential effects of contaminants were also brought up by CTWS tribal members in meetings with CTWS and USFWS Fisheries Staff.

In 2006, 10 hatchery origin adult Chinook were transported to the Abernathy Fish Technology Center (USFWS, Abernathy, WA) for contaminant analysis. Samples were collected during the early portion of the run to obtain fish that would be in the same condition as those distributed to the Tribe (i.e. the same fat content). Whole fish were analyzed for congener specific polychlorinated biphenyls (PCBs), dioxin/furans, and organochlorine pesticides as well as polybrominated diphenyl ethers (PBDEs) (flame retardants). The sampling procedures generally followed EPA guidelines (EPA Guidance for assessing chemical contaminant data for use in fish advisories, volume 1: Fish Sampling and Analysis – 3rd Edition, U.S. EPA, Washington, DC (2000) <http://www.epa.gov/ost/fishadvice/volume1/index.html>). This sampling may be repeated in the future, depending upon funding and interest.

### **Objective 8: Stock the lower Warm Springs River with catchable trout, as requested by CTWSRO.**

Originally, WSNFH was expected to provide trout for all programs on the Warm Springs Reservation of Oregon, including Lake Simtustus, and also provide trout for the Umatilla Reservation. Due to disease considerations and changing priorities, the program had been reduced to holding rainbow trout for planting in the Warm Springs River at Kah-Nee-Ta Resort.

Data suggest the stocking of hatchery rainbow trout into the Kah-nee-tah stretch of the Warm Springs River may have been limiting the production of native redband trout. Since the cessation of stocking in the 1999, and the ensuing closure of the recreational fishery, the numbers of native redband trout and steelhead passing the hatchery has increased. At the present time, the rainbow trout stocking program is not being implemented at WSNFH. However, the CTWSRO reserves the right to reactivate the program if desired.

### **Objective 9: Develop and implement projects to improve quality of production at WSNFH.**

#### ***Constraints to production at Warm Springs National Fish Hatchery***

Limiting factors affecting fish survival at the WSNFH, and returns to the WSNFH include high summer water temperatures, water quality issues, limited early-rearing space, parasite loads, BKD, predation, Columbia River passage problems past The Dalles and Bonneville Dams, variable ocean productivity, and harvest.

### ***Modifications made (2002-2006)***

The WSNFH installed shade structure and/or sprinklers over the adult separator and adult catch areas to provide protection and relief from the sun for adult fish.

CTWSRO replaced the floating Humphrey Scoop trap used to monitor outmigrants from the Warm Springs River with an 8-foot screw trap in 2002. The trap was relocated to a new site in 2002 approximately 100m upstream to improve trapping efficiency.

Additional water alarms were purchased and installed. The interior and exterior water supply alarms were replaced, and new alarms were added for the rearing ponds, adult catch ponds, and adult holding ponds. Due to funding shortage, alarms were not included for the early rearing and incubation facilities.

A Hatchery and Genetic Management Plan (HGMP) was created in 1999. The last update to the WSNFH HGMP was 2004.

The feasibility of a reuse system including biological filters, ozone disinfection, and chilling during the summer months was investigated. An advanced engineering plan was developed for a re-use/ozone water supply/disinfection system and is currently on hold because of the high construction and operational costs. Operation of a new reuse system may also be more complicated than desired.

The hatchery water intake structure was replaced to meet NMFS Hatchery Biological Opinion criteria in 2004.

The coded wire tag detection equipment and gates on the automated volitional passage system were improved to increase sorting efficiency and to reduce unintentional upstream escapement of hatchery adults and jacks.

### ***Ongoing studies / projects***

CTWSRO will continue to monitor juvenile outmigration with a screw trap near the mouth of the Warm Springs River.

Fall volitional releases will be evaluated using a variety of potential techniques, including but not limited to the use of PIT tags and outmigrant traps.

The growth patterns of wild and hatchery origin juveniles are being investigated. Wild fish in the Warm Springs River are being collected on a monthly basis for comparison to hatchery fish.

Investigate and implement techniques to improve retention of fin clips and coded wire tags in hatchery spring Chinook. Objective should be minimum 97% and preferably 99+% retention. Use the automated marking trailer for fin clipping and coded-wire tagging.

Implement studies of ecological interactions between hatchery and wild fish including: winter rearing and migration of fall hatchery releases, predation (including potential predation impacts of aquatic and terrestrial predators that may be attracted by hatchery origin fish at the release point below the weir), and behavioral interactions between hatchery and wild fish. Evaluate relative reproductive success of wild and hatchery Chinook spawning together in a natural stream, and monitor habitat utilization of outplanted adult hatchery fish.

Assess health and monitor for Whirling Disease in the wild fish of the Warm Springs River and Deschutes Basin.

Continue to enhance visitor's center and implement community outreach projects.

### ***Projects to implement / improvements needed***

Install alarms in the early rearing and incubation facilities.

Continue to develop and implement studies on the effects of antibiotic treatment. Identify, evaluate and propose alternative culture or treatment strategies to control BKD that reduce the biological, human health and environmental risks of antibiotics while maintaining program benefits, including equivalent fish survival. These alternatives could include reduced rearing densities, increased flows, and modulation of water temperature.

Develop a three-year phase-out plan for the prophylactic use of erythromycin-medicated feed.

Investigate whether broodstock collection of 630 adults is necessary to meet WSNFH program goals. Investigate benefits and risks of reducing or increasing broodstock collection.

Make efforts to make the kelt reconditioning tank more similar to natural conditions, in order to reduce stress on the fish. This may include painting and the addition of habitat structure.

In 2010 evaluate the kelt reconditioning program to determine if it should be a continuing activity at the hatchery. The USFWS and CTWSRO agreed to continue the kelt reconditioning project through 2009, depending on BPA funding.

Continue to investigate methods to increase survival while minimizing impacts on wild populations. This may include size and time of release studies, rearing density variations, rearing hatchery fish similar to natural fish, different feed types, and feed methods.

Develop and implement a plan to significantly improve the juvenile rearing environment. Increase inside rearing space to reduce rearing density index to desired levels. This may also reduce the use and need for medicated feed.

Install PIT tag detector in adult fish ladder.

Investigate marking fish prior to the fall release compared to traditional spring time marking.

Increase the participation of Tribal youth in hatchery operations and conservation education programs.

Conduct studies to create a more natural-like environment at the hatchery.

Explore the need to provide protection of smolts at the hatchery release outlet in the Warm Springs River to reduce impacts of predators and or staging of predators at the outlet. Investigate methods to deter avian and aquatic predators away from the raceway outlet drain where it enters the Warm Springs River based on monitoring and evaluation results.

Ensure that the weir, ladder, and bypass operations safely pass native fish upstream.

Investigate causes of pre-spawning mortality of wild and hatchery fish.

Produce Station Development Plans and a Comprehensive Hatchery Management Plan.

Investigate effects of downstream sport fishery, particularly the effect of hooking mortality on wild fish.

Implement recommendations from May 2006 Hatchery Review, Assessments and Recommendations Final Report ([www.fws.gov/Pacific/fisheries/HatcheryReview](http://www.fws.gov/Pacific/fisheries/HatcheryReview))

### ***Predator control***

WSNFH staff will notify the CTWSRO fish and wildlife staff as soon as a predation problem is suspected in hatchery raceways, brood pond, or ladder. Each agency will notify appropriate staff and policy level representatives. The Parties will immediately develop appropriate actions to be taken considering all existing Tribal, State, and Federal codes and laws.

### **Objective 10: Effectively communicate with salmon producers and managers.**

Quarterly hatchery evaluation team (HET) and coordination meetings will be held. These meetings will 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. A yearly meeting with all cooperators and policy level personnel will be held in March.

The CTWSRO and the USFWS each have representatives on the Production Advisory Committee (PAC). Each agency will review production numbers in this plan to ensure compliance with the US v. Oregon production agreements.

ODFW, Portland General Electric (PGE), CTWSRO, Bonneville Power Administration (BPA) and USFWS will participate in annual production coordination meetings for operation of the Round Butte Fish Hatchery.

### ***Record keeping***

Records will be kept to comply with IHOT standards. Fish rearing records will be updated monthly and be available upon request.

WSNFH staff will keep accurate records of returns to the hatchery on a standard data form approved by the HET. Fish will be examined closely for the presence/absence of marks and tags. Tag numbers will be recorded and reported to appropriate agencies.

### ***Data reporting and requests***

The WSNFH records and reports data using the Columbia River Information System (CRIS) of the USFWS. WSNFH will make every attempt to provide the CTWSRO with trap and video counts every Tuesday and Friday during the spring Chinook salmon migration (April 16 through September 30). Counts of steelhead and other species will be provided monthly. Egg and run summaries will also be provided to the CTWSRO. Prior to release of adult Chinook salmon and steelhead return data outside the USFWS, the information will be provided to and reviewed by CTWSRO staff. CTWSRO staff will review data and provide comments within one week of receiving data. Data will not be released until the USFWS has confirmed the data with the CTWSRO. The USFWS will only release accurate and up to date information. The hatchery production data is a responsibility of the USFWS.

A summary of data reports will be provided at regularly scheduled HET meetings, the annual meeting, and at the Round Butte hatchery coordination meeting. Prior to making presentations at outside workshops and conferences, the HET members will present their findings to the HET, Tribe and USFWS as requested. Parties to this plan agree to provide requested data in a timely matter.

## **ESA - SECTION 7 CONSULTATION**

The USFWS will coordinate and write applicable Hatchery and Genetic Management Plans (HGMPs) and biological assessments (BAs) for WSNFH. These documents will have tribal review prior to submission to NMFS and USFWS record. The latest revision of the HMGP document was 2004.

## **DISPUTE RESOLUTION PROCESS**

All Parties to this operational plan agree to make a good faith effort to resolve disagreements on all issues. On issues for which the Parties are unable to reach consensus, the technical representatives will submit in writing a statement in support of their position on the disputed issue to appropriate executive management level representatives. A meeting will be convened at this level to resolve the issue. Issues not resolved at this level shall be submitted in writing to a policy level forum with appropriate technical, executive, policy and/or legal analysis and recommendations.

## **AGENCY RESPONSIBILITIES**

The USFWS is responsible for operation and management of WSNFH. Nothing in this agreement is intended to alter, amend, modify, or abridge any sovereign responsibilities of the United States or intended to impose a legal obligation on the USFWS that conflicts with applicable federal laws, regulations, procedures and policies. The USFWS will operate the facility in accordance with IHOT standards or other mutually acceptable standards. The Columbia River Fisheries Program Office will provide management assistance to WSNFH staff, CTWSRO, and regional fisheries programs. USFWS employees will comply with all applicable codes, laws, and policies, i.e. water and wildlife codes.

The Parties have the responsibility of ensuring that WSNFH is operated to produce fish for harvest while minimizing negative effects on indigenous populations. The Parties will ensure that the hatchery is operated within CTWSRO fishery management guidelines and within Tribal codes, laws, and policies to the extent that they do not conflict with Federal laws, codes, or policies. The Parties also have the responsibility of ensuring that the facility is operated in an efficient matter, considering the effects of operations on the biological world around the facility.

## **TIME SPAN**

This operational plan will be in effect from the time of signing until December 31, 2011. At that time, a new agreement will be established for future years. The current operational plan may remain in effect until the signing of the new agreement. Alterations to this plan shall have the mutual agreement of both parties.

## ANTICIPATED TIMELINE FOR MEETINGS AND TASK COMPLETION

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HET												
Coordination Meetings												
Annual Meeting												
Run Prediction Completed												
Studies Reports Distributed												
Redd Counts												
Redd Count Data Reported												
Rainbow stocking (If applicable)												
Fish Counts Reported												
Fish Passage System Operated												
Broodstock Collection												
Hatchery Adult Spawning												
Juvenile/Smolt Releases												

## REFERENCES AND SUPPORTING DOCUMENTATION

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U.S. Fish and Wildlife Service Fish Health Policy and Implementation. 2004. February 15, 1995. FWM 440, Part 713 Fish Health, FW1 to 5 1.1 to 4.5. In U. S. Fish and Wildlife Service Manual (FWM440, March 3, 2004).


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<<[http://www.fws.gov/pacific/Fisheries/Hatcheryreview/documents/WarmSpringsReviewFinalReport\\_004.pdf](http://www.fws.gov/pacific/Fisheries/Hatcheryreview/documents/WarmSpringsReviewFinalReport_004.pdf)>>

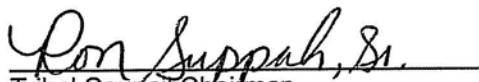
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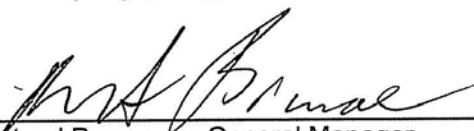
SIGNATURES

  
Assistant Regional Director  
Fishery Resources  
U.S. Fish and Wildlife Service  
Region 1  
Portland, Oregon

May 30, 2007  
Date

  
Tribal Council Chairman  
The Confederated Tribes of the  
Warm Springs Reservation of Oregon  
Warm Springs, Oregon

May 16, 2007  
Date

  
Natural Resources General Manager  
The Confederated Tribes of the  
Warm Springs Reservation of Oregon  
Warm Springs, Oregon

5-17-07  
Date