

MONITORING AND EVALUATION OF YEARLING SNAKE RIVER FALL CHINOOK

9801004

SHORT DESCRIPTION:

Monitor and evaluate movement patterns, migration timing, travel times, juvenile emigration survival and adult returns through supplementation of Lyons Ferry Hatchery fall chinook salmon in the Snake and Clearwater Rivers.

SPONSOR/CONTRACTOR: USFWS/LSRCP/NPT
U.S. Fish and Wildlife Service/Lower Snake River
Compensation Plan/Nez Perce Tribe Department of Fisheries
Resources Management
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SUB-CONTRACTORS:
U.S. Fish and Wildlife Service (USFWS), Washington
Department of Fish and Wildlife (WDFW), joint sponsors

GOALS

GENERAL:

Supports a healthy Columbia basin, Maintains biological diversity, Maintains genetic integrity, Increases run sizes or populations

ANADROMOUS FISH:

Research, M&E

NPPC PROGRAM MEASURE:

7.3B.2: 7.5B.1

RELATION TO MEASURE:

This project will evaluate how effective supplementation of Lyons Ferry Hatchery yearling fall chinook salmon (Snake River stock) is in the recovery of the ESA listed Snake River fall chinook.

BIOLOGICAL OPINION ID:

Section X. Conservation Recommendations A. 1,2,3 NMFS Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin

OTHER PLANNING DOCUMENTS:

Proposed Recovery Plan for Snake River Salmon (March, 1995), 4.1.d. ATo determine if supplementation can assist in fall chinook recovery, the management plan for Lyons Ferry Hatchery should call for supplementation and be carefully evaluated in areas above Lower Granite Dam. @ In relation to the Draft Tribal Recovery Plan (June, 1995 p 3-20), the plan states that Afish utilized in supplementation and reintroduction efforts will be selected to best match the natural population of the stream in question@ and Athe increase in survival and reproduction capacity gained through the use of artificial propagation in supplementation and reintroduction programs is necessary to recover stocks in a timely fashion@ and P.5B-25 recommends to: develop experimental and monitoring programs in association with these projects to study the relationships between natural and supplemented components of the populations.

TARGET STOCK

Snake River Fall Chinook

LIFE STAGE

yearling smolts, adults

MGMT CODE (see below)

S, L, W

AFFECTED STOCK

None

BENEFIT OR DETRIMENT

BACKGROUND

STREAM AREA AFFECTED

Stream name:

Snake and Clearwater Rivers

Subbasin:

Snake River

Stream miles affected:
215 and 175, respectively
Hydro project mitigated:
N/A

Land ownership:
public and private

Habitat types:
N/A

HISTORY:

The first two years of this project were funded indirectly through the USFWS Lower Snake River Compensation Plan by BPA. Supplementation of Lyons Ferry Hatchery fall chinook yearlings and monitoring and evaluation studies were initiated on the Snake River at the Pittsburg Landing acclimation facility constructed by the U.S. Army Corps of Engineers in 1996. During 1997, a second acclimation facility was constructed at Big Canyon Creek on the lower Clearwater River. A third acclimation facility at Captain Johns Rapid on the Snake River is scheduled to be constructed and be in operation to acclimate fall chinook in 1998. Acclimation facilities will be sufficient to acclimate a total of 450,000 Lyons Ferry Hatchery fall chinook (150,000 at each of the three facilities).

BIOLOGICAL RESULTS ACHIEVED:

Results from the 1996 monitoring and evaluation of yearling fall chinook released at Pittsburg Landing on the Snake River were encouraging. Fish health assessments were favorable for fish releases, mortality during the six week acclimation period was low, and survival rates from PIT tagged fish were higher than expected to the Snake and Columbia River dams.

PROJECT REPORTS AND PAPERS:

We are currently working with the USFWS and WDFW on a cooperative annual report on monitoring and evaluation of yearling fall chinook acclimated and released at Pittsburg Landing in 1996.

ADAPTIVE MANAGEMENT IMPLICATIONS:

This monitoring and evaluation study has greatly increased our knowledge of travel times and survival rates of supplemented yearling fall chinook through the Snake And Columbia River dams. Survival estimates were relatively high for juvenile emigration to the mainstem dams and may be an indication of adult returns which may lead to a better understanding of how supplementation can be used to recover the Snake River fall chinook.

PURPOSE AND METHODS

SPECIFIC MEASUREABLE OBJECTIVES:

Objective 1. Monitor, evaluate and compare pre-release and release health conditions of yearling Lyons Ferry Hatchery fall chinook acclimated and released at Pittsburg Landing and Captain Johns Rapid on the Snake River and at Big Canyon Creek on the Clearwater River.

Objective 2. Monitor, evaluate, and compare post-release behavior, migration timing, and survival of yearling fall chinook released at Pittsburg Landing, Captain Johns Rapid, and Big Canyon Creek.

Objective 3. Monitor and compare contribution and distribution of adult returns and smolt-to-adult survivals of yearling fall chinook released from Pittsburg Landing, Captain Johns Rapid, and Big Canyon Creek.

Objective 4. Prepare a cooperative annual report with the USFWS and WDFW that evaluates the success of supplementation of yearling fall chinook above Lower Granite Dam.

CRITICAL UNCERTAINTIES:

Flow and passage conditions at the mainstem dams will be improved substantially for juvenile migrants so supplementation can be adequately assessed as a tool to recover the Snake River fall chinook. Lyons Ferry Hatchery fall chinook salmon smolts that are barged to the estuary return to spawn at least as well as those fish left in river.

BIOLOGICAL NEED:

This project addresses uncertainties about the use of supplementation as a tool to rebuild the ESA listed Snake River fall chinook salmon. The juvenile PIT tag information from fish released at acclimation facilities on the Snake And Clearwater Rivers will be

essential in describing initial juvenile survival rates, emigration timing, and travel times. Ultimately, adult returns over Lower Granite Dam and contribution of hatchery fish to natural production will be the most important aspect in evaluating supplementation success.

HYPOTHESIS TO BE TESTED:

Ho1: No difference in emigration survival and travel times occurs between Lyons Ferry Hatchery yearling fall chinook released at Pittsburg Landing, Captain Johns Rapid, and Big Canyon Creek and yearlings released on station at Lyons Ferry Hatchery.

Corollary: A detectable difference in the emigration survival and travel times will be observed between hatchery fall chinook released at different acclimation sites and at Lyons Ferry Hatchery.

Ho2: Adult return rates will be the same for supplemented yearling fall chinook released above Lower Granite Dam and those returning to Lyons Ferry Hatchery. Corollary: A detectable difference in adult return rates will be observed between supplemented yearling fall chinook and yearling fish released at Lyons Ferry Hatchery.

Ho3: Adult return rates to the stream of release will be the same for both the Snake and Clearwater release groups. Corollary: A detectable difference in adult returns to the origin of release will be observed between the Snake And Clearwater Rivers.

ALTERNATIVE APPROACHES:

N/A, no biological objectives were rejected.

JUSTIFICATION FOR PLANNING:

N/A, project is in implementation, monitoring and evaluation phase.

METHODS:

M1: Weekly health assessments of 100 fish/wk for six weeks will be conducted in cooperation with the USFWS at each acclimation facility before release into the Snake and Clearwater Rivers. Sample sizes were evaluated and coordinated with the WDFW and USFWS to detect a disease outbreak in the acclimated fish.

M2: PIT tag a total of 10,000 yearling fall chinook at each of the three acclimation facilities in cooperation with the USFWS. At each acclimation facility, four replicates of 2,500 fish each will be PIT tagged and released over a four day period. Sample sizes for PIT tagging were determined from the 1996 PIT tagging and survival estimates for the Pittsburg Landing releases. We will use the Survival Under Proportional Hazards (SURPH) model to estimate juvenile emigration survival through the mainstem dams and ANOVA to test for survival differences between fish released at the acclimation facilities and those released from Lyons Ferry Hatchery.

M3: Radio tag 100 yearling fall chinook at the Clearwater River acclimation facility and 100 fish at one of the Snake River acclimation facilities to investigate post-release dispersal patterns, habitat selection, movement patterns in the free-flowing river segments and in Lower Granite Reservoir, resident times in the forebay, and travel routes through Lower Granite Dam. Radio tags will be placed in non-PIT tagged yearlings at each acclimation facility at least two days before release. Fish will be followed by boat and air to map movement patterns and habitat selection. Fish will also be monitored in Lower Granite Reservoir and at Lower Granite Dam through fixed receiver locations in cooperation with the U.S. Geological Survey (USGS). Sample size for radio tagging was determined from previous studies on spring chinook and steelhead by the Nez Perce Tribe and USGS.

M3: Monitor and compare contribution and distribution of adult returns and smolt-to-adult survival of yearling fall chinook released from acclimation facilities at Pittsburg Landing and Captain Johns Rapid on the Snake River and from Big Canyon Creek on the Clearwater River. We will download all adult PIT tag information from the mainstem dams and collect spawned-out fall chinook carcasses for biological information and to determine percent hatchery contributions. We will assist the USFWS in radio telemetry studies of a subsample of adults captured and tagged at Lower Granite Dam. We will conduct aerial fall chinook spawning ground surveys by helicopter (through another BPA funded study) to determine adult escapement to spawning locations. Fall chinook carcasses observed from the air will be collected and biological measurements made to determine sex, size, age, percent spawned, and if hatchery fish, what acclimation facility fish were released from as juveniles. All hatchery fish will be coded wire tagged and differentially elastomer tagged to differentiate between the three acclimation facilities and between yearlings released from Lyons Ferry Hatchery.

PLANNED ACTIVITIES

SCHEDULE:

Planning Phase **Start** 8/95 **End** 1/96 **Subcontractor** N/A

000 from 1950 through 1959 (NMFS Biological Opinion for 1995 to 1998 Hatchery Operations). Past dam counts averaged 12,700 adults at Ice Harbor Dam from 1964 through 1968 and 600 from 1975 through 1980 at Lower Granite Dam (NMFS 3/95 Proposed Recovery Plan). During the past decade, estimates of adults to Lower Granite ranged from a low of 78 fish in 1990 to a high of 958 in 1996.

Long term expected utilization and conservation potential for target population or habitat:

To use yearling fall chinook from Lyons Ferry Hatchery to supplement and recover the Snake River fall chinook in all production areas above Lower Granite Dam and then switch to a subyearling release strategy if supplementation is needed to maintain adult numbers for sustaining natural production and a viable fishery.

Contribution toward long-term goal:

Determine if supplementation will contribute to the recovery and restoration of the Snake River fall chinook and if and what level of supplementation is needed to maintain the stock in the future.

Indirect biological or environmental changes:

More favorable dam operations for increasing fall chinook survival. Habitat protection measures may be implemented in drainages where fall chinook spawning is increased and expanded.

Physical products:

We are planning to PIT tag 30,000 Lyons Ferry Hatchery fall chinook yearlings and radio tag 200 yearlings prior to release at the three acclimation facilities above Lower Granite Dam. We are also assisting the USFWS in radio tagging up to 100 adults from the acclimated releases when they return to Lower Granite Dam.

Environmental attributes affected by the project:

Water flow and dam operations during the release of fall chinook from acclimation facilities may affect how efficient the bypass and PIT tag detection facilities are at the mainstem dams which may affect estimates of emigrating survival if fish guidance efficiencies are not monitored.

Changes assumed or expected for affected environmental attributes:

For example, a total drawdown of the lower Snake River Reservoirs would preclude detections at those facilities and detections would be limited to McNary Dam with less confidence in survival estimates, however, smolt-to-adult survival may actually be higher with a drawdown scenario.

Measure of attribute changes:

Remaining fall chinook spawning habitat in the mainstem Snake and tributaries may be enhanced in the near future by protection measures in the drainages.

Assessment of effects on project outcomes of critical uncertainty:

Juvenile survival estimates and migration routes through the mainstem dams will be compared to other anadromous species and stocks to assess emigration conditions as a whole. Adult returns from supplementation will be assessed in the context of other wild and hatchery anadromous fish returns to the basin to evaluate environmental variables beyond the control of the project (i.e. juvenile emigration survival, ocean conditions, etc.).

Information products:

Information products will include chinook salmon adult escapement information and how supplementation has contributed to natural production and recovery of the Snake River fall chinook. Supplementation strategies (i.e. release timing, acclimated versus direct stream release, yearling to a subyearling release) may change to improve survival conditions and to maximize adult returns to spawning areas above Lower Granite

Coordination outcomes:

We will be coordinating with the USFWS and WDFW on project tasks and on supplementation recommendations above Lower Granite Dam based on the monitoring and evaluation findings.

MONITORING APPROACH

Juvenile movement patterns and emigration survival estimates will be important in describing survival rates through the mainstem dams in relation to current dam operations. Ultimately, monitoring adult returns to Lower Granite Dam and to the natural spawning areas will allow managers to assess the potential to recover the Snake River fall chinook through supplementation.

Provisions to monitor population status or habitat quality:

We will continue to monitor fall chinook adult returns to the spawning areas through aerial redd surveys and evaluate the contribution of supplementation by Lower Granite Dam adult returns and carcass collections in the spawning areas.

Data analysis and evaluation:

The number of adult returns to Lower Granite Dam and to the stream of acclimation and release will be compared to adult returns to Lyons Ferry Hatchery and the contribution of supplementation to enhance natural production will be evaluated.

Information feed back to management decisions:

Coordination with fishery managers on supplementation strategies that make the best contribution in enhancing natural production that will lead to fall chinook recovery and restoration.

Critical uncertainties affecting project's outcomes:

Broader scale research needs would be test different mainstem dam operation alternatives for improving smolt-to-adult survival of ESA listed stocks. A drawdown of the lower Snake River reservoirs and John Day may be what is required to increase survival for a significant difference in adult returns.

EVALUATION

Increased fall chinook adult returns to the spawning areas above Lower Granite Dam that were the result of the supplementation program.

Incorporating new information regarding uncertainties:

If juvenile survival through the mainstem dams and adult returns increase substantially in the short term, we will evaluate survival of different supplementation strategies (i.e. acclimation versus direct stream release, subyearling versus yearling) to evaluate what works best in returning the adult product that naturally occurred and in the greatest number.

Increasing public awareness of F&W activities:

By increasing the number of fall chinook to the production spawning areas above Lower Granite Dam, the public will have a better understanding of how hatcheries and supplementation can aid in the recovery and delisting of the Snake River fall chinook.

RELATIONSHIPS

RELATED BPA PROJECT

9403400

RELATIONSHIP

Project is assessing fall chinook restoration in the Clearwater River and includes subyearling fall chinook supplementation and survival studies to evaluation supplementation as a tool to enhance natural production. This project relates in that we will monitor and evaluate the effects of supplementing yearling fall chinook to enhance natural production in the Clearwater River.

Project is assessing fall chinook spawning habitat availability and quality, juvenile life history characteristics, emigration survival of wild and hatchery subyearlings, and assessing supplementation as a recovery tool by outplanting hatchery subyearlings in the mainstem Snake River. This project relates in that we will monitor and evaluate the effects of supplementing yearling fall chinook to enhance natural production in the Snake River.

RELATED NON-BPA PROJECT

Fall Chinook Salmon Survival and Supplementation studies in the Snake River and Lower Snake River Reservoirs/U.S. Corps of Engineers and BPA

RELATIONSHIP

The NMFS and USFWS worked cooperatively on this project in 1995 to evaluate the emigration survival of supplemented subyearling fall chinook (non-Snake River stock) in the Snake River above Lower Granite Dam. During 1996, we worked cooperatively with these entities to evaluate emigration survival of supplemented Lyons Ferry Hatchery subyearling fall chinook (Snake River stock) in the Snake and Clearwater Rivers. We are also cooperating with these entities and the WDFW on similar and expanded studies in 1997.

OPPORTUNITIES FOR COOPERATION:

Cooperation will continue with the WDFW and the USFWS in this supplementation monitoring and evaluation effort. Cooperation will include transportation of fish from Lyons Ferry Hatchery to the Snake and Clearwater acclimation facilities, conducting fish health assessments, PIT tagging, monitoring of juvenile performance and evaluation of adult returns over Lower Granite Dam and their contribution to natural production. We are also coordinating with the U.S. Geological Survey (USGS) in radio tagging studies of yearling fall chinook released from acclimation facilities above Lower Granite Dam. Radio receivers will be borrowed from the WDFW and the USGS will collect yearling location data in Lower Granite Reservoir and dam through their fixed receiver locations for other studies.

COSTS AND FTE

FUTURE FUNDING NEEDS:

<u>FY</u>	<u>\$ NEED</u>	<u>% PLAN</u>	<u>% IMPLEMENT</u>	<u>% O AND M</u>
1998	\$180,000		100%	0%
1999	\$180,000		100%	0%
2000	\$180,000		100%	0%
2001	\$180,000		100%	0%
2002	\$180,000		100%	0%

PAST OBLIGATIONS (incl. 1997 if done):

<u>FY</u>	<u>OTHER FUNDING SOURCE</u>	<u>AMOUNT</u>	<u>IN-KIND VALUE</u>
1998			

OTHER NON-FINANCIAL SUPPORTERS:

N/A

LONGER TERM COSTS: 180,000/yr for implementation, monitoring and evaluation of fall chinook supplementation.

1997 OVERHEAD PERCENT: Indirect costs: 29.5%

HOW DOES PERCENTAGE APPLY TO DIRECT COSTS:

Total direct project costs.

CONTRACTOR FTE: Two full time staff for six months

SUBCONTRACTOR FTE: None
