Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

EVALUATION OF FALL CHINOOK SALMON PRODUCTION AND HABITAT CONDITIONS IN THE LOWER TUCANNON RIVER

Bonneville project number, if an ongoing project 9008

Business name of agency, institution or organization requesting funding
Washington Department of Fish and Wildlife, Snake River Lab, 401 S. Cottonwood Dayton, WA 99328

Business acronym (if appropriate) WDFW

Proposal contact person :

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
None			

NPPC Program Measure Number(s) which this project addresses. .

4.1A.3. This proposal will be used in assessing the success of the existing Model Watershed Programs in the Tucannon and Pataha river basins by providing baseline information on spawning conditions and success, as well as measuring changes as habitat improvements are implemented.

7.2. As part of the assessment of the Model Watershed Programs in the basin, and as baseline information for determining future supplementation, this study could address the measures under 7.2 of the Council's Plan. This includes evaluating future adjustments to

the Lyons Ferry Hatchery program to facilitate rebuilding a naturally produced population of fall chinook by using scientifically supported programs to supplement weak wild and naturally spawning fish populations, and to balance hatchery releases with the capacity of the natural environment (7.2D.1, 7.4A.1, 7.2A.6, 7.5B.1, 7.5B.3, 7.6B.3., 7.6B.3, 7.6D).

NMFS Biological Opinion Number(s) which this project addresses.

NMFS Proposed Recovery Plan

4.1.d. This study will provide information needed to develop and implement a management plan for Snake River fall chinook salmon gene banking and conservation, particularly regarding hatchery supplementation in the Tucannon and Snake rivers.

4.3-4.7 This study would provide baseline information for a potential future hatchery supplementation program that may partially address these five measures.

4.8. This study will also assist with optimizing hatchery production of fall chinook salmon in the Snake River Basin while conserving natural populations. This would be the first step of assessing the potential for fall chinook supplementation in the lower Tucannon River.

Other planning document references. Lower Snake River Compensation Plan

Subbasin. Tucannon River Subbasin.

Short description.

Determine the origin of the fall chinook found in the lower Tucannon River of South East Washington, and if these fish represent a self-sustaining population. Identify which factors are limiting production. We propose this project as a first step toward recovery of this salmon population.

Since 1987, WDFW, under funding from the Lower Snake River Compensation Program (LSRCP), has documented 16-61 fall chinook salmon redds per year in the lower Tucannon River. These naturally spawning salmon are listed as threatened under the Endangered Species Act (ESA). Also, the Tucannon River has been listed as critical habitat under the ESA.

Presently, we do not know if these fish represent a portion of a self-sustaining population, or even produce juvenile migrants consistently year to year. We also cannot predict the likelihood of success of a possible hatchery supplementation program without more information concerning habitat conditions and fall chinook production. We suspect that severe turbidity during high water events, channel instability, and high sedimentation of the substrate are some of the factors limiting natural production .

Redd success and habitat conditions would be assessed. Migrating sub-yearling chinook salmon would be captured, identified and enumerated. Migration and return success as

adults to the Snake or Tucannon would be estimated. Electrophoretic or DNA analysis would be used for genetic stock identification.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish		Construction	+	Watershed
	Resident fish		O & M	+	Biodiversity/genetics
	Wildlife		Production	X	Population dynamics
	Oceans/estuaries	X	Research		Ecosystems
	Climate	+	Monitoring/eval.		Flow/survival
	Other	+	Resource mgmt		Fish disease
		+	Planning/admin.	+	Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords. stock identification, life history

Section 3. Relationships to other Bonneville projects

The study can provide a habitat assessment baseline that would be invaluable for evaluating the two model watershed programs (Tucannon and Pataha rivers; Project number 9401800) that are now being developed in the Tucannon River Basin. Delay in funding this project will reduce our effectiveness in monitoring and evaluating the model watershed programs and in addressing the feasibility of increasing this population through a combination of habitat improvements and supplementation.

Project #	Project title/description	Nature of relationship
9401800	Tucannon and Pataha rivers model watershed programs	provide a habitat assessment baseline

Section 4. Objectives, tasks and schedules

Obj	Objective	Task	Task
1	Determine the fate of fall chinook redds, eggs and alevins.	1A	Conduct weekly spawning ground surveys, identify and mark location of all redds.
		1B	Cap 3-5 natural redds. Monitor

			success of eggs and alevins.
		1C	Collect fall chinook salmon eggs from the brood stock at Lyons Ferry Hatchery and incubate eggs to the eyed stage
		1D	Create 3-5 or more artificial redds, place a known number (approximately 2,000) eggs in egg baskets, in each redd.
		1E	Cap these redds. Monitor success of eggs and alevins.
		1F	Estimate egg to hatch success by digging the egg basket up, count the number of un-hatched eggs. Divide this number by the total number of eggs placed in a basket
		1G	Estimate egg to swim up success by dividing the number of alevins collected by the total number of eggs placed in a basket.
2	Determine the presence of and estimate annual production of juvenile fall chinook smolts leaving the river.	2A	Operate fish trap, capture, identify enumerate, PIT tag, CWT and adipose fin clip fall chinook salmon smolts.
		2B	Associate fall chinook genetic characteristics to physical characteristics and migration time to assist in identification upon capture.
		2C	Compare scale samples to distinguish between natural origin fall and spring chinook to facilitate identification upon capture
		2D	Mark and release a known number of fall chinook smolts upstream of the fish trap to recapture and calibrate trap efficiency.
		2E	Estimate the number of fall chinook smolts annually leaving the river.
3	Monitor juvenile fish out migrant to adult return success.	3A	Collect information concerning tagged and fin clipped juvenile and adult chinook interrogated at the Snake River dams and or observed in the Tucannon River

			during spawning surveys.
4	Estimate annual egg to smolt success of juvenile fall chinook	4A	Estimate the total number of eggs in the river by multiplying the total number of redds times average fecundity.
		4B	Estimate annual egg to smolt success by dividing the estimate of annual smolt production determined from Objective 1, by the total number of eggs in the river.
5	Identify in- river factors that would limit fall chinook production. Special attention will be placed on identifying extreme conditions throughout the year.	5A	Monitor daily river flow and temperatures throughout the year via USGS flow measurements and WDFW temperature recorders in the lower Tucannon River. Special attention will be paid to variances above and below tributaries.
		5B	Monitor silt deposition on both artificial and natural redds during the spawning and incubation period using freeze core and scour chain, methods.
6	Determine genetically, and through scale samples comparisons, if fall chinook found in the Tucannon River are of Snake River Origin.	6A	Collect genetic (fin clips, scales, tissue) samples of adults and juvenile fish.
		6B	Have the genetic characteristics of these fish analyzed by DNA or electrophoretic methods and the results compared to known origin Snake River fall chinook salmon.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	October/99-2002	May/99-2002	33
2	March/99-2002	July/99-2002	30
3	March/99-2002	December/99-2002	10

4	November/99-2002	December/99-2002	2
5	October/99	December/2002	15
6	March/99-2002	July/99-2002	10

Schedule constraints. During some years extreme river flows may preclude successful redd capping and trapping of juvenile salmon. ESA concerns may prevent us from disturbing natural fall chinook redds. In this case we will have to apply for a modification to our section 10 permit or use the results from artificial redds created as natural as possible without using egg baskets. We would also need to request a modification to our section 10 permit for approval to PiT tag more fish. Because this project is not scheduled to begin until 1999 we will have time to request these changes.

Completion date. 2003, This project is expected to require 5 years initially,(1999-2003) and then possibly continue intermittently thereafter to monitor changes in spawning habitat and redd success.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	Three Technician 2s, Two Biologist 3s, one Biologist 4 and one Graduate student.	$58,682
Fringe benefits	Required for all except the graduate student (his will come from the university)	$9,799
Supplies, materials, non-expendable property	Freeze core sampler, temperature recorders, materials to build redd caps.	$3,000
Operations & maintenance	Vehicle maintenance	$1,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	None	0
PIT tags	# of tags: 1,000 x $2.90/tag	2,900
Travel	Gas 1000 miles/month x $0.31 x 5 months	$1,550
Indirect costs	Overhead at 19.5%	$14,997
Subcontracts	None	0
Other	None	0
TOTAL		$91,928

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	$96,524	$101,351	$106,418	$111,739

O&M as % of total	2.6%	2.6%	2.6%	2.6%

Section 6. Abstract

The proposed project will determine if the fall chinook found in the lower Tucannon River of South East Washington represent a self-sustaining population of Snake River origin fish, and to identify which factors are limiting production. We propose this project as a first step toward recovery of this salmon population. Project objectives are designed to gather information on the genetic origin, presence, abundance and fate of fall chinook redds, eggs, alevins and smolts, as well as smolt to adult survival. Information will be gathered that identifies which factors are limiting survival of this salmon population. The results of this study will be used as part of the assessment of the Model Watershed Programs (1992 NWPPC) in the basin, and as baseline information for determining if future Lower Snake River Compensation Plan (1975 USACE), hatchery supplementation could address the Columbia Basin Fish and Wildlife Program (1994 NWPPC) attempt to encourage rebuilding a naturally produced population of fall chinook. Findings will be used to develop scientifically supported programs to supplement weak wild and naturally spawning fish, and to balance hatchery releases with the capacity of the natural environment. The project is proposed for 1999-2003. A detailed report of results and recommendations will be provided.

Section 7. Project description

a. Technical and/or scientific background.

Since 1987, the Washington Department of Fish and Wildlife (WDFW) has documented 16-61 fall chinook salmon redds per year in the lower Tucannon River. Most recovered salmon carcasses have not been externally marked. Although the origin of most spawning fall chinook in the Tucannon River is uncertain, these naturally spawning salmon are listed as threatened under the Endangered Species Act (ESA).

We speculate that severe turbidity during high water events, channel instability, and high sedimentation of the substrate are some of the factors limiting natural production of salmon in the lower Tucannon River. Presently, we do not know if naturally spawning fall chinook in the lower Tucannon River are a self sustaining population, or even produce juvenile migrants during most years. We also cannot predict the likelihood of success of a possible hatchery supplementation program for fall chinook salmon without more information concerning habitat conditions and fall chinook production in the lower Tucannon River.

b. Proposal objectives

1) Determine the fate of fall chinook redds, eggs and alevins; 2) Determine the presence and fate of juvenile fall chinook; 3) Monitor juvenile fish out- migrant to adult return success; 4) Estimate annual production of juvenile fall chinook; 5) Assess the quantity and quality of salmon spawning habitat available in the Tucannon River from Highway 12 down river to the mouth; 6) Identify in river factors that would limit fall chinook production and 7) Determine genetically if fall chinook found in the Tucannon River are of Snake River origin. A detailed report of results and recommendations will be provided.

c. Rationale and significance to Regional Programs

The proposed project would partially satisfy the following measures in the NWPPC's Fish and Wildlife Program and the NMFS's Proposed Recovery Plan.

NWPPC Fish and Wildlife Plan

4.1A.3. This proposal will be used in assessing the success of the existing Model Watershed Programs in the Tucannon and Pataha river basins by providing baseline information on spawning conditions and success, as well as measuring changes as habitat improvements are implemented.

7.2. As part of the assessment of the Model Watershed Programs in the basin, and as baseline information for determining future supplementation, this study could address the measures under 7.2 of the Council's Plan. This includes evaluating future adjustments to the Lyons Ferry Hatchery program to facilitate rebuilding a naturally produced population of fall chinook by using scientifically supported programs to supplement weak wild and naturally spawning fish populations, and to balance hatchery releases with the capacity of the natural environment (7.2D.1, 7.4A.1, 7.2A.6, 7.5B.1, 7.5B.3, 7.6B.3., 7.6B.3, 7.6D).

NMFS Proposed Recovery Plan

4.1.d. This study will provide information needed to develop and implement a management plan for Snake River fall chinook salmon gene banking and conservation, particularly regarding hatchery supplementation in the Tucannon and Snake rivers.

4.3-4.7 This study would provide baseline information for a potential future hatchery supplementation program that may partially address these five measures.

4.8. This study will also assist with optimizing hatchery production of fall chinook salmon in the Snake River Basin while conserving natural populations. This would be the first step of assessing the potential for fall chinook supplementation in the lower Tucannon River.

d. Project history: None

e. Methods.

Redd success and habitat conditions would be assessed with a combination of redd capping, monitoring of artificial redds, scour chains and freeze core sampling. In conjunction with our LSRCP study of spring chinook and steelhead, we would operate a juvenile migrant trap in the lower river to capture and enumerate sub-yearling chinook salmon. Sub-yearling fall chinook would be identified from spring chinook through scale sample comparisons, DNA or electrophoretic analysis, and through differences in physical traits. Tissue samples would be collected from adult and juvenile fall chinook and analyzed for genetic stock identification. Some naturally produced fall chinook captured at the juvenile migrant trap may be PIT tagged or otherwise marked for external identification to assess migration and return as adults to the Snake or Tucannon rivers. We will secure the necessary permits from the NMFS for our proposed actions, or modify our existing Section 10 permit that covers our current activities in the Tucannon River for spring chinook salmon.

Project Objectives and Tasks:

Objective 1. Determine the fate of fall chinook redds, eggs and alevins.

Task 1A Conduct weekly spawning ground surveys, identify and mark location of all redds.

Task 1B Cap 3-5 natural redds. Monitor success of eggs and alviens.

*Because of the threatened status of this population we feel the smallest sample size that will allow statistical comparisons should be used.

Task 1C Collect fall chinook salmon eggs from the brood stock at Lyons Ferry Hatchery and incubate eggs to the eyed stage

Task 1D Create 3-5 or more artificial redds, place a known number (approximately 2,000) eggs in egg baskets in each redd.

*Because we will cap only a small number of natural redds, we will increase our sample size by construct and monitor as many artificial redds as the egg supply will allow.

Task 1E Cap these redds. Monitor success of eggs and alevins.

Task 1F Estimate egg to hatch success by digging the egg basket up, count the number of un-hatched eggs. Divide this number by the total number of eggs placed in a basket

Task 1G Estimate egg to swim up success by dividing the number of alevins collected by the total number of eggs placed in a basket.

Objective 2 Determine the presence of and estimate annual production of juvenile fall chinook smolts leaving the river.

Task 2A Operate fish trap, capture, identify enumerate, PIT tag, CWT and adipose fin clip fall chinook salmon smolts.

Task 2B Associate fall chinook genetic characteristics to physical characteristics and migration time to assist in identification upon capture.

Task 2C Compare scale samples to distinguish between natural origin fall and spring chinook to facilitate identification upon capture

Task 2D Mark and release a known number of fall chinook smolts upstream of the fish trap to recapture and calibrate trap efficiency.

Task 2E Estimate the number of fall chinook smolts annually leaving the river.

Objective 3 Monitor juvenile fish out migrant to adult return success.

Task 3A Collect information concerning tagged and fin clipped juvenile and adult chinook interrogated at the Snake River dams and or observed in the Tucannon River during spawning surveys.

Objective 4 Estimate annual egg to smolt success of juvenile fall chinook

Task 4A Estimate the total number of eggs in the river by multiplying the total number of redds times average fecundity.

Task 4B Estimate annual egg to smolt success by dividing the estimate of annual smolt production determined from Objective 1, by the total number of eggs in the river.

Objective 5 Identify in river factors that would limit fall chinook production. Special attention will be placed on identifying extreme conditions throughout the year.

Task 5A Monitor daily river flow and temperatures throughout the year via USGS flow measurements and WDFW temperature recorders from Highway 12 down river to the mouth. Special attention will be paid to variances above and below tributaries.

Task 5B Monitor silt deposition on both artificial and natural redds during the spawning and incubation period using freeze core and scour chain, methods.

Objective 6 Determine genetically and through scale samples comparisons if fall chinook found in the Tucannon River are of Snake River Origin.

Task 6A Collect genetic (fin clips, scales tissue) samples of adults and juvenile fish

Task 6B Have the genetic characteristics of these fish analyzed by DNA or electrophoretic methods and the results compared to known origin Snake River fall chinook salmon.

f. Facilities and equipment.

Fall chinook will be spawned and their eggs incubated at Lyons Ferry Hatchery. A fully functional and reliable juvenile fish trap is already owned by the WDFW. Some money may need to be spent in the future for maintenance of this trap. Office space, and vehicles will be provided by the WDFW at the Snake River Lab in Dayton. Field equipment such as the materials to build redd caps, scour chains a freeze core sampler, screens to sift substrate from the core samples and other minor field equipment and some office supplies will have to be purchased

g. References.

Northwest Power Planning Council. 1992. Strategy for salmon, Tucannon River Model Watershed Plan. 1997. Northwest Power Planning Council. Portland, Oregon.

Northwest Power Planning Council. 1994. Columbia River Basin Fish and Wildlife Program. Northwest Power Planning Council. Portland, Oregon.

U.S. Army Engineer District. 1975. Lower Snake River Fish and Wildlife Compensation Plan. Special Report, U.S. Army Engineer District Walla Walla, Washington.

Section 8. Relationships to other projects

This study would provide important information about spawning and incubation habitat, spawning success, and production for a naturally spawning population of threatened Snake River fall chinook salmon in designated critical habitat. We would be able to determine if the Tucannon River is a production area for Snake River origin fall chinook salmon and whether the Tucannon River provides suitable "critical" habitat. Current stock accountability used for ESA recovery of fall chinook may be incomplete. This study would also enable us to evaluate the potential for supplementing the Tucannon fall chinook population from Lyons Ferry Hatchery under the Lower Snake River Compensation Plan in the future. Supplementation has been suggested for the Tucannon River fall chinook as part of US v Oregon discussions by the Production Advisory Committee. The proposed study should be funded for 1999 to facilitate coordination with related data collection for on-going LSRCP studies of spring chinook and steelhead, and because it is consistent with, and necessary for, the proposed Recovery Plan and the NWPPC's Fish and Wildlife Program. Further, the study can provide a habitat assessment baseline that would be invaluable for evaluating the two model watershed programs (Tucannon and Pataha rivers; Project number 9401800) that are now being developed in the Tucannon River Basin. Delay in funding this project will reduce our effectiveness in monitoring and evaluating the model watershed programs and in addressing the feasibility of increasing this population through a combination of habitat improvements and supplementation.

Section 9. Key personnel

Responsibilities will be shared by:

Art Viola, Fish Biologist 3 WDFW, Hatcheries Assessment and Development

Joe Bumgarner, Fish Biologist 3, WDFW, Hatcheries Assessment and Development

Mark Schuck, Fish Bio 4 WDFW, Hatcheries Assessment and Development

Deborah Milks Fish Bio 1 WDFW, Hatcheries Assessment and Development

Glen Mendel Fish Bio 3 WDFW, Fish Management

Resume=s are included

Section 10. Information/technology transfer

WDFW will report the findings of this study in an annual publication for the LSRCP, and, if possible, a journal publication. Results will be incorporated into the WDFW and the Tucannon River Model Watershed Projects= decision making process.

Thank you for reviewing this FY99 project proposal.