

**Bonneville Power Administration  
Fish and Wildlife Program FY99 Proposal**

**Section 1. General administrative information**

**Begin Implementation Of Year 1 Of The K Pool  
Master Plan Program**

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**Bonneville project number, if an ongoing project**    9603201

**Business name of agency, institution or organization requesting funding**  
Yakama Indian Nation

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**Business acronym (if appropriate)**    YIN

**Proposal contact person or principal investigator:**

**Name**                    Lynn Hatcher  
**Mailing Address**    P.O. Box 151  
**City, ST Zip**         Toppenish, WA 98948  
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**Subcontractors.**

<b>Organization</b>	<b>Mailing Address</b>	<b>City, ST Zip</b>	<b>Contact Name</b>
B.N. Anderson	95005 Reata Rd	Kennewick, WA 99338	B.N. Anderson
D.I. Herborn	319 Seattle Ct	Richland, WA 99352	D.I. Herborn
Quality Aquatics	1604 L Ave	La Grande, OR 97850	T.L. Macy
PNNL	P.O. Box 999	Richland, WA 99352	Dennis Dauble
Yakama Industries	P.O. Box 406	Wapato, WA 98951	James Horton
AquaGen Engineers	P.O. Box 210	El Nido, CA 95317	G.R. Grace
Forster Consulting, Inc.	533 East Park	Port Angeles, WA 98362	John Forster
Stan Owsley	5132 Wren Ct	West Richland, WA 99353	Stan Owsley

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

7.4J.4, 7.4J.5

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

Endangered Species Act of 1973 (ESA), Section 7, Biological Opinion on 1995-1998 Hatchery Operations in the Columbia River Basin, Consultation Number [383]

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**Other planning document references.**

Wy-Kan-Ush-Mi Wa-Kish-Wit: Spirit of the Salmon

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**Subbasin.**

Lower Mid-Columbia River Mainstem, Yakima River

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**Short description.**

Initiate white sturgeon rearing activities and Pacific lamprey pilot studies specified in the K Pool Master Plan that will lead to supplementation programs that will reestablish naturally reproducing populations of these species.

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**Section 2. Key words**

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

**Other keywords.**

White sturgeon, Pacific lamprey

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**Section 3. Relationships to other Bonneville projects**

Project #	Project title/description	Nature of relationship

## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Initiate white sturgeon supplementation program	a	Initiate white sturgeon spawning and egg hatching activities
		b	Initiate white sturgeon juvenile rearing activities
		c	Initiate white sturgeon broodstock development activities
2	Initiate Pacific lamprey supplementation program	a	Capture wild Pacific lamprey ammocoetes and/or juveniles
		b	Prepare aquatic laboratory for Pacific lamprey pilot tests

### *Objective schedules and costs*

<b>Objective #</b>	<b>Start Date mm/yyyy</b>	<b>End Date mm/yyyy</b>	<b>Cost %</b>
1	10/1998	10/2008	0.93
2	10/1998	10/2008	0.07
			TOTAL 100.00%

### **Schedule constraints.**

### **Completion date.**

2008

## Section 5. Budget

### *FY99 budget by line item*

<b>Item</b>	<b>Note</b>	<b>FY99</b>
Personnel		\$68,200
Fringe benefits	@ 25.3%	\$17,300

Supplies, materials, non-expendable property		\$150,600
Operations & maintenance	Sum of all items but capital and M&E = \$583,000	
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		\$187,300
PIT tags	# of tags: 500 PIT + 10,000 CWTs	\$2,500
Travel		\$6,800
Indirect costs	@ 26.8%	\$123,000
Subcontracts		\$213,700
Other	M&E costs	76,000
<b>TOTAL</b>		<b>\$845,400</b>

***Outyear costs***

<b>Outyear costs</b>	<b>FY2000</b>	<b>FY01</b>	<b>FY02</b>	<b>FY03</b>
Total budget	\$1,300,000	\$1,400,000	\$1,200,000	\$1,100,000
O&M as % of total	38.00%	33.00%	32.00%	31.00%

**Section 6. Abstract**

This project initiates white sturgeon and Pacific lamprey supplementation activities specified in the K Pool Master Plan, which was prepared by the YIN under contract 96-BI-94489 with BPA to implement Section 7.4J.4 of the NPPC Fish and Wildlife Program. The K Pool Master Plan is currently under review and is fully expected to be approved in FY98. The overall project objective is for this supplementation program to become a valuable tool for reestablishing naturally spawning populations of white sturgeon and Pacific lamprey in the Columbia Basin. The goal for the white sturgeon portion of the project is to prepare facilities and initiate spawning and egg hatching, broodstock development, and juvenile rearing activities. The goal for the lamprey portion is to prepare detailed plans and conceptual designs for pilot rearing tests and to initiate capture of wild juveniles. At the end of FY99, it is expected that the project will be well underway and proving critical concepts and assumptions. The project approaches and methods will be genetically sound and will test natural rearing environment concepts, as explained in the Master Plan. The project will be initiated at several facilities and in phases so as to be very cost effective and to provide the flexibility for adaptive management to make changes when they become necessary. The monitoring and evaluation activities and plans are described in the Master Plan.

**Section 7. Project description**

**a. Technical and/or scientific background.**

The importance of fishing to the Yakama Indian Nation and the problem of steadily declining white sturgeon and Pacific lamprey fisheries are described in Chapter 2 of the K Pool Master Plan. The goals and objectives of the Master Plan white sturgeon and lamprey activities implement FWP measures under Section 7.4J.4; are completely consistent with the framework, hypotheses, and recommendations of Wy-Kan-Ush-Mi Wa-Kish-Wit; and are consistent with the positions and recommendations in relevant federal and state fishery agency plans and programs. Chapter 4 of the Master Plan describes in detail the relationship of this project to other plans, federal legislation, and court settlements. Chapter 5 of the Master Plan shows the overall conceptual framework for the white sturgeon supplementation program, which integrates logical components such as production goals, facility options, biological criteria, risks (genetic, disease transmission, and ecological interactions), a monitoring and evaluation program, and use of an Independent Impact Assessment team's conclusions and recommendations. Chapter 7 of the Master Plan describes the overall conceptual framework for the lamprey supplementation activities. The YIN fisheries staff has over four years of experience in raising white sturgeon. In 1993, about 350 two-to-three year old sturgeon were given to the YIN by two private companies and placed in net pens in a K Pool where they are currently being reared.

**b. Proposal objectives.**

**Objective 1: Initiate White Sturgeon Supplementation Program**

Task a): Prepare a facility and initiate white sturgeon spawning and egg hatching activities. Several wild gravid white sturgeon female will initially be captured and spawned, as described in Chapter 5 of the Master Plan. The eggs taken will then be fertilized and incubated. This will test this concept for obtaining sturgeon fry for eventual supplementation purposes.

Task b): Prepare a facility and initiate white sturgeon juvenile rearing activities. Selected fry obtained from the Task a) activities will be raised for at least a year in preparation for sturgeon supplementation described in Chapter 5 of the Master Plan.

Task c): Prepare a facility and initiate white sturgeon broodstock development activities. Capture some wild subadult sturgeon (average age of 4 years) and acclimate them to appropriate captive rearing environments. This will test the concept of acclimating captured wild sturgeon and developing captive broodstock that can eventually obviate the need for the supplementation program to take gravid wild females.

**Objective 2: Initiate Pacific Lamprey Supplementation Program**

Task a): Perform pilot tests on capturing wild lamprey ammocoetes and/or downstream migrating juveniles for eventual use in the future rearing tests.

Task b): Prepare a detailed plan and conceptual design for a Pacific lamprey pilot rearing test. Develop a controlled rearing and testing environment for use in determining if lamprey can easily acclimate to rearing in a freshwater environment.

**c. Rationale and significance to Regional Programs.**

The rationale for the white sturgeon supplementation project and its phased approach are presented in Chapter 5 of the Master Plan. The initial short-term production goals and objectives are as follows: (1) capturing up to 18 gravid female sturgeon and associated mature male annually for the spawning and egg taking activity, (2) obtaining 110,000 fry annually from the incubation task and rearing them at least one year until they reach a supplementation release size, and (3) obtaining 500 young adult wild sturgeon annually for the broodstock development activity. From the regional benefits derived and lessons learned from the initial phase of the white sturgeon supplementation project, plans will be made for futher FWP goals in the intermediate and long term. The vision is for the YIN to ultimately develop cost-effective modern facilities and operations that can provide healthy and genetically-compatible sturgeon juveniles for restoring populations in all Columbia River Basin impoundments to optimum levels.

The rationale for the Pacific lamprey supplementation project is presented in Chapter 7 of the Master Plan. The initial phases of the lamprey project will be pilot-scale tests under controlled aquatic laboratory conditions. There is evidence that adult lamprey have fed in freshwater in dam impoundments when migration paths were cut off. Thus there is the possibility that a freshwater production program can be developed. If the initial tests are successful then the intermediate-term goal of the lamprey project is to develop a capability for significant artificial normative freshwater production and propagation.

**d. Project history**

Other than the preparation of a Master Plan, no work has been initiated under this project.

**e. Methods.**

Methodology for Objective 1, Task a): Prepare a facility and initiate white sturgeon spawning and egg hatching activities. Shallow circular small-diameter holding tanks will be needed to spawn gravid females. These will be situated so that fish can easily be lifted

from and returned to them. The females will be inoculated, lifted from a tank, and laid upside down in a stretcher. With water flowing over the fish's gills, the female can be held in this position while the eggs are surgically removed. After egg taking, the female will be sutured and placed in a holding tank for observation before release to the wild. Once the eggs are fertilized and a de-adhesion procedure performed, they will then be incubated in MacDonald-type hatching jars. Once the sturgeon fry hatch, they will be placed in a series of shallow tanks and raised until they are transferred to juvenile rearing facilities. The requirements, tasks, and methods for accomplishing this task are described in detail in Chapters 5, 8 and 9 of the Master Plan. A factor that may limit the success of Task a) is the ability to capture wild gravid females.

Methodology for Objective 1, Task b): Prepare a facility and initiate white sturgeon juvenile rearing activities. The minimum culture volume to raise 110,000 sturgeon juveniles to an average weight of 0.25 lb at the end of a rearing year is 60,000 gal. In addition, the minimum water flow rate for this production objective is 750 gpm. The minimum basic equipment needs to meet these requirements are a series of circular fiberglass tanks (ranging from 5-ft to 20-ft in diameter), a settling basin and sludge hopper, PVC piping and plumbing, a well or surface source of 750 gpm of clean water, and low-head oxygenators and associated equipment. The requirements, tasks, and methods for accomplishing Task b) are also described in detail in Chapters 5, 8 and 9 of the Master Plan.

Methodology for Objective 1, Task c): Prepare a facility and initiate white sturgeon broodstock development activities. The minimum culture volume to rear 500 wild sub-adult white sturgeon in a captive broodstock-rearing environment is 100,000 gal and the minimum water flow rate needed is 1,250 gpm. This requires ten circular fiberglass tanks 20 ft in diameter or equivalent volume raceways or pools and a river water source of 1,250 gpm. The requirements, tasks, and methods for accomplishing Task c) are described in detail in Chapters 5, 8 and 9 of the Master Plan. A factor that may limit the success of Task c) is the ability to acclimate wild young sturgeon to captive conditions and to take feed.

Methodology for Objective 2, Task a): Perform pilot tests on capturing wild lamprey ammocoetes and/or downstream migrating juveniles for eventual use in lamprey rearing tests. The following options exist: (1) obtain wild ammocoetes from mud if water levels drop unusually low or use artificial methods similar to night crawler retrieval, and (2) obtain downstream migrating young adults from juvenile fish collection facilities at dams.

Methodology for Objective 2, Task b): Prepare a detailed plan and conceptual design for a Pacific lamprey pilot rearing test. A pilot-scale culture system is to be set up for proof-of-principle testing in a controlled environment to determine if lamprey can easily acclimate to rearing in a freshwater environment and to see if the adult parasitic phase can be tested using host fish, such as rainbow trout or easily captured indigenous suckers.

**f. Facilities and equipment.**

The currently unused Washington Department of Fish and Wildlife (WDFW) Yakima Trout Hatchery (YTH) near the Yakima airport will be used for the white sturgeon spawning and egg hatching and juvenile rearing activities. It is centrally located to transport wild gravid females obtained from the lower Columbia River and mid-to-upper Columbia River dam impoundments where sturgeon recruitment is low or no longer taking place. Partly sedated female sturgeon should be capable of doing well on a road journey of several hours. To use the YTH for these two sturgeon rearing activities will require renovating the existing hatchery building and water supply and discharge systems, sealing the surfaces of some concrete pools and raceways, providing new spawning and hatching equipment, and providing some new juvenile rearing tanks. In addition, arrangements with WDFW will be needed as well as some design and permitting activities. The YTH capabilities and the possible modifications needed are described in Chapters 1, 5, 8 and 9 of the Master Plan.

The existing K Pool facilities at the Hanford Site will be used for the white sturgeon broodstock development activity. In the past, the K Pools have proved to have flexible and cost-effective facilities and infrastructure for successful fish rearing projects, including the raising of sturgeon. The knowledge gained from past rearing projects is being extrapolated to the concept of using several pools in tandem, with one pool serving as a “head pond” and another adjacent pool outfitted with tanks or raceways on the pool floor for broodstock rearing. To use the K Pools for broodstock development will require obtaining and installing new tanks or raceways and also providing a new smaller river water pump. A detailed technical evaluation of the K Pool capabilities for fish rearing and broodstock development is provided in Chapter 8 of the Master Plan. Most arrangements for the use and permitting of the K Pools have been completed.

The Aquatic Laboratory operated by Pacific Northwest National Laboratory (PNNL) and located at the 300 Area of the Hanford Site will be used for the Pacific lamprey pilot-scale tests. This laboratory has a long history of successfully rearing and culturing fish species and invertebrate organisms. Columbia River and groundwater can be conditioned to meet specific rearing needs, and the temperature and lighting can be controlled to simulate seasonal and diurnal cycles. Emergency backup systems protect the water supply, electrical and other critical life-support systems. Some design activity and new equipment will likely be needed to modify existing features and systems for lamprey pilot testing.

**g. References.**

Herborn, D.I., T.L. Macy and B.N. Anderson, January 1998, *Master Plan for Acclimation and Artificial Propagation of Anadromous Fish, White Sturgeon, and Pacific Lamprey in the K Pool Facilities at the Hanford Site, Washington*, Bonneville Power Administration, Portland, Oregon (to be published).

## Section 8. Relationships to other projects

Strenuous efforts will be made to avoid duplication of sturgeon monitoring, index sampling, stock assessment, and evaluation efforts. There will be close coordination with regional sturgeon research programs so that research and production objectives are met and tasks are not duplicated. The relationships and coordination needs are described in Chapter 5 of the Master Plan.

## Section 9. Key personnel

### RESUME

Name: Lynn Hatcher  
Address: 1380 Orchardvale , Zillah, WA 98953  
Birthdate: February 10, 1951, Wichita, Kansas  
Nationality: U.S.  
Sex: Male

Education: High School: Mount Rainier, Des Moines, Washington, 1969  
Bachelor of Science, College of Fisheries, University of Washington 1974

Work Experience: National Marine Fisheries Service: Summers 1970, 1971, 1972.

Participated in fur seal harvest and tagging studies on St. Paul Island, Alaska.

Quinault Indian Nation, Fisheries Biologist, 1974 to 1979.

Supervised :

Adult Escapement and enumeration studies for assesment of salmon and steelhead run dynamics.

Supervised and designed:

Aquatic productivity studies.

Participated in a wide range of aquaculture activities including brood stock acquisition, spawning operations, incubation, fry and smolt rearing, sampling, tagging, and release.

Puget Sound Power and Light Company, Fisheries Biologist 1979-1980

Supervised:

Skagit River Aquatic Resources Program.

Yakama Indian Nation, Fisheries Biologist 1980-1982,

Supervised:

Data collection and analysis for tribal fisheries staff.

Yakama Indian Nation, Fisheries Program Manager, 1983-Present.

Supervised and Managed:

A team of professionals engaged in a variety of fisheries management activities.

Achievements:

National Marine Fisheries Service Incentive Award: 1970, 1971, 1972.

Yakama Nation Supervisor of the Year Award: 1991, 1996

## **Section 10. Information/technology transfer**

Technical information generated by this project will be shared through publication of results in reports and briefings at public meetings.