

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

Section 1. General administrative information

**Supplement And Enhance The Two Existing
Stocks Of Yakima R. Fall Chinook.**

Bonneville project number, if an ongoing project 9603301

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

Business acronym (if appropriate) YIN

Proposal contact person or principal investigator:

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Subcontractors.

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

7.3B, 7.4A, 7.4F, 7.4O, 7.4K.1

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

Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995a); Biological Assessment of 1997-2001 Hatchery Operations of the Proposed Cle Elum Hatchery, December 1995 (BPA 1995); NMFS concurrence letter dated 4/1/96.

Other planning document references.

Subbasin.
 Yakima

Short description.

- Test new supplementation techniques to increase natural production and improve harvest opportunities, while maintaining genetic fitness of salmonid populations; and,
 - Provide critical knowledge to resource managers throughout the Columbia River Basin
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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	+	Population dynamics
	Oceans/estuaries	X	Research	+	Ecosystems
	Climate	+	Monitoring/eval.	+	Flow/survival
	Other	+	Resource mgmt	+	Fish disease
		+	Planning/admin.	X	Supplementation
			Enforcement		Wildlife habitat en-
		+	Acquisitions		hancement/restoration

Other keywords.

DNA, stock identification, life history, modeling, nutrient dynamics, predation, hydrodynamics, hatchery-wild interactions, ecological interactions

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
8812001	Yakima/Klickitat Fisheries Project MGMT.	Core Management/Admin. Support services for all YIN's YKFP Tasks.
8811500	Yakima Hatchery Construction	Final design/construction of needed acclimation facilities/wells for YFP.
9701300	Yakima Cle Elum Hatchery O&M	O&M costs for Cle Elum Supplementation and Research Facilities. Core Facility for the Yakima Fisheries Project.
9506300	Yakima/Klickitat M&E Program	Covers the diverse M&E needs for the target species which are essential for the success of the YKFP.

8812008	Fisheries Technician Field Activities	Provides essential technical support to fulfill the diverse needs of the YKFP i.e. M&E support, surveys, juvenile facility operations, marking, etc.
8812005	Fish Passage Video Monitoring	Monitors, at Prosser and Roza dams, the adult salmonids returning to Yakima Basin. The need for this key M&E information is essential to YFP.
9706200	Objectives & Strategies for Yakima	Represents the modeling process, for iterative planning for species consistent with the Regional Assessment of Supplementation Project.
9603302	Yakima River Coho Restoration-O&M	Essential for YKFP's all stock initiative for experimental purposes for supplementation.
9506404	Policy/Tech Involvement/Planning-YKFP	Supports the required co-manager process for the YKFP
9506406	Monitoring of Supplementation Response Variables for YKFP	Essential for adequate M&E planning and technical participation as co-manager of the YKFP.
9506402	Upper Yakima Species Interaction Studies	Vital M&E function relative to behavior of multi species within the Yakima Basin for the YKFP. Defines competitive/ecological interaction

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	GENETIC- Minimize genetic risks as described by Busack and Currens (1995) (extinction, loss of within-population variability, loss of between-population variability, and domestication selection) to Marion Drain and mainstem stocks	a	Segregate stocks by selecting broodstock

1		b	Whose origin can be reasonably well determined. Continue refinement of techniques for determining stock of origin of individual fish; e.g., DNA, elemental analysis, scale pattern analysis, etc.
1		c	Use for broodstock only fish that are not first-generation hatchery fish
1		d	Spawn fish in accordance with YKFP broodstock mating guidelines.
1		e	Use less than 50% of the natural-origin adult escapement from each stock for broodstock purposes. Segregate fall chinook by stock through rearing and release.
1		f	Develop and apply methods to maximize the likelihood that only Marion Drain-origin fish enter and spawn in Marion Drain.
2	NATURAL PRODUCTION- Optimize natural production of fall chinook with respect to abundance and distribution.	a	Site acclimation and release facilities to optimize natural spawning distribution (temporal and spatial)
2		b	Assess the productivity of environmentally distinct portions of the lower river for fall chinook production by inventorying habitat quality attributes and estimating the survival of marked test fish released in such areas.
2		c	Develop facilities, procedures and marking methods to estimate the production of wild and hatchery smolts and adults on a stock-specific basis.
2		d	Develop computer models to estimate productivity and carrying capacity of potential release sites and to determine the probability of ultimately increasing natural production on the basis of incomplete empirical data.

3	NATURAL PRODUCTION- Optimize natural production of fall chinook while managing adverse ecological impacts resulting from interactions between and within species and stocks.	a	Use harvest management and the location of acclimation and release facilities to optimize natural spawning distribution (temporal and spatial).
3		b	Control the magnitude of releases(number of fish released), the size of fish released,and the timing and location of releases to minimize adverse impacts of indirect predation on wild conspecifics.
3		c	Assess pre-implementation status (distribution, abundance, and size distributions) of non-target taxa of concern, set criteria for allowable adverse impacts, and determine whether criterial post-implementation changes are due to supplementation. (Cont.
3		c	If criterial changes are due to supplementaion, alter protocols appropriately.
4	EXPERIMENTAL - Use supplementation as described by RASP (1991) (i.e., to increase natural production of Yakima fall chinook and increase harvest opportunities, while keeping genetic and ecological impacts within acceptable limits) to provide scientific	a	Monitor the fall chinook supplementation effort, following the approach developed in the YKFP Spring Chinook Monitoring Plan (Busack et al. 1997)
4		b	Experimentally test new rearing and/or acclimation treatments designed to improve performance of hatchery fall chinook.
4		c	Develop techniques of identifying individual fish to stock so that broodstock for the mainstem stock can be collected from facilities in the lower river (Horn Dam or Prosser Dam) with little

			probability of including Marion Drain fish. Collect (Cont.)
4		c	Marion Drain broodstock from a trap located inside Marion Drain.
4		d	Retrofit the adult collection facilities at Prosser Dam or retrofit the adult ladders at Horn Dam to permit benign, unbiased collection of adults for broodstock.
4		e	Release all hatchery smolts from acclimation ponds connected to target streams located in areas determined to be suitable for supplementation in terms of productivity and carrying capacity.
4		f	Release a number of hatchery fish from M. Drain and mainstem acclimation facilities consistent with life history characteristics of local populations and revised estimates of carrying capacity and productivity for habitat in the area of acclim. ponds.
4		g	Conduct power analyses of all experimental and monitoring efforts prior to inception to insure that power is adequate to detect effects of biological significance.
5	HARVEST – Increase harvest opportunities for all fishers consistent with the requirements of genetic, natural production, and experimentation objectives.	a	Develop policies to increase harvest opportunities inside the Yakima Basin for all fishers.
5		b	Develop procedures to estimate stock-specific harvest of wild and hatchery Yakima fall chinook inside the Yakima Basin and in major oceanic and Columbia River fisheries.
6	ECOLOGICAL INTERACTIONS – Keep adverse impacts of fall chinook supplementation on non-target taxa of concern (NTTOC) within prescribed limits.	a	Determine pre-implementation status (distribution, abundance and size distributions) of NTTOC and set maximum allowable adverse impacts in relation to baseline values.

6		b	Monitor status of NTTOC after implementation, conduct focused studies as warranted to determine cause of criterial impacts, and alter supplementation protocols as needed or accept impacts as a lesser priority.
7	ECOLOGICAL INTERACTIONS - Limit losses of wild and hatchery smolts to native and exotic predators to levels that do not significantly limit the scope for increase in natural production	a	Design and conduct experiments to evaluate the level of predation upon supplemental and natural fall chinook smolts and implement prey protection or predator control measures as warranted.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	6/1996	12/2048	20.00%
2	6/1996	12/2048	20.00%
3	6/1996	12/2048	20.00%
4	6/1996	12/2048	20.00%
5	6/1996	12/2048	5.00%
6	6/1996	12/2048	7.50%
7	6/1996	12/2048	7.50%
			TOTAL 100.00%

Schedule constraints.

Broodstock availability, construction, NEPA, PSR, budget constraints

Completion date.

2048

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		\$150,000
Fringe benefits	25.3%	\$37,950
Supplies, materials, non-expendable property		\$75,000
Operations & maintenance		\$300,000

Capital acquisitions or improvements (e.g. land, buildings, major equip.)		\$170,000
PIT tags	# of tags:	
Travel		\$35,000
Indirect costs	26.6%	\$185,654
Subcontracts		\$100,000
Other		
TOTAL		\$1,053,604

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$1,080,000	\$1,145,000	\$1,110,000	\$1,165,000
O&M as % of total	30.00%	32.00%	35.00%	36.00%

Section 6. Abstract

- a. The operation and maintenance of fall chinook acclimation/supplementation sites. These sites will be developed in strategic areas to optimize fish rearing activities, and in areas determined most productive for successful adult returns..
- b. The YKFP’s core objectives are as follows:
 - 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
 - 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
 - 3) To implement and be consistent with the Council's Fish and Wildlife Program;
 - and
 - 4) To implement the Project in a prudent and environmentally sound manner.
- c. All activities conducted by the YKFP are consistent with the NPPC’s Columbia River Basin Fish and Wildlife Program (“Program”) Measure 7.4K.1.
- d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The project plans to evaluate several generations of releases to obtain a statistically significant result.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. The Project's upper Yakima spring chinook monitoring plan addresses the following five monitoring categories which the fall chinook project will be modeled after. Not all of these steps may be used: 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs. SNT) and to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment, and 5. Monitoring of stock status.

Details can be found in the YKFP's M&E Project No. 9506300.

Section 7. Project description

a. Technical and/or scientific background.

The Yakima Klickitat Fisheries Project is part of a comprehensive effort by the Northwest Power Planning Council, Yakama Indian Nation, Washington Department of Fish and Wildlife, U.S. Bureau of Reclamation, U.S. Forest Service, and the Bonneville Power Administration to protect, mitigate and enhance the anadromous fish populations in the Yakima and Klickitat River basins. These governments and agencies have developed and implemented a long-term strategy to restore the habitat and ecosystem necessary to support the anadromous fish resources in the Yakima River basin and to increase fish production through supplementation.

Earlier fishery and habitat mitigation efforts in the Yakima River Basin include federal legislation to authorize passage improvements (fish screening and adult ladders) at numerous irrigation facilities. Other efforts include measures to enhance Yakima River Basin water resources, which will benefit anadromous fish. In 1984, the Yakima River Basin Water and Conservation Act, Public Law 103-434, authorized such water conservation activities, including improvements to irrigation water delivery systems. The USFS, as well as State and private entities have also conducted habitat improvement activities in the basin.

Some fishery mitigation activities are currently taking place in the basin under the auspices of the Columbia River Fish Management Plan. Current CRFMP-sponsored activities in the basin include programs for both fall chinook and coho. The fall chinook program includes the annual production and release of 1.7 million smolts in to the lower Yakima River. Since 1987, 700,000 early-run coho from the Cascade Hatchery have been released in the basin. In 1995, an additional 600,000 juvenile coho were obtained by the YIN fisheries program for release in the basin. Such mitigation programs have been necessitated by the losses attributed to the development of federal hydroelectric projects.

Historically, the Yakima River carried spring, summer, and fall chinook salmon; sockeye salmon; coho salmon; and summer steelhead. Prior to extensive agricultural development in the Yakima river Basin, the numbers of anadromous fish returning to the Yakima River were estimated to have ranged from 600,000 to as many as 960,000 per year (Bryant and Parkhurst, 1950; USBR and USFWS, 1976; YIN et al., 1990). The Table below sets forth a comparison of the estimated historical fish runs (by species/race) with recent run size averages.

Estimates of Historical Anadromous Fish Runs in the Yakima River as Compared to Recent Run Size (5-year average, 1989-1994). (Fast, EIS, 1994)

Species/Race	Pre-1900 Run	Recent Average
Fall Chinook	132,000	1,200
Spring Chinook	200,000	3,800
Summer Chinook	68,000	0
Coho	110,000	240

Summer Steelhead	80,500	1,100
Sockeye	200,000	0

Wild sockeye and coho salmon are now extinct; the handful of sockeye and coho salmon now present in the Yakima River Basin are the result of strays from other Columbia River watersheds or hatchery plants of nonlocal fish into the Yakima River. They have not established naturalized populations in the Yakima River. Summer chinook are believed to be extinct, but this has not been confirmed. Spring and fall chinook salmon and summer steelhead are present, but at a fraction of their original numbers. The 1989-1994 5-year mean annual return of salmon and steelhead to the Yakima River system is approximately 6,300 adults (less than 1 percent of the historical run size).

Planned by the Council since 1982 and included its Columbia River Basin Fish and Wildlife Program (“Program”) as Measure 7.4K.1, the YKFP’s operation is calculated to compensate for losses from development and operation of hydroelectric projects elsewhere in the Columbia Basin. Project development has been subject to the NMFS Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995a) and BPA’s Biological Assessment of 1997-2001 Hatchery Operations of the Proposed Cle Elum Hatchery, December 1995 (BPA 1995), which was concurred to by NMFS in its letter dated 4/1/96. See YKFP Final EIS, January 1996.

It is the Council’s intention that the YKFP will help determine the role that supplementation might play in increasing natural production of anadromous salmonids throughout the Columbia Basin. The YKFP is designed to test the hypothesis that success of supplementation can be improved by rearing fish under more natural conditions in the hatchery (substrate, cover, structure, natural feeding, predators, etc) and by following genetic guidelines to minimize differences between the supplementation fish and the naturally reared fish. Preliminary research projects on the naturalized rearing have been conducted by NMFS and WDF&W scientists to determine the appropriate treatment variables to be tested in the large scale production experiments that the YKFP is conducting.

b. Proposal objectives.

The Project managers have agreed on a set of objectives and strategies for supplementing each of the Yakima River Basin stocks. Since the Project’s inception, these objectives and strategies have been reviewed (i.e. critical peer review) and revised. The objectives and strategies are precise and increasingly specific statements about the YKFP in four categories: genetics, natural production, experimentation, and harvest, while taking steps to contain unacceptable genetic and ecological risks.

Quantitative production objectives (for most of the seven stocks originally identified to be supplemented as part of the YKFP) were formulated in 1990 in the Refined Goals section

of the Preliminary Design Report (BPA, 1990b). The Refined Goals objectives were based on computer simulations generated by the Council's System Planning Model.

Project objectives are continually re-assessed in the light of the latest demographic data, suspected ecological relationships, and modeling tools. Quantitative production objectives for upper Yakima spring chinook have been refined, based on computer simulations using the Ecosystem Diagnostic and Treatment Planning Model (EDTPM) (Lestelle et al., 1994) developed under the Regional Assessment of Supplementation Project (RASP, 1992). BPA and the project managers have used the EDTPM for YKFP planning rather than the System Planning Model, because it tracks juvenile production capacity more closely and allows for variable (density-dependent) predation on outmigrating smolts.

c. Rationale and significance to Regional Programs.

The Yakima Klickitat Fisheries Project is part of a comprehensive effort by the Northwest Power Planning Council, Yakama Indian Nation, Washington Department of Fish and Wildlife, U.S. Bureau of Reclamation, U.S. Forest Service, and the Bonneville Power Administration to protect, mitigate and enhance the anadromous fish populations in the Yakima and Klickitat River basins. These governments and agencies have developed and implemented a long-term strategy to restore the habitat and ecosystem necessary to support the anadromous fish resources in the Yakima River basin and to increase fish production through supplementation.

Planned by the Council since 1982 and included its Columbia River Basin Fish and Wildlife Program ("Program") as Measure 7.4K.1, the YKFP's operation is calculated to compensate for losses from development and operation of hydroelectric projects elsewhere in the Columbia Basin. Project development has been subject to the NMFS Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995a) and BPA's Biological Assessment of 1997-2001 Hatchery Operations of the Proposed Cle Elum Hatchery, December 1995 (BPA 1995), which was concurred to by NMFS in its letter dated 4/1/96. See YKFP Final EIS, January 1996.

d. Project history

The Yakima Klickitat Fisheries Project ("YKFP or Project") was first approved by the Northwest Power Planning Council ("NPPC or Council") in 1982. At that time, the Council envisioned the Project as a cluster of production facilities in both the Yakima and Klickitat River Basins designed to enhance the fishery for the Yakama Indian Nation ("YIN") and other harvesters. The development of the Project's master plan began in 1985. By that time, however, the Council had modified the purpose of the Project to include research activities testing the assumption that new supplementation methods

could increase natural production while protecting the genetic resources common to the river basins. The Council also determined that the principles of adaptive management, which encourages an affirmative pro-active response to research discoveries, were to be utilized by the resource managers selected to manage the YKFP. These managers are the YIN and the Washington Department of Fish and Wildlife (“WDFW”).

As recommended and directed by the Council, the Project’s master plan, which included a supplementation research program, was conceived and developed. On October 15, 1987, the Council approved the YKFP’s master plan, which included the construction of the production and acclimation facilities in the Upper Yakima River Basin commonly referred to as the Upper Yakima Supplementation Complex (“UYSC or Complex”). Consistent with the NPPC’s Columbia River Basin Fish and Wildlife Program (“Program”) Measure 7.4K.1, the Project’s Preliminary Design Report was completed in 1990. At that time, an Environmental Assessment (EA) was prepared for YKFP construction activities and facility operations throughout the Yakima and Klickitat River Basins.

In 1992, the Project began the process of preparing an Environmental Impact Statement (“EIS”). During the EIS’s preparation period, the Council endorsed the managers proposal to “tier” the Project’s production and research activities by bringing them on-line in gradual stages. The first phase (tier) targeted the supplementation of depressed populations of upper Yakima river spring chinook. This initial phase also included research designed to determine the feasibility of re-establishing a naturally spawning population and a significant fall fishery of coho salmon in the Yakima Basin. Future phases of the YKFP include the supplementation of fall chinook and steelhead, and a reintroduction of now extirpated stocks. Also envisioned for the Project’s future is the introduction of supplementation to the Klickitat Basin, which could include the use of the Klickitat Hatchery, a Mitchell Act facility now operated by WDFW.

By design, the supplementation of summer steelhead and fall chinook populations in the Yakima basin was not detailed in the initial EIS. Research activities focused upon the Klickitat River fisheries also fell outside its scope. However, they remain essential components of the Project. At this time, fall chinook, steelhead and the Klickitat basin are the subjects of on-going research activities designed to determine whether the YKFP will support the introduction of additional anadromous fish stocks into its production and research programs.

The Project’s EIS was completed in 1996, and the Record of Decision (“ROD”) was signed by BPA’s Administrator and Chief Executive Officer, Randall W. Hardy, on March 13, 1996. With the completion of the EIS and the signing of the ROD, construction of the YKFP’s Cle Elum Supplementation and Research Facility (“Cle Elum Facility”) began in May of 1996. The Cle Elum Facility was completed on August 1, 1997. The UYSC also includes three acclimation facilities to be constructed in the Upper Yakima basin. Thus far, the YIN, as the Project’s Lead Agency and the UYSC’s operator, has captured 240 adult spring chinook at the Roza adult collection facility. Egg

taking and fertilization procedures were performed in September 1997. 450,000 eggs were fertilized and incubated at the facility. Funding for the continued operation and maintenance of the UYSC has been approved by the Council and included in Program Measure 7.4K.1.

Earlier YKFP project numbers included under the Council's Fish and Wildlife plan are as follows:

- 82-016 - YAKIMA RV. SPRING CHINOOK ENHANCEMENT STUDY - YIN
- 85-062 - PASSANGE IMPROVEMENT EVALUATION - BPNL
- 86-045 - YAKIMA HATCHERY PRE-DESIGN - CLE ELUM PROJECT - NMFS
- 86-101 - FILMING FOR PROJECT RECORD - MOVING PICTURES INC.
- 87-135 - YAKIMA HATCHERY - MASTER PLAN DEVEL - YIN
- 87-136 - YAKIMA HATCHERY - WAPATO CANAL PEN REARING - YIN
- 87-414 - YAKIMA ANADROMOUS FISH A/V - JOHN CAMPBELL
- 88-120 - YAKIMA NAT. PROD. & ENHANCEMENT PROG. - YIN
- 88-120-01 - YAKIMA/KLICKITAT FISHERIES PROJECT MGMT. - YIN
- 88-120-02 - YAKIMA ENGINEER ASSISTANCE - YIN
- 88-120-03 - YAKIMA SPECIES INTERACTION - YIN
- 88-120-04 - HATCHERY TRAINING AND EDUCATION - YIN
- 88-120-05 - FISH PASSAGE VIDEO MONITORING - YIN
- 88-120-06 - YAKIMA FISHERIES TECHNICIANS - YIN
- 88-120-07 - YAKIMA SPRING CHINOOK NATURAL PROD. - YIN
- 88-120-08 - FISHERIES TECHNICIAN FIELD ACTIVITIES - YIN
- 88-120-09 - STEELHEAD AND FALL CHINOOK PROD. OBJECTIVES - YIN
- 88-123 - YAKIMA HATCHERY COORDINATION - ROZA IRRIGATION DISTRICT
- 88-149 - YAKIMA HATCHERY - WATER ANALYSIS - BOR
- 88-167 - YAKIMA HATCHERY ECONOMIC STUDY - CWU
- 89-082 - YAKIMA HATCHERY - EXPERIMENTAL DESIGN - WDFW
- 89-083 - YAKIMA HATCHERY - EXPERIMENTAL DESIGN - WDFW
- 89-089 - YAKIMA/KLICKITAT RADIO TELEMETRY STUDY - NMFS
- 89-100 - YAKIMA HATCHERY ENVIRONMENTAL ASSESS. REVIEW - BPNL
- 89-105 - YAKIMA - SPECIES INTERACTION STUDY - WDFW
- 90-058 - YAKIMA HATCHERY - PROJ. LEADER FUNCTION - SAMPSEL CONS.
- 90-062 - CLERICAL SERVICES-YAKIMA PROJECT - PENNYS FROM HEAVEN
- 90-065 - CHANDLER JUVENILE TRAP CALIBRATION - NMFS
- 90-069 - YAKIMA HATCHERY - FINAL DESIGN - CH2M HILL
- 90-045 - YAKIMA ADULT/JUVENILE TRAPPING FINAL DESIGN - BOR
- 91-048 - EVAL. OF ENV. IMPACTS OF YAKIMA PROD. PROG. - BPNL
- 91-055 - SUPPLEMENTATION FISH QUALITY (YAKIMA) - NMFS
- 91-059 - FOOD ABUNDANCE YAKIMA RV TROUT, STLHD, CHINOOK - CWU
- 92-021 - EXPERIMENTAL DESIGN DEVELOPMENT - CWU
- 94-037 - YAKIMA BIO SPEC INTERFACE - HATCHERY OP CONSULTING
- 94-036 - ECONOMIC IMPACT ANALYSIS YAKIMA RV BASIN - CWU
- 94-040 - QUANTITATIVE PROD. OBJ. FOR YAKIMA FALL CH. & STLHD - MOBRAND

- 95-055 - UPDATE OF YAKIMA FISH PROJECT ECONOMIC ANALYSIS -
CWU
- 95-062 - YAKIMA/KLICKITAT FISH. PROJECT ADAPT. MGMT. -
- 95-063 - YAKIMA/KLICKITAT MONT. AND EVAL. PROGRAM -
- 95-064 - YAKIMA FISHERIES PROJECT SCI. MGMT SERVICES - WDFW
- 95-064-01 - REFINEMENT OF MARKING METHODS FOR YKFP - WDFW
- 95-064-02 - UPPER YAKIMA RIVER SPECIES INTERACTION STUDIES - WDFW
- 95-064-03 - GENETIC MGMT. FRAMEWORK FOR YAKIMA SP. CHINOOK - WDFW
- 95-064-04 - POLICY/TECHNICAL INVOLVEMENT AND PLANNING - WDFW
- 95-064-05 - FURTHER DEVEL. OF NIT/LNIT REARING STRATEGY FOR YKFP -
WDFW
- 95-068 - KLUCKITAT PASSAGE/HABITAT PRELIMINARY DESIGN - YIN

BONNEVILLE PROJECT SPECIFIC SUPPORT

- 88-034 - ENGINEERING SUPPORT --YAKIMA HATCHERY (also 92-029, 91-
080) - BPA
- 88-115 - YAKIMA HATCHERY CONSTRUCTION - BPA
- 89-042 - ENGINEERING SERVICES PREL. DESIGN S&S FACIL -
- 89-043 - YAKIMA HATCHERY - PRELIMINARY ENGINEERING -
- 89-093 - BPA CONSTRUCTION SUPPORT FOR YAKIMA HATCHERY - BPA
- 93-081 - BPA LANDS SUPPORT FOR YAKIMA HATCHERY - BPA
- 95-037 - SUPPORT FROM FACILITIES DESIGN - BPA
- 95-038 - SUPPORT FROM CONSTRUCTION SERVICES - BPA
- 95-040 - SUPPORT FROM REAL ESTATE - BPA
- 95-061 - SUPPORT FOR ENVIRONMENTAL ANALYSIS -
- 95-069 - YAKIMA/CLE ELUM LAND PURCHASE -

A summary of Project reports and technical papers can be found in the YKFP's Final EIS (January 1996). All major research results are include in those reports. Hardcopies of these reports are in the possession of BPA's Fish and Wildlife Program.

Because the YKFP is attempting to mitigate for effects on declining natural resources in a complicated, large-scale ecosystem without a full understanding of its complexities, the Project managers believe the principles of adaptive management to be particularly appropriate tools. By incorporating them into the Project's scientific method, the managers expect to achieve Project goals while protecting the basin's fishery resources from unforeseen, adverse Project impacts.

In applying adaptive management, actions by YKFP managers will respond to a set of agreed-upon objectives. These actions are designed as experiments to test hypotheses regarding their outcome: to see whether the predicted result occurs or whether some other result occurs. Carefully designed to obtain valid (i.e., statistically reliable) results, the experiments are conducted, monitored and evaluated to allow statistical evaluation of the results. New experimental insights are used to modify or discard ineffective strategies, to improve underlying theory and, when necessary, to revise objectives to conform with perceived possibilities. Informed Project scientists and managers may modify programs, procedures, and facilities in response to these findings, even if it means drastic changes to a program. Thus risks to the ecosystem are realized and addressed in the Project's annual

planning cycle (described in detail below), which will annually examine the capacity and constraints of the stock and stream system, as well as the performance of hatchery fish, testing and revising a theory of supplementation. The rearing and release of each new group of smolts will represent an experimental test of the latest revision of the theory.

e. Methods.

Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. It enables them project managers to determine whether an action achieved its objective, or whether the objective was properly developed. Monitoring should also provide insight into the actual result of an action as well as explain the success (or lack) in achieving the predicted result.

The YKFP's PSR lays out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. It also ensures efficiency, prevents duplication of effort, and tracks progress toward meeting objectives.

Since monitoring activities for these categories overlap, they will be developed into an integrated monitoring plan. The monitoring plan would be revised and expanded as part of the adaptive management process. The Project's upper Yakima spring chinook monitoring plan, which will be used as a template for future production activities, addresses the following five monitoring categories:

1. Quality control will monitor the performance of the facilities and their operators. Standards would be developed for all fish culture and data collection activities as part of the certification process required for the facilities. Monitoring procedures would be included in the operations manuals for all facilities and field activities.
2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival.
3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs. SNT) and to compare their performance with naturally reared fish. These monitoring activities would be performed at the Roza and Chandler juvenile facilities for outmigrating smolts, at the Prosser and Roza fish ladders and collection facilities for returning adults, and on the spawning grounds for straying rates and reproductive success monitoring. Research monitoring would include measurements of performance in four main areas:
 - o post-release survival (survival from time of release until the fish return to spawn);

- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment consists of a monitoring plan developed to evaluate four categories of interest identified in the risk analysis to monitor risk containment: 1) experimental; 2) genetic; 3) harvest; and, 4) natural production/ecological interactions. These four areas relate back to the objectives and strategies. The risk analysis defines risk in terms of the probability of failure to meet the objectives of the project for these four categories.

5. Monitoring of stock status includes measurements of run size and escapement to determine whether harvest objectives can be met without affecting natural production. It would provide information essential to track the long-term performance and fitness of the fish populations.

Details of the monitoring program can be found in “Yakima Fisheries Project Spring Chinook Supplementation Monitoring Plan”, Busack et al, 1997. Also see YIN project 9506300, YKFP Monitoring and Evaluation Proposal.

Implementation of the monitoring plan, annual review of the findings, and subsequent adjustment, as necessary, of the supplementation program objectives, strategies, assumptions, uncertainties, and risk analysis would complete the feedback loop that is essential to the success of the adaptive management process, and ultimately, the entire project.

f. Facilities and equipment.

The facilities designed to enable the YKFP’s restoration and production activities include Prosser Tribal Hatchery, Marion Drain Tribal Hatchery, Chandler Juvenile Facility, and various acclimation ponds at strategic sites in the Yakima Basin. Earlier fishery and habitat mitigation efforts in the basin include fish passage improvements at numerous irrigation facilities. In addition, the Yakima River Basin and Conservation Act, Public Law 103-434 (1994), authorizes the dedication of water conserved as a result of federally funded improvements to irrigation facilities and practices to enhance instream flows.

Facilities needed for the Yakima fall chinook experimental program include those for adult capture, holding and spawning, egg incubation, juvenile rearing, acclimation, release, and monitoring.

Facilities will be required for fish originating from both in-basin and out-of-basin broodstock.. Existing adult fall chinook trapping will be used to collect in-basin broodstock.

Existing ponds, side channels, and irrigation ditches in the Yakima basins are being investigated for this supplementation purpose. Sites are evaluated based on their biological suitability, accessibility, water supply dependability, water supply quality, and cost of site development. Each will require fish containment apparatus, water flow control structures, avian and mammalian predator protection, and a discharge channel from the rearing area to the river allowing safe smolt passage.

Monitoring facilities will be identified through the development and implementation of the URP. They will meet the needs of the five levels of monitoring needed for the project and follow the hatchery practices, fish health, ecological interaction, and genetic policy guidelines developed by the Integrated Hatchery Operations Team (IHOT) and endorsed by tribal, state, and federal resource managers.

Descriptions of specific project facilities and equipment follow:

Acclimation sites

Fish culture equipment - feed buckets, feed scoops, boots, rain gear, scales, sample nets, dip nets, dissolved oxygen meters, and thermometers are among the equipment to be used.

Alarm systems - alarm systems will sense low water levels and low flow conditions, then send signals via radio frequencies to an auto dialer which will notify personnel of the alarm status.

Hand tools - necessary tools include shovels, hand saws, hammers, wrenches, sledges, rakes, drills, skill saws, small portable generators, cell phones, etc.

Barrier nets - nets used to contain fish will be sized to meet the conditions at each site. They will be installed at an angle to the flow to maximize the net surface area. Trash nets will have a 1" mesh size, coho barrier nets will have a 1/2" mesh size, and fry barrier nets will have a 3/32" mesh size. Nets will have heavy weights attached to their lead lines and will be well anchored to the ground on the surface to prevent blowouts.

Screen structures - sites requiring screen structures will be built to meet the WDFW screen requirements. Screens will be sloped to allow for easy cleaning and to increase surface area.

Predator control - bird netting will cover suitable sites and wire mesh fencing will be added as needed.

Flow control - sites which do not have a means of controlling the amount of flow entering the rearing area will require removable structures constructed of sand bags and pipe. They will be located upstream of the barrier nets.

Vehicles - a variety of vehicles will be utilized for the project, including full size pick-ups and light trucks.

Hatcheries

Water intake screens - sloped screen intakes will supply water to the facilities. The screens will meet WDFW criteria for approach velocity and screen mesh size.

Water supply pumps - low head pumps will supply rearing and incubation water. Multiple pumps per site will provide a safety back up. Generators with automatic transfer

switches will provide power during outages. The pump and generator size will be site dependent.

Incubators - fiberglass, deep tough incubators will incubate eggs and serve as first feeding units. Water and space will also be available for the installation of bucket incubators for individual females.

Rearing ponds - the main rearing units will be vinyl lined ponds, measuring 150' long, 50' deep, with a 4' water depth (22,000 cft). They will have sloped, concrete screen structures at the downstream end and a pipe manifold across the front end. They will be covered with predator netting. Each pond will be capable of holding up to 400,000 coho smolts.

Office equipment - computers, printers, telephones, fax machines, radios, microwaves, refrigerators, sleeping bunks, desks, chairs, and file cabinets are needed. Provisions will be made to allow overnight stays in the office during storm events.

Fish waste cleaning system - a vacuum will be generated by a high pressure pump and a venturi nozzle. Pipelines throughout the sites will allow attachment of cleaning heads to the vacuum system. Wastes will be removed from the rearing unit bottoms and stored in a waste pond.

Monitoring and Evaluation

Screw traps - portable traps to monitor migratory in-basin natural and hatchery production. Used to collect samples for stomach analysis and demographic data.

Snorkel equipment - used for visual monitoring of species habitat preference, ecological interactions, growth rates, adult carcass retrieval.

Beach seines - used to sample study reaches in order to collect demographic data on species of concern.

Rafts – used to access remote acclimation sites, and to conduct spawning ground surveys.

Electro-shockers-use for population census.

g. References.

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 Washington; and Washington Department of Fisheries and Department of
 Wildlife, Olympia, Washington; for the Northwest Power Planning Council and
 Agencies and Indian Tribes of the Columbia Basin Fish and Wildlife Authority.

Section 8. Relationships to other projects

The following projects are vital to the success of the Fall Chinook Supplementation Project as well as the Spring Chinook Supplementation Project and the Coho Restoration Project: 9105700, Yakima Phase 2 Screen Fabrication, Vital to species control within basin for straying into irrigation diversions- 9200900, Yakima Screen II-O&M, Vital to maintain screens for above purpose and effectiveness- 9107500, Yakima Phase 2 Screens- Construction, Vital for control within basin for straying into irrigation diversions- 9503300, O&M of Yakima Fish Protection, Mitigation & Enhancement Facilities, Vital to maintain screens for control of target species within basin from irrigation diversion- 9704900, Teanaway Instream Flow Restoration, Essential tributary enhancement vital to success for YKFP- 9603501, Satus Watershed Restoration, Represents a positive factor for improving tributaries within Yakima Basin; Vital for supplementation.

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Section 9. Key personnel

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EXPERIENCE:

2/93-PRESENT POLICY ADVISOR/PROJECT COORDINATOR
Yakima/Klickitat Fisheries Project
Yakama Indian Nation
Toppenish, WA 98948

1989-1992 PRESIDENT
-Melco Petroleum Inc., Wapato, WA 98951
***Wholesale fuel distribution**
VICE-PRESIDENT
-Yakima Petroleum Inc., Wapato, WA 98951
***Wholesale fuel distribution**
-Eagle Stop and Save, Inc.
***Fuel-convenience stores**
-Yakima Solutions Inc., Wapato, WA 98951
-Native Solutions Inc., Wapato, WA 98951
***Consulting and Business Management**

1985-1989 CHAIRMAN, YAKAMA TRIBAL COUNCIL

1971-1989 YAKAMA TRIBAL COUNCIL (ELECTED)
Committees served:
-Timber, Grazing, Overall Economic Development
-Loan, Extension, Education, and Housing
-Legislative
-Health, Employment, Welfare, Recreation, and Youth

Activities

-Budget and Finance
-Executive Board
-Enrollment
-Special Tax Committee
-Radio Active/Hazardous Waste
-Public Relations/Media
-While serving on the Tribal Council for 18 years, I served as
Chairman at one point of the listed committees

1971 TRIBAL PLANNER

1969-1970 ASSISTANT MANAGER
PERSONNEL MANAGER
-White Swan Industries

- Wholesale Furniture Manufacturing
- 1968-1969** **RESIDENT COUNSELOR**
 -Fort Simco Job Corps
 -Worked nights, commuted to CWSU during day
- 1967-1968** **MANAGER TRAINEE**
 -White Swan Industries
 -Wholesale Furniture Manufacturing
- 1965-1967** **Industrial injury, not employed**
- 1961-1965** **STUDENT**
 -Lower Columbia College, Longview, WA
 -While attending college, worked full time at night in a lumber
 planner mill in various jobs, including lumber grader.
- 1959-1961** -U.S. Army, Active Service
- 1956-1959** **VARIOUS JOBS**
 -Fisherman
 -Boeing Aircraft Company
 -Construction
 -Farm Labor

EDUCATION:

- American Indian Management Institute, Albuquerque, NM**
 -Completed six-week comprehensive studies on Tribal Executive
 Development
- Central Washington State College, Ellensburg, WA**
 -Major: Sociology Minor: Psychology, Business
- Lower Columbia College, Longview, WA**
 -Business Major
- Lower Columbia College, Longview, WA**
 -Associate Degree in Electronics, 1963
- White Swan High School, White Swan, WA.**
 -Graduate, 1956

ORGANIZATION AFFILIATES:

- Lifetime member, National Congress of American Indians
- Member, Fraternal Order of Eagles No. 2225, Toppenish, WA
- Founder, member, past Chairman, Northwest Portland Area Indian Health
 Board,

Portland, OR. (18 years)
 -Member, past Chairman, National Indian Health Board, Denver, CO (16ears)
 -Served as a member, Indian Food & Nutrition Board, Denver, CO (3 years)
 -Served, Yakima Valley College Board of Trustee, Yakima, WA (2 years)
 -Served as member, founder, Heritage College Board of Trustees, Toppenish, WA
 -Served on Advisory Board, Master of Public Health, University of California at Berkeley, CA. (2 years)
 -Served on, Inter-Mountain School Board, Provo, UT (2 years)
 -Member, President, Yakama Indian Rodeo Assoc., (25 years, volunteer)
 -Member, founder, past President, Western States Indian Rodeo Assoc. (20 years)
 -Member, founder, current President, Indian National Finals Rodeo, Inc.,(22 years)
 -Served as member, Special Yakima Rodeo Board, to produce, promote the National High School Rodeo Finals in Yakima, WA. in 1980.
 -Served on "The Advisory Panel on Alternative Means of Financing and Managing Radioactive Waste Facilities", Administrative Appointee, Depart. of Energy, 1984.

RECOGNITIONS:

-Yakama Indian Nation, Supervisor of the Year, 1995.
 -Board Member of the year, Northwest Portland Area Indian Health Board, 4 times.
 -Board Member of the year, National Indian Health Board, 2 times.
 -Special Recognition of Appreciation as a Founder of Western States Indian Rodeo Association on their Tenth Anniversary.
 -Special Recognition as a Founder of the Indian National Finals Rodeo from the American Revolution Bicentennial, 1776-1976.
 -National Indian Rodeo Man of the Year, 1978, Hoof and Horns Magazine.
 -National Indian Man of the Year, American Indian Heritage Foundation, Washington, D.C., 1988.

MILITARY EXPERIENCE:

1959-1965 VETERAN, United States Army, Honorable Discharge, SGT E-5.

PERSONAL DATA:

Date of Birth: April 20, 1938
Tribe: Yakama, Enrollment # 4059
Marital Status: Married, 5 daughters, 1 son

HOBBIES AND INTERESTS:

-Hunting, Fishing, Horses, Sports, Crafts, & Rodeo

REFERENCES:

-Submitted upon request

CURRICULUM VITAE

DAVID E. FAST

Fisheries Resource Management
P.O. Box 151
Toppenish, Washington 98948
Work: 509-966-5291

Education

University of Washington, Seattle, Washington
Doctor of Philosophy in Fisheries Science, 1987.

University of Puerto Rico, Mayaguez, Puerto Rico
Master of Science in Marine Sciences, 1974.

St. John's University, Collegeville, Minnesota
Bachelor of Science in Zoology, 1969.

Research Experience

1988-Present: Research Manager. Fisheries Resource Management Program, Yakima Indian Nation. Responsible for the design, development, and implementation of a major supplementation and research facility to test the concept of using artificial production to rebuild natural spawning populations of spring chinook salmon in the Yakima Basin. Write detailed project plans, develop short and long-term project goals and objectives, and supervise professional and technical staff.

1985-1988: Project Leader. Spring Chinook Enhancement Study.

Responsible for research project designed to determine the best methods of enhancing the spring chinook salmon population in the Yakima Basin. Evaluate survival through various life stages and total production of naturally producing salmon. Determine methods of supplementation with hatchery reared fish while minimizing adverse genetic impacts.

Fast, D.E. 1987. The Behavior of salmonid alevins in response to light, velocity and dissolved oxygen during incubation.

Pages 84-92 in Salmonid Migration and Distribution Symposium (E.L. Brannon, ed.), School of Fisheries, University of Washington, and Directorate for Nature Management, Norway, Trondheim, Norway.

Fast, D.E., J.D. Hubble, T.B. Scribner, M.V. Johnston, W.R. Sharp.

1989. Yakima/Klickitat Natural Production and Enhancement Program. 1989 Annual Report to Bonneville Power Administration. Project 88-120. 107 pp.

Fast, D.E. 1989. Supplementation Strategies For The Yakima/Klickitat Production Facility. Pages 143-147 in Northwest Fish Culture Conference Proceedings (R.Z. Smith, ed.).

Fast, D.E., J.D. Hubble, M.S.Kohn, and B.D.Watson. 1991. Yakima River Spring Chinook Enhancement Study. Project Completion Report to Bonneville Power Administration. Project 82-16. Volume 1 - 345 pp. and Volume 2 (Appendices) 133 pp.

RESUME

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Dependents: Two Daughters
D.O.B.: 3/26/52
S.S.#: 531-56-5568
Enrollment #: Yakama Nation #4264

EDUCATION:

90-92 Bachelor of Science Degree in Biology, Central Washington University,
Ellensburg., Washington
73-77 Bachelor of Arts Degree in Anthropology and Bachelor of Arts Degree in

Native American Studies, Central Washington University,
 Ellensburg., Washington
 71-73 Washington General Studies, Yakima Valley Community College, Yakima,
 Washington
 70-71 General Studies, Wenatchee Valley Community College, Wenatchee,
 Washington
 66-70 High School Diploma, White Swan High School, White Swan,
 Washington

TRAINING:

96 Northwest Fish Culture Conference, Victoria, B.C.
 College of Southern Idaho Sturgeon Workshop
 U.C. Davis Sturgeon Workshop
 Pacific Northwest Fish Health Protection Committee Meeting
 San Diego, California
 95 Fish Genetics, Anchorage, Alaska
 94 Northwest Fish Culture Conference
 OJT Northwest Indian Fisheries Commission
 Pacific Northwest Fish Health Protection Committee
 International Symposium of Aquatic Animal Health, Seattle, Washington
 Cold Water Fish Culture Course, Bozeman, Montana
 93 Native American Fish & Wildlife Society Pacific Region Conference
 Laboratory Technician Workshop, Olympia, Washington
 Western Fish Disease Workshop, Port Townsend, Washington
 Organosomatic Workshop, Wenatchee, Washington
 92 Fish Health Short Course, Gresham, Oregon

WORK EXPERIENCE:

96-97 Supervised Marion Drain Hatchery
 94-97 Supervised K-Basin Projects- Fall Chinook, Sturgeon, Rainbow Trout
 Supervised Yakima Basin Fall Chinook Acclimation Project
 Supervised Yakima Basin Coho Acclimation Project
 Supervised Prosser Tribal Hatchery
 92-97 Supervised BPA Training and Education Program
 92 Reclassified to Biologist I
 90-92 Reclassified to Trainee Progression
 89-90 Tech IV- Spawning Grounds Survey, Fish Traps, Electro-Shocking
 85-89 Tech III- Spring Chinook Enhancement Study, Reservation Fish Study,
 Spawning Grounds Survey, Fish Traps, Electro-Shocking
 84-85 Tech II- Spring Chinook Enhancement Study
 83-84 Tech I- Spring Chinook Enhancement Study

PUBLICATIONS:

- 1997 Yakama/Klickitat Natural Production and Enhancement Program
Training and Education Task Order 4.0
Annual Report CY 1997
Prepared by Melvin R. Sampson and William Fiander
- 1996 Yakama/Klickitat Natural Production and Enhancement Program
Training and Education Task Order 4.0
Annual Report CY 1996
Prepared by Melvin R. Sampson and William Fiander
- 1975 "Collecting Historical Artifacts," by William Fiander
Printed for Resources Development Internship Program
Western Interstate Commission for Higher Education

Section 10. Information/technology transfer

Section 10. Information/Technology transfer

The technical information resulting from this project (and its component tasks) will be distributed in the following ways:

Where applicable, task specific, annual reports will be submitted to Bonneville consistent with the contract requirements and Bonneville will distribute copies to all individuals and agencies on its mailing list.

Excerpted data will be appropriately formatted and submitted to the Northwest Aquatic Information Network (StreamNet) and made available to the public via Internet.

As an element of the YKFP, the objectives and findings of this project will also be entered into the YKFP home-page in the Internet. This home-page is currently under construction, and should be operational some time in 1998. The kind of information posted to the YKFP home-page will differ somewhat from that posted to StreamNet. Specifically, the YKFP Internet site will contain more detail and site-specific information than that in StreamNet, which has a regional perspective and therefore aggregates data in standardized units of larger geographic scope. There will also be more different kinds of data posted to the YKFP site than can presently be accommodated by StreamNet.

The results of this study will also be presented and critiqued in a work shop hosted by the YKFP, the "Project Annual Review". The Yakama Indian Nation can be contacted for abstracts of presentations made at this work shop.

Information pertinent to monitoring natural production and ecological interactions of species targeted by the YKFP will be incorporated into appropriate specie's monitoring plan.