

Subbasin.

Yakima River Subbasin

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.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish	X	Construction		Watershed
	Resident fish	*	O & M		Biodiversity/genetics
	Wildlife	*	Production		Population dynamics
	Oceans/estuaries	*	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.

Adaptive Management, Co-Managers, Harvest, Acclimation, Predation, Monitoring & Evaluation, Modeling.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
8812001	Yakima/Klickita Fisheries Project Management	Core Management/Admin. Support services for all YIN's YKFP Tasks..
9701300	Yakima Cle Elum Hatchery O&M	O&M costs for Cle Elum Supple. 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 the essential technical support to fulfill the diverse needs of the YKFP i.e. M&E support, surveys,

		juvenile fac. operations, marking, etc.
8821005	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.
9603301	Yakima River Fall Chinook Suppl-O&M	Essential for YKFP's all stock initiative for experimental purposes for supplementation.
9603302	Yakima River Coho Restoratin-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	Complete all six wells and do thorough testing of them	a	Testing will determine the level of RWCF that will be needed.
2	Evaluate, determine size, model, and other project required construction needs.	b	After purchase, seek appropriate construction bids for installation/completion/testing.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	10/1997	12/2048	0.00%
2	10/1998	12/2048	100.00%
			TOTAL 100.00%

Schedule constraints.

Final completion/full testing of all the wells: Funding schedule.

Completion date.

This phase of project construction, 1999: YKFP 2048

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		
Fringe benefits		
Supplies, materials, non-expendable property		
Operations & maintenance		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Includes costs for River Water Cooling Facility (RWCF), subcontract(s) for installation and constru.	\$2,700,000
PIT tags	# of tags:	
Travel		
Indirect costs	est.at 23.5% uncertain @ this time	0
Subcontracts		
Other	Contingency est. at 10%	\$300,000
TOTAL		\$3,000,000

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget				
O&M as % of total				

Section 6. Abstract

- a. The operation and maintenance of the YKFP's Cle Elum Research and Supplementation Facility (CERSF), including its three acclimation sites (to be constructed in the upper Yakima River Basin).
- 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.
 5. As YKFP continues to implement the all stock initiative, additional construction requirements may be needed. The project is currently not at a stage where the construction needs can be identified, as requested in **Section 5. Outyear costs**, therefore, it was not answered.
- a. All activities conducted by the YKFP, including the operation and maintenance of the CERSF; 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 first smolts will be released in 1999, and the majority of the adults will return in 2001 from that release. The project plans to evaluate several generations of releases to obtain a statistically significant result.

A River Water Cooling Facility (RWCF) is planned for the Cle Elum Supplementation and Research Facility. THE RWCF will cool the warm Yakima River water during summer as required for fish rearing. The exact size and configuration of the RWCF will be determined after an extensive test on the facility well system is completed this summer. The well test will establish the amount of cold well water available to temper the warm river water.

As a minimum, the RWCF will consist of pumps and heat exchangers that will cool the warm river water by transferring river water heat to the cooler hatchery discharge water. If the heat exchangers along with the available cold well water is not adequate to maintain the hatchery water at the required temperature, a mechanical chiller facility will be included as part of the RWCF.

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: 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 YKFP's M&E Project #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.

Taken from the YKFP’s Planning Status Report 1995, Volume 3, the Table below presents the latest version of the objectives and strategies for spring chinook.

Upper Yakima Spring Chinook Objectives and Associated Strategies

Objectives	Strategies
Genetic	
Manage genetic risks (extinction, loss of within- and between-population variability, and <u>domestication selection</u>) to all stocks from management of the fishery.	Segregate identified stocks by selecting broodstock for which the origin can be reasonably well determined, and release hatchery-reared progeny only in ancestral drainages. Use for broodstock only those fish that are not first-generation hatchery fish. Operate the supplementation facilities using appropriate mating procedures, naturalized environments, and experimental numbers to reduce the possibility of extinction, loss of within- and between-population variability, and domestication selection. Use less than 50% of the natural-origin returning adult escapement from each stock for broodstock purposes. Manage the proportion of natural- to hatchery-origin adults allowed to spawn naturally.
Conserve upper Yakima and Naches stocks of spring chinook salmon.	Segregate identified stocks by selecting broodstock for which the origin can be reasonably well determined, and release hatchery-reared progeny only in ancestral drainages. Collect, identify and segregate spring chinook by stock, through spawning, rearing and release.
Conserve the American River stock of spring chinook salmon.	Collect, identify and segregate spring chinook by stock, through spawning, rearing and release. Develop and apply methods to maximize the likelihood that only American River-origin fish enter and spawn in the American River.
Natural Production	
Optimize natural production of spring chinook with respect to abundance and distribution.	Improve the physical, biological, and chemical environment on a priority basis. Use harvest controls and supplementation to optimize natural spawning

	distribution (temporal and spatial). Release 810,000 acclimated smolts into the upper Yakima basin.
Optimize natural production of spring chinook salmon while managing adverse impacts from interactions between and within species and stocks.	Improve the physical, biological, and chemical environment on a priority basis. Use harvest controls and supplementation to optimize natural spawning distribution (temporal and spatial). Release 810,000 acclimated smolts into the upper Yakima basin.

Natural Production (con't)	
Maintain upper Yakima spring chinook natural production at a level that would contribute an annual average of 3,000 fish to the Yakima Basin adult return.	Improve the physical, biological, and chemical environment on a priority basis. Use harvest controls and supplementation to optimize natural spawning distribution (temporal and spatial). Release 810,000 acclimated smolts into the upper Yakima Basin.
Maintain natural escapement of upper Yakima spring chinook (hatchery and wild) at an average of 2,000 adult returns and consistently greater than 1,700 spawners per year.	Improve the physical, biological, and chemical environment on a priority basis. Use harvest controls and supplementation to optimize natural spawning distribution (temporal and spatial). Release 810,000 acclimated smolts into the upper Yakima Basin.
Experimentation	
Learn to use supplementation as defined by the RASP (RASP, 1992) to increase natural production of upper Yakima spring chinook and increase harvest opportunities.	Conduct experiments using upper Yakima stocks to evaluate the risks and benefits of supplementation as defined by the RASP (1992). Design and conduct experiments using upper Yakima stocks to compare risks and benefits of a Semi-Natural Innovative Treatment (SNT) against an Optimal Conventional Treatment (OCT) for supplementation. The SNT would use methods resulting in fish that mimic natural fish. The OCT would use methods resulting in fish raised according to the state-of-the-art hatchery definition of quality. Collect upper Yakima broodstock at Roza Dam. Release 18 groups of 45,000 fish each of the upper Yakima stock into the upper Yakima River. Release experimental groups of fish from separate acclimation sites connected to target streams. Design experiments to detect a 50% or greater difference (with 90% certainty) between test treatments for all response variables.
Harvest	
Increase harvest opportunities for all fishers consistent with requirements of genetic, natural production, and experimentation objectives.	Use selective and/or "status-index harvest" policies to increase harvest opportunities for all fishers.

The YKFP will incorporate two repeated tests or treatments: a Semi-Natural Innovative Treatment using incubation, rearing, and release techniques that attempt to produce smolts with attributes and, consequently, survival, similar to those of wild or native fish, and an Optional Conventional Treatment. The Optimal Conventional Treatment (“OCT”) will incubate, rear, and acclimate salmonids using the currently accepted "Best Technology" used at state, Tribal, and Federal hatcheries. The Semi-Natural Innovative Treatment (“SNT”) will create a more natural environment (e.g., natural cover, substrate, and structures) to incubate, rear, and acclimate fish. This treatment is calculated to raise and release fish with characteristics and behavior similar to those of naturally produced fish in order to achieve improved survival and productivity.

The fish from these two treatments will be compared (e.g., in terms of physical characteristics and survival to returning adults) with each other as well as to the native fish. These comparisons would be used to determine the success of the YKFP. As much as possible, information on variation in ocean conditions, instream flows, harvest, and other activities and factors would be used to provide a context for interpretation of YKFP findings.

There are three stocks of spring chinook in the Yakima River: an upper Yakima stock that spawns upstream of Roza Dam, a stock that spawns in the Naches River, and one in the American River. Of these, only the upper Yakima spring chinook stock will be supplemented during the Project's first phase. This program includes facilities to release up to 810,000 such smolts each year.

Natural production objectives for all Yakima River spring chinook stocks were modeled assuming that all upper Yakima supplementation facilities were operational and were producing a range of 600,000 to 1,150,000 smolts. As modeled, the proposed production level (810,000 smolts) would be expected to produce adult returns, spawning, and harvest objectives in the middle of the range of estimates that follow. Simulations indicated that production levels would produce a total return to the Yakima basin that would range from 8,200 to 11,590 adults: 6,600 to 9,800 upper Yakima spring chinook, 1,000 to 1,100 Naches spring chinook, and 600 to 690 American River spring chinook. Objectives for natural spawning would include 3,100 spring chinook in the upper Yakima (combined wild and hatchery fish at all production rates); 570 to 630 spring chinook in the Naches (all wild); and 340 to 390 spring chinook in the American River (also all wild). Spawning escapement (how many adult fish return to spawn) for all stocks would be above the level (approximately 200-250 spawners per year) at which loss of within-population variability becomes a concern.

The quantitative production objectives described above for upper Yakima spring chinook are based on the EDTPM computer simulations. These natural production and harvest objectives make the following assumptions:

- 1) that hatchery fish survive at half the rate of wild fish in an environment in which natural production is winter-limited;
- 2) that carrying capacity is about 543,000 smolts naturally produced in the upper Yakima River under current habitat conditions and operation of the river for irrigation (900,000 smolts for the entire Basin); and
- 3) that up to 240,000 smolts (27 percent of carrying capacity) can be lost to density-dependent mortality inside the subbasin (Watson et al., 1993).

Under these conditions, the EDTPM indicates that natural production and harvest objectives are attainable with a terminal harvest rate of 30 percent, applied uniformly over all stocks. The EDTPM assumptions included selective removal of between 100 and

3,000 upper Yakima hatchery fish in order to limit the maximum proportion of hatchery fish in the natural spawning escapement to 50 percent or less.

Note that these preliminary supplementation strategies and production objectives are based on modeled assumptions, not on empirical data. The assumptions underlying the computer analyses represent a reasonable synthesis of what is known at present about the natural production and post-release survival of spring chinook in the Yakima River (Watson et al., 1993). Future and ongoing risk analysis and ecological research would be expected, through the normal operation of the annual planning and implementation cycle, to result in refinements to supplementation strategies and perhaps to objectives as well.

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 TELEMENTRY 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 -Klickitat 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.

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 and constructed to currently enable the YKFP's restoration and production activities include the broodstock collection facility at Roza Dam, the juvenile and adult monitoring stations at Roza and Prosser dams, and the Cle Elum Research and Supplementation Facility, which will include three acclimation sites when finally completed. 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.

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Section 8. Relationships to other projects

The following projects are complimentary with the YKFP:

9105700	Yakima Species 2 Screen Fabrication	Vital to species control within basin for straying into irrigation diversions.
9200900	Yakima Screen Phase 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,	Vital to maintain, screens for control of target species within basin from irrigation diversions.
9704900	Teanaway Instream Flow Restoration	Essential tributary enhancement vital to success of YKFP.
9603501	Satus Watershed Restoration	Represents a positive factor for improving tributaries within Yakima Basin; vital for supplementation
9506800	Klickitat/Habitat Preliminary Design Project YIN	Klickitat, in its preliminary stages, is a vital part of YKFP for the implementation of supplementation
5512600	Upper Klickitat Meadows Riparian Restoration YIN	Contributes to improving prime habitat which is vital for success of supplementation implementation.
5512700	Klickitat Basin Culvert Rehabilitation YIN	Passage within tributaries is essential for natural restoration of species.
5512800	Lower Klickitat Habitat Enhancement	Essential for improved reproduction of affected species.

Section 9. Key personnel

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509-848-2854

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
 planer 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 (16 years)
- 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.

Section 10. Information/technology transfer

The technical information resulting from this project (and its components 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 the Internet.
- As an element of the YKFP, the objectives and findings of this project will also be entered into the YKFP home-page on the Internet. This home-page is currently under construction, and should be operational sometime 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 detailed 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 (public?) workshop hosted by the YKFP, the "Project Annual Review". The Yakama Indian Nation can be contacted for abstracts of presentations made at this workshop.

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