

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

Section 1. General administrative information

Evaluate Adult Migration In Lwr Col. River And Tributaries

Bonneville project number, if an ongoing project 9204101

Business name of agency, institution or organization requesting funding
U.S. Army Corps of Engineers, Portland District

Business acronym (if appropriate) COE

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
National Marine Fisheries Service	2725 Montlake Blvd. East	Seattle, WA 98112	Lowell Stuehrenberg
University of Idaho	Idaho Cooperative Fish And Wildlife Research Unit	Moscow, ID 83843	Ted Bjornn

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

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

ESA Conservation Recommendation #2; Incidental Take Statement # 1, Operation of the Federal Columbia River Power System

Other planning document references.

6.1A.2, 6.1A.3, 6.1A.4, 6.1B1, 6.1B.8, 6.1D.7, 6.1E.1, 6.1F.1: This study will respond directly to program requirements listed for the COE, and is being conducted in conjunction with other evaluations undertaken by various public and private organizations. The data collected will provide adult fish passage information at Columbia River basin hydroelectric projects. Results of the studies will assist in operation of the hydropower system and will provide needed information to regional managers. Deficiencies identified in adult passage throughout the program will be more closely evaluated and system modifications will be recommended.

Subbasin.

Lower Columbia and Snake River, and tributaries

Short description.

Assess the success of adult salmon and steelhead passage at dams and reservoirs on the lower Columbia and Snake rivers; assess fish facility operations and potential modifications; assess spill operations and other flow augmentation strategies.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
*	Anadromous fish		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.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

BPA funding of \$375,000 is required in 1999 to support their interests in this joint COE BPA program

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Determine the proportion of fish passing Bonneville Dam that ultimately pass the upstream dams, enter tributaries, enter hatcheries, are taken in fisheries, and are "losses" between dams.	a	Tasks for each objective require trapping and tagging up to 800 of each species to be studied at the Bonneville Dam, installing monitoring equipment at each of the dams and tributaries, developing a data base for each recorded fish, and analyzing the
2	Assess the time for fish to pass each dam and migrate through the reservoirs between dams.		2 (cont.) data base to satisfy each of the stated objectives.
3	Evaluate entrance use and passage through the fishways.		
4	Evaluate the effects of various spill volumes and patterns on fish passage at selected dams.		
5	Evaluate the effects of the Bonneville navigation lock on passage past the dam or into the hatchery.		
6	Assessing fallback at each dam.		

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	10/1997	9/1998	50.00%
2	10/1997	9/1998	10.00%
3	10/1997	9/1998	10.00%
4	10/1997	9/1998	10.00%
5	10/1997	9/1998	10.00%
6	10/1997	9/1998	10.00%
			TOTAL 100.00%

Schedule constraints.

Extremely high flow may warrant a delay, eliminating a particular species, or the entire year.

Completion date.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	There are no COE Charges for any of these items, this is the BPA portion of the contractor charges.	\$127,500
Fringe benefits		\$48,750
Supplies, materials, non-expendable property		\$142,500
Operations & maintenance		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		
PIT tags	# of tags:	
Travel		\$18,750
Indirect costs		\$37,500
Subcontracts		
Other		
TOTAL		\$375,000

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$375,000	\$ 0	\$ 0	\$ 0
O&M as % of total	0.00%	0.00%	0.00%	0.00%

Section 6. Abstract

Adult salmon and steelhead migrating to their natal streams in tributaries of the Columbia River must pass eight or nine dams and reservoirs, four each in the lower Columbia and Snake rivers and five in the mid Columbia River. Losses and delays in migration at each hydroelectric project must be minimized to succeed in maintaining the native runs of fish and achieve the Northwest Power Planning Council's goal of doubling the abundance of fish in the future.

This study was developed in response to a request for a preliminary proposal issued by the U.S. Army Corps of Engineers (CORPS) in June of 1994, and addresses concerns of the CORPS, the Council in section 6 of the 1994 Columbia River Basin Fish and Wildlife Program, and NMFS in the Proposed

Recovery Plan for Snake River Salmon. The study was developed in consultation with the CORPS, and in response to the high priority assigned to adult passage research in the Columbia and Snake rivers by the former Fish Research Needs and Priorities subcommittee of the Fish Passage Development and Evaluation Program.

Adult salmon, steelhead, and lamprey were captured at Bonneville Dam in 1996 and 1997, outfitted with radio transmitters and released downstream from the dam to better define: (1) the use of fishway entrances and passage through the fishways, (2) the effect of spill and powerhouse discharge patterns on the entry of fish into the fishways and on passage rates, (3) the effect of the new Bonneville navigation lock on fish passage at the dam and movement into Bonneville Hatchery, (4) the rate of fallback over the dams with various flow conditions, and (5) the distribution, migration rates, and survival of fish after they are tagged and released near Bonneville Dam.

From the start, 1998 has been planned as a year that would be devoted to analysis of the large amounts of data collected in 1996 and 1997 to develop recommendations for studies in later years. However, river flows, spill, and turbidity are factors that we cannot control, but they can affect migrations of salmon, steelhead and lamprey. Spring runoffs in 1996 and 1997 were significantly above average, with large amounts of spill, and the timing of the spring chinook salmon run past Bonneville Dam was delayed by two to three weeks. Estimates of passage rates at the dams and through the reservoirs, fallback at the dams, and minimum survival will be available for both 1996 and 1997. We now need similar data for years with average or below runoffs. Because it is impossible to predict the size of future runoffs, we propose being prepared to continue field studies in 1998 and 1999, and proceed with tagging spring chinook salmon if an average or lower runoff is forecast on 1 March 1998.

Although fewer spring chinook salmon will return to Bonneville Dam in 1998 than in 1997, we believe there will be enough fish to allow continuation of the field studies. Based on counts of "jack" salmon in 1997 and returns of chinook salmon that spent two years in the ocean before returning in 1997, the Snake River run of chinook salmon in 1998 may be about 35,000 fish, mostly 3-ocean fish that migrated seaward in 1995 (Gene Matthews, NMFS). Returns of 2-ocean chinook salmon in 1998 will be small, partly because of the small number of smolts that migrated seaward in 1996.

The project leaders will be responsible for preparation and submission of all project proposals, documents, and reports. Personnel of the Idaho CFWRU and NMFS will develop detailed study designs for each segment of the project. NMFS personnel will lead in processing the data downloaded from receivers, CFWRU personnel will code the records, and both groups will share in the field work, analysis of data, and preparation of reports.

Personnel of the Idaho CFWRU and NMFS developed this preliminary study plan for review by representatives of various interested groups. The study plan includes proposed objectives for work and studies to be continued in 1999, fish to be studied, methods of study, and geographic scope of the work. Reviewers are requested to provide suggestions on all aspects of the study. The proposed study plan will then be revised and prepared for final review in fall 1998.

If we continue field studies in 1999, protocols for radio tracking, downloading of data from receivers, recovery of information of recaptured fish, and processing of the data will be similar to those developed for 1996, 1997 and 1998. Computer programs prepared and tested in 1996 and 1997 for processing the data and getting it into summary form for analysis and report preparation will be used.

Transmitters were placed in 853 spring/summer chinook salmon, 100 lamprey, and about 800 steelhead during 1996, and the movements of the fish were monitored at all the lower Columbia River dams and into the tributaries. In 1999, we plan to release about 900 spring/summer chinook salmon, 200 lamprey, 600 sockeye, and 800 steelhead with transmitters. Field work will continue through 1999 and into the spring of 1998 to complete tracking of steelhead tagged in the summer and fall of 1997. In 1999, we propose outfitting about 800 spring/summer chinook salmon and 200 lamprey with transmitters if river flows in the spring are near average or below average.

If we tag fish in 1999, we would monitor passage of fish at the lower Columbia River dams in a manner similar to 1996 and 1997, with specific sub-studies yet to be determined. Studies are also planned for 1999 at the lower Snake River dams by the Walla Walla District that require salmon outfitted with transmitters. Salmon tagged at Bonneville would provide the fish needed for the Snake River studies, otherwise, salmon would likely be trapped for tagging at Ice Harbor Dam. We are not aware of any studies planned for the mid Columbia River at Public Utility District dams, but if they develop, we will coordinate with people conducting those studies. We will coordinate with all research groups using radio telemetry for both adult and juvenile salmon and steelhead and other fishes to insure efficient use of the equipment and resources available. As we did in 1996 and 1997, we will coordinate use of transmitter frequencies and codes by all groups using radio telemetry in the main stem study areas to prevent duplicate use of frequencies and codes that would lead to confounded data.

Maintenance and repairs for the more than 120 receiver sites at the dams and in tributaries will be accomplished during fall-winter of 1998-99 when flows and tailrace elevations are low and when fishways are normally dewatered for maintenance.

Section 7. Project description

a. Technical and/or scientific background.

The BPA and COE are cost sharing throughout this five year program. Costs incurred in 1995 for program planning were approximately \$255,000. Efforts included finalization of the study design; the determination, purchase, and installation of necessary equipment; and preliminary trapping and tag implantation evaluations. Physiological evaluations of adult lamprey tagging procedures were also conducted. In 1996, BPA and COE contributions totaled \$350,000, and approximately \$1,000,000 respectively. Program implementation, data collection, and analysis began in 1996. In 1997, data collection and analysis continued although BPA support was reduced to \$200,000. BPA support is currently estimated at \$200,000 for 1998 and \$375,000 for 1999.

b. Proposal objectives.

1) Determine the proportion of fish passing Bonneville Dam that ultimately pass the upstream dams, enter tributaries, enter hatcheries, are taken in fisheries, and are "losses" between dams. 2) Assess the time for fish to pass each dam and migrate through the reservoirs between dams. 3) Evaluate entrance use and passage through the fishways. 4) Evaluate the effects of various spill volumes and patterns on fish passage at selected dams. 5) Evaluate the effects of the Bonneville navigation lock on passage past the dam or into the hatchery. 6) Assessing fallback at each dam.

c. Rationale and significance to Regional Programs.

Consecutive year evaluations will better enable relevant conclusions for 'typical' species behavior pertaining to each measurable objective over a range of flow, operational, and environmental conditions. No relevant underlying assumptions, or critical constraints should impact this study.

d. Project history

Information collected in 1996 and 1997 for the adult salmon migration have not yet been published or presented. The data sets are extremely large and require time to evaluate. In season information is distributed to salmon managers on an as needed, in season basis. For example, fallback counts at the Bonneville Dam assisted in determining actual fish passage numbers that were used to negotiate in season fishing activities, as well as provide an assessment for fallback mortality, and impacts due to excessive flow. Preliminary results are expected by February, 1998, and are being evaluated initially to compliment the COE and CBFWA adult fish passage improvements programs. Information from the 1997 lamprey migration were just sent out for review under the

COE Anadromous Fish Evaluation Program, Studies Review Workgroup. The title of the report is *Migration Patterns of Pacific Lamprey (Lampetra tridentata) In the Lower Columbia River, 1997*.

e. Methods.

Tracking fish outfitted with radio transmitters will be the primary method of data collection. Fixed-site receivers will be installed at the mouths of major tributaries, in the tailraces and forebays of dams, and in the entrances and exits to fishways. Fish will be captured at the Bonneville Dam north ladder collection facility, outfitted with transmitters and tags, released downstream from Bonneville Dam, and then monitored as they migrate upstream through the drainages. Approximately 45 receivers (SRX, SRX-S, SRX-DSP, SRX-DSP-S) will be required to monitor the selected locations, and mobile tracking will be conducted along the mainstem rivers between the dams and in the tributaries. Fish handling, tagging, and transporting procedures will be similar to those used successfully in recent years for the lower Snake River adult passage study (Bjornn et al. 1992; 1994). Statistical analysis requires that 800 summer chinook, 800 steelhead (or fall chinook), and 200 lamprey be tagged and monitored throughout the study area.

f. Facilities and equipment.

Radio telemetry equipment used in 1997 would be available for studies in 1998. With the possibility of studies at the lower Columbia River dams, and those planned for the Snake River dams, coordination and planning will be necessary to distribute the equipment as needed. Transmitters for use in 1999 will be ordered in October 1998. Computers, vehicles, and boats will be supplied by the researchers as needed on a rental basis. Transmitters purchased for 1998 field studies would be held over for use in 1999 if fish were not tagged in 1998.

g. References.

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Junge, C.O., and B.E. Carnegie. 1976. Dam operations and adult fish passage, 1975. Completion Report, Contract DACW68-75-C-0129, Oregon Department of Fish and Wildlife, Portland.

Knapp, S.M. and C.J. Knutsen. 1993. Evaluation of electronic impedance tunnel and low-light underwater video camera technologies as methods of evaluating passage of adult salmonids through fishway entrances. Oregon Department of Fish and Wildlife, Portland.

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Schiavone, Albert Jr., and R. D. Adams. 1994. Movement of Sea Lamprey Past The Dexter Dam Complex on the Black River, New York. Unpublished. New York State Department of Environmental Conservation, 317 Washington Street, New York, 13601.

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Tibbles, James J. , S. M. Dustin, R. A. Braem, and H. H. Moore. 1983. Annual Report 1981, Great Lakes Fishery Commission. 1451 Green Road, Ann Arbor, Michigan.

Turner, A.R., J.R. Kuskie, and K.E. Kostow. 1983. Evaluation of adult fish passage at Little Goose and Lower Granite dams, 1981. U.S. Army Corps of Engineers, Portland District, Oregon.

Turner, A.R., J.R. Kuskie, and K.E. Kostow. 1984. Evaluation of adult fish passage at Ice Harbor and Lower Monumental dams, 1982. U.S. Army Corps of Engineers, Portland District, Oregon.

Section 8. Relationships to other projects

Section 9. Key personnel

Project planning, administration, reporting:

Project leader, T.C. Bjornn,

Work plan preparation, protocols, computer programs, permits:

T. Bjornn, NBS

L. Stuehrenberg, NMFS

C. Peery, U of I

Equipment specifications and purchase:

K. Tolotti, U of I

Tagging of fish

R. Ringe, tagging crew

Monitoring of receivers at dams and downloading data

K. Tolotti, P. Kinery, R. Ringe, J. Vela

Mobile tracking and gathering of recapture information

C. Peery, R. Ringe, NMFS people, Bio aides

Processing of data

L. Stuehrenberg, C. Peery

Analysis of data and preparation of report segments

T. Bjornn, C. Peery, K. Tolotti, L. Stuehrenberg, J. Vela

Graduate students

Section 10. Information/technology transfer

Information and analyses from this study will be provided regularly to managers via reports and verbal presentations. Information that is appropriate will be published in technical journals. Special efforts will be made to provide essential information as needed, such as fallbacks at Bonneville Dam in 1996.