
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Smolt Monitoring At The Head Of Lwr. Granite Reservoir & Lwr. Granite Dam

BPA project number: 8332300
Contract renewal date (mm/yyyy): 7/1999 Multiple actions?

Business name of agency, institution or organization requesting funding
Idaho Dept. Fish and Game

Business acronym (if appropriate) IDFG

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses
5.9A.1

FWS/NMFS Biological Opinion Number(s) which this project addresses
NMFS BO RPA Sec. 13a and 13f

Other planning document references
Snake River Salmon Recover Plan 2.1.d.3

Short description

Operate smolt traps; monitor migration timing and provide relative passage index; PIT tag groups of smolts for in-season travel time and survival information, including collection of data required for BiOP implementation and decision path determinations.

Target species

Spring, summer, and fall chinook salmon, steelhead trout, and sockeye salmon

Section 2. Sorting and evaluation

Subbasin

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
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Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20552	Smolt Monitoring Umbrella
9403300	Fish Passage Center
8401400	Smolt Monitoring at Federal Dams
8712700	Smolt Monitoring by Non-Federal Agencies
8332300	Smolt Monitoring at the Head of Lwr Granite Dam and Lwr Granite Reservoir
8712702	Comparative Survival Study
9602100	Gas Bubble Disease Research and Monitoring of Juvenile Salmonids
8712703	Imnaha River Smolt Monitoring Program Project
8906500	Missing Groups USFWS marking for CSS and marking for SMP

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9107300	IDFG Idaho Natural Production Monitoring/Evaluation	Uses project 8332300 data in generating survival estimate from point of release to head of L. Granite pool
9008000	PSMFC Columbia Basin PIT Tag Information System	Provide PIT tag information to PTAGIS database. 8332300 project leader also Idaho representative to PIT tag Steering Committee.
9701000	BPA Essential M&E Infrastructure-PIT Tag Monitor Procurement and Inst.	Idaho representative to the ISO Transition Planning Team.
8740100	USGS Travel Time and Survival Smolt Physiology	Provide PIT-tagged sample fish.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
	See SMP-umbrella proposal	See SMP-umbrella proposal

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Provide smolt moitoring sites on the Snake River at the head of LGR and on the lower Salmon River	a	Operate migrant dipper trap on the Snake River at rkm 225 between March 14 and June 4
		b	Operate scoop trap on the lower Salmon River at rkm 103 between March 7 and May 28
		c	Provide smolt trap catch data to FPC, daily
2	PIT tag salmon and steelhead smolts at the Snake and Salmon River traps	a	PIT tag up to 600 hatchery and wild chinook and steelhead weekly at both traps
		b	Verify PIT-tagging files and send to PTAGIS, daily
3	Provide PIT tag interrogation site at the Snake and Salmon River traps	a	Install and maintain PIT tag detection systems on the Snake and Salmon River traps
		b	Interrogate all smolts captured at both the Snake and Salmon River traps, daily
		c	Transmit interrogation data to PTAGIS, daily
4	Produce an annual report	a	Acquire hatchery release information for chinook, steelhead, sockeye, and coho released above Lower Granite Dam
		b	Analyze trap catch and PIT tag data
		c	Write report and provide to BPA for publishing
5	Provide smolts, in excess of SMP needs, for other research projects as needed	a	Provide smolts for the Corps of Engineer's surface collector evaluation project.
6	Equipment maintenance	a	Do all trap maintenance and repair all trap damage
		b	Maintain and repair all PIT-tagging equipment
		c	Maintain and repair all boats and other project equipment
7	IDFG representative to PIT Tag Steering Committee and the ISO Transition Planning Team	a	Participate in PIT Tag Steering Committee functions
		b	Participate in ISO Transition Planning Team functions as needed

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	3/2000	6/2000			25.00%
2	3/2000	6/2000			20.00%
3	3/2000	6/2000			2.00%
4	6/2000	3/2001			15.00%
5	3/2000	6/2000			2.00%
6	6/2000	3/2001			30.00%
7	1/2000	12/2000			6.00%
				Total	100.00%

Schedule constraints

High flows and/or heavy debris may hamper or terminate trapping prior to the end of the field season.

Completion date

On going

Section 5. Budget

FY99 project budget (BPA obligated):

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%41	160,900
Fringe benefits		%13	52,000
Supplies, materials, non-expendable property		%0	
Operations & maintenance		%11	44,800
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Miscellaneous equipment and emergency repairs	%2	6,000
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags: 23,000	%17	66,700
Travel		%2	6,500
Indirect costs		%15	59,800
Subcontractor		%0	
Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			\$396,700

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
N.A.		%0	
		%0	
		%0	
		%0	
Total project cost (including BPA portion)			\$396,700

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$408,600	\$420,800	\$433,400	\$446,400

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Mason, J.E. 1966. The migrant dipper: a trap for downstream migrating fish. <i>Progressive Fish Culturist</i> 28:96-102.
<input type="checkbox"/>	Mosteller, F., and J.W. Tukey. 1977. <i>Data analysis and regression</i> . Addison-Wesley Publishing, Reading, Massachusetts.
<input type="checkbox"/>	Ostle, B., and R.W.Mensing. 1975. <i>Statistics in research</i> , 3rd edition. The Iowa State University Press, Ames, Iowa.
<input type="checkbox"/>	Prentice, E.F., T.A. Flagg, and S. McCutcheon. 1987. A study to determine the biological feasibility of a new tagging system, 1986-1987. Report of U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries S.
<input type="checkbox"/>	Raymond, H.L., and G.B. Collins. 1974. Techniques for appraisal of migrating juvenile anadromous fish populations in the Columbia R. Basin. In: <i>Symposium on methodology for the survey, monitoring, and appraisal of fishery resources in lakes and rivers</i> .
<input type="checkbox"/>	Steinhorst, K.,B.Dennis, A.Byrne, and A.Polymenopoulos. 1988. Tools for analyzing fish travel time. Report of the University of Idaho Statistical Consulting Center to Idaho Department of Fish and Game, Boise, Idaho.
<input type="checkbox"/>	Zar, J.H. 1984. <i>Biostatistical analysis</i> , 2nd edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

PART II - NARRATIVE

Section 7. Abstract

The Smolt Monitoring Program (SMP), described in the SMP-Umbrella Proposal, is a collection of eight BPA funded programs. The SMP, mandated in section 5.9A.1 of the Northwest Power Planning Council's (NPPC) Fish and Wildlife Program, provides data on movement of smolts out of major drainages and past the series of dams on the Snake and Columbia rivers. Indices of migration strength and migration timing are provided for the run-at-large at key monitoring sites. In addition, marked smolts from hatcheries and traps provide measures of smolt speed and in-river survival through key index reaches. These data are used for in-season operational decisions relative to flow and spill management, particularly during periods when spill is being provided to improve smolt passage.

This project, as part of the SMP, provides data to fulfill objective one in the SMP-umbrella proposal. Smolt traps on the Snake River, at rkm 225 and on the Salmon River at rkm 103 provide important information on salmon and steelhead movement at the upper end of the Snake River's series of dams. Fish PIT-tagged at these sites are used to measure migration speed in key reaches of the Snake and Columbia rivers. The determination of the current year's migration timing of ESA listed Snake River salmonid stocks is a key aspect of the year's in-season SMP management decisions. Also documented, is the arrival timing of smolts at the head of Lwr Granite pool and migration timing and rate of movement through the Snake and Salmon rivers and Snake and Columbia River reservoirs. This is accomplished by PIT-tagging smolts captured at the Snake and Salmon River traps. Information collected by this project is critical for in-season management decisions relative to operations of the FCRPS for fish protection, flow augmentation, facility power operations, fish collections and transportation programs.

Section 8. Project description

a. Technical and/or scientific background

See SMP-umbrella proposal.

b. Rationale and significance to Regional Programs

See SMP-umbrella proposal.

c. Relationships to other projects

See SMP-umbrella proposal. The Idaho Natural Production Monitoring and Evaluation Program (BPA # 9107300) uses information generated by this project in developing survival estimates from the point of release to the head of Lwr Granite pool. We PIT tag up to 23,000 smolts annually for ongoing monitoring studies and provide PIT tagging and interrogation data to the Columbia Basin PIT Tag Information System (BPA #9008000). This project provides smolts for the Corps of Engineers radio telemetry evaluation of the Surface Bypass Collector at Lwr Granite Dam (Migration Characteristics of Juvenile Chinook and Steelhead in the Forebay of Lwr Granite Reservoir Relative to the 2000 Surface Bypass Collector Test, project # E86930151). In addition, the project leader also is the IDFG representative to the PIT Tag Steering Committee and the representative to the ISO Transition Planning Team, which is an important component of the Essential M&E Infrastructure and PIT Tag Monitoring Procurement and Installation (BPA #9701000).

d. Project history (for ongoing projects)

See SMP-umbrella proposal. This project is one component of the basin-wide SMP, directed by the Fish Passage Center (FPC). The project was initiated in 1983 by the NMFS who built and installed traps on the Snake, Clearwater, and Salmon rivers. The IDFG assumed responsibility for the project in 1984 and continues to operate traps on the Snake and Salmon rivers as part of the annual coordinated SMP. Trap operations provide data on outmigration timing and biological characteristics of smolts and serve as sites for PIT-tagging smolts for subsequent analysis of travel time and survival indices to downstream dams. The data from this and other SMP sites allow managers increased information to make informed decisions concerning flow augmentation and spill planning. This project has been funded since 1983 at a cumulative cost of \$3.7 million.

e. Proposal objectives

The SMP is designed to provide long term, consistent data for fish passage management and mitigation decisions. As a component of the SMP this project; 1) monitors smolts at sites on the Snake and Salmon rivers, 2) PIT tags up to 23,000 salmon and steelhead smolts at the Snake and Salmon River traps. 3) provides PIT tag interrogation sites at the Snake and Salmon River traps. 4) produce an annual report, 5) provide smolts, in excess of SMP needs, for other research projects, as needed, 6) maintain equipment, 7) provide IDFG representative to PIT Tag Steering Committee and the ISO Transition Planning Team.

f. Methods

Smolt Monitoring Traps

During the 2000 outmigration, two smolt-monitoring traps will be operated to monitor the passage of juvenile chinook salmon, steelhead trout, and sockeye salmon. A dipper trap (Mason 1966) will be located on the Snake River near Lewiston, Idaho (rkm 225). A scoop trap (Raymond and Collins 1974) will be located on the Salmon River near Slate Creek, Idaho (rkm103). Smolts will be captured, examined, and enumerated daily at the traps and released back to the river. Fork length of up to 100 smolts, for each species and rearing type, will be measured the nearest millimeter, daily. Between 200 and 600 hatchery chinook, wild chinook, hatchery steelhead, and wild steelhead will be PIT-tagged (Prentice et al 1987) weekly, for a season total of up to 11,400 at the Snake River trap and 12,000 at the Salmon River trap (sample size criteria established by FPC). FPC uses PIT tag data from this project for survival estimates, travel time characteristics, migration rate discharge relations, PIT tag passage distribution, and passage timing and indices. Up to 2,000 fish will be examined daily for hatchery brands at the Snake River trap. Fish are not examined for brands at the Salmon River trap. Smolts will be anesthetized before handling with tricaine methanesulfonate (MS-222). Fish will be allowed to recover from the anesthesia before being returned to the river.

All fish captured in the Snake and Salmon River traps will be passively interrogated for PIT tags as they enter the live well. The interrogation and tagging information will be sent to PTAGIS Data Center (managed by Pacific States Marine Fisheries Commission) daily. The interrogation data from the traps will be used to determine timing of arrival at the head of Lwr Granite Reservoir for representative PIT tag groups from distinct wild or hatchery populations.

Water temperature (C) and secchi disk transparency (m) will be recorded daily at each trap. Snake River discharge will be measured at the U.S. Geological Survey (USGS) Anatone gauge (#13334300) 44.4 km upstream from the Snake River trap. Salmon River discharge will be measured at the USGS White Bird gauge (#13317000), 16.6 km downstream from the Salmon River trap.

Travel Time and Migration Rates

Migration statistics will be calculated for hatchery release groups from release sites to traps. Travel time and migration rates to the traps will be calculated using median arrival times at the Snake and Salmon River traps. Median arrival (or passage) date is the date the 50th percentile fish arrived at the trap or collection facility.

Smolts will be PIT-tagged at the Snake River trap to determine travel time from the head of Lwr Granite Reservoir to Lwr Granite Dam. Smolts will be PIT-tagged at the Salmon River trap to determine migration rate in a free-flowing section of river plus Lwr Granite reservoir. Individual arrival times at the Lwr Granite collection facility will be determined for each daily release group. A minimum recapture number, sufficient for use in migration rate estimations, will be derived from an empirical distribution function of the travel time for each individual release group (Steinhorst et al. 1988). If recapture numbers are less than five or less than the number derived from the empirical distribution function, the daily data will be combined with another day's data or the data will not be used. If they are combined, they will be added to daily data from an adjacent release day that had similar discharge and travel time.

Smolt migration rate/discharge relations through Lwr Granite Reservoir will be investigated using linear regression analysis after both variables are stratified into 5-kcfs discharge intervals (Mosteller and Tukey 1977) and log (ln) transformed (Zar 1984). The 0.05 level will be used to determine significance. This analysis will be performed for the PIT-tagged hatchery chinook, wild chinook, hatchery steelhead, and wild steelhead marked at the Snake and Salmon River traps.

The migration rate/discharge relations for PIT-tagged hatchery chinook, wild chinook, hatchery steelhead, and wild steelhead released from the Snake River trap will be individually examined using analysis of covariance to determine if there are groups of years with common slopes and intercepts. Plots will be used to help identify years that differ when non-homogeneous slopes between years are found. Subsequent analyses will be run, without these years, to determine if common slopes and intercepts exist for a smaller subset of years. Also, the analysis of variance will be used to determine if there is a sufficient overlap in the covariate (discharge) between years to continue the analysis (Ostle and Mensing 1975). If no significant difference is detected in the migration rate/discharge relations between years, then the yearly data are pooled to provide a long-term relation. After pooling, linear regression will be used to find the best-fitting equation to describe the relation between migration rate and discharge for an individual species over pooled years.

Reach Survival Estimates

Fish PIT-tagged on the Snake and Salmon River traps will also be used to estimate reach survival. FPC is responsible for this analysis and it will be reported in the FPC annual report.

g. Facilities and equipment

Two smolt monitoring traps, a dipper trap on the Snake River and a scoop trap on the Salmon River, are used to sample run-of-the-river smolts. A second scoop trap which was used on the Clearwater River from 1984-1995 is used as a backup and for spare parts for the Salmon River trap. Three boats are used on this project, one each for the Snake River and Salmon River traps and one for a backup. A purse seine barge is utilized to move the Snake River trap components at the beginning and end of the field season and used to capture fish to supplement Snake River trap catch, when needed. Each trap has a PIT

tag interrogation system. There is a full component of PIT-tagging equipment for each trap. The project has two 586 desktop computers for data storage and manipulation, administration, and electronic communication and two laptop computers for field PIT tagging. Office facilities consist of a four-office complex, which is shared by other BPA and LSRCF funded programs. Storage consists of a four bay open faced boat shed for boats and one closed bay for equipment storage.

h. Budget

Personnel and Fringe Benefits – Smolt monitoring and smolt trapping operations in large rivers during spring runoff is a labor-intensive task requiring year-to-year consistency in key personnel.

Operations and Maintenance – To reduce in-season failure, equipment must be in extremely good condition at the beginning of the field season. Therefore, one of the largest O&M expenditures we have is equipment maintenance and repair.

Capital Acquisitions or Improvements – This item is for emergency repairs of equipment damaged during the field season or other unforeseen emergencies.

PIT Tags – a key component of this project is to PIT tag run-of-the-river smolts. FPC statisticians have established sample size.

Travel – A portion of the travel expenses are for the operating of the Salmon River trap and the other portion are for the IDFG representative to attend PIT Tag Steering Committee and ISO Transition Team meetings.

Section 9. Key personnel

Edwin Buettner
Senior Fisheries Research Biologist
Idaho Department of Fish and Game
FTE/hours – 2080

Education:

Bachelor of Science, University of Idaho, Moscow, Idaho. General Biology, 1975

Masters of Science, University of Idaho, Moscow, Idaho. Fisheries Resources, 1987

Current Responsibilities:

Program leader for the 'Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam' project. Responsibilities include project administration, personnel hiring and supervision, supervision of field operations, equipment maintenance oversight, data analysis, and report preparation. Other duties include IDFG representative to the PIT Tag Steering Committee and to the ISO Transition Planning team.

Recent Previous Employment: Employee of IDFG since 1984.

Expertise:

Operation of smolt traps on large rivers during spring runoff. Also, use of purse seine equipment to capture smolts. Capture, handle and examine large numbers of anadromous smolts and mark with PIT tags, freeze brands and fin clips. Familiar with the PIT tag data repository (PTAGIS) and high degree of knowledge and experience PIT tagging fish.

Recent Publications:

Buettner, E.W. and A. F. Brimmer. 1997. (In Press) Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A. F. Brimmer. 1996. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A. F. Brimmer. 1995. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Buettner, E.W. and A. F. Brimmer. 1994. Smolt Monitoring at the Head of Lower Granite Reservoir and Lower Granite Dam. Report of Idaho Department of Fish and Game to Bonneville Power Administration, Project 83-323B, Portland, Oregon.

Section 10. Information/technology transfer

See SMP-umbrella. Information is transmitted in electronic format to FPC and PTAGIS daily. An annual report is also produced.

Congratulations!