

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

Section 1. General administrative information

**Genetic Inventory of Westslope Cutthroat Trout
in the North Fork Clearwater Basin**

Bonneville project number, if an ongoing project 9501600

Business name of agency, institution or organization requesting funding
Nez Perce Tribe Department of Fisheries Resource Management

Business acronym (if appropriate) NPT

Proposal contact person or principal investigator:

Name	Dana Weigel
Mailing Address	3404 Hwy 12
City, ST Zip	Orofino, ID 83544
Phone	(208)476-9502
Fax	(208)476-0719
Email address	weigeld@clearwater.net

Subcontractors. List one subcontractor per row; to add more rows, press Alt-Insert from within this table

Organization	Mailing Address	City, ST Zip	Contact Name
University of Montana	Div. of Biological Sciences	Missoula, MT 59812	Fred Allendorf, Paul Spruell

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

10.3C.4, 10.3C.5, 10.3C.7

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

Other planning document references.

If the project type is "Watershed" (see Section 2), reference any demonstrable

support from affected agencies, tribes, local watershed groups, and public and/or private landowners, and cite available documentation.

Bennett (1997) identifies the need for developing a westslope cutthroat trout broodstock as resident fish mitigation for Dworshak Reservoir to preserve the native cutthroat trout in the basin. Fickeisen and Geist (1993) identify the need for a genetic inventory and preservation of westslope cutthroat trout in Dworshak Reservoir and the North Fork Clearwater basin. Additionally, they identify the need for life history and habitat use of westslope cutthroat trout and bull trout in the basin (Fickeisen and Geist 1993).

Bennett, D. H. 1997. Evaluation of current environmental conditions and operations at Dworshak Reservoir, Clearwater River, Idaho, and an analysis of fisheries management mitigation alternatives. Final Report. U.S. Army Corps of Engineers. Walla Walla, WA. 39 pp.

Fickeisen, D. H. and D. R. Geist 1993. Resident fish planning: Dworshak Reservoir, Lake Roosevelt, and Lake Pend Oreille. Project No. 93-026. Bonneville Power Administration. Portland, OR. 45pp.

Subbasin.

North Fork of the Clearwater River basin

Short description.

Document the extent of hybridization among native westslope cutthroat trout and introduced rainbow trout, and evaluate the effects of Dworshak resident fish mitigation on native trout in the North Fork Clearwater basin.

Section 2. Key words

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

Other keywords.

DNA, introgression, westslope cutthroat trout, bull trout, habitat

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
8740700	Dworshak Dam Impacts M&E	resident fish mitigation in DworRes.
8709900	Dworshak Dam Impacts Assessmt	resident fish mitigation in DworRes.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	develop genetic reference sample for westslope	a	select appropriate genetic method to detect introgression
		b	select reputable genetic subcontractor
		c	background research to determine the species needed in the reference sample
		d	complete the reference sample using the selected subcontractor
2	collect and analyze tissue samples from the basin	a	select sites in the basin to collect samples, habitat, and popn data
		b	collect fin clips and data
		c	summarize results and make recommendations for mitigation
3	broodstock development and management	a	identify pure westslope with potential for use in broodstock
		b	locate a facility and collect broodstock
		c	increase broodstock and numbers of trout for release
		d	release hatchery reared trout into DworRes and the NF basin
4	Monitoring and Evaluation	a	collect baseline data on life history, habitat use, and migration
		b	determine best times, locations, equipment to collect broodstock
		c	evaluate the suitability of spawning habitat in the basin
		d	evaluate the life history, habitat use, and migration of hatchery westslope released into the basin

		e	collect genetic data from cutthroat trout in the basin periodically (every 10 yrs) to test effect of mitigation changes
		f	evaluate and make recommendations related to the effectiveness of the mitigation program on westslope and bull trout

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	09/1995	03/1997	10
2	06/1997	01/2000	20
3	01/2000	01/2010	40
4	10/1999	01/2010	30

Schedule constraints.

Problems finding suitable, genetically pure westslope cutthroat trout broodstock, and/or successfully adapting the broodstock to the hatchery may delay completion of the broodstock development objective.

Completion date.

2010 However, mitigation and monitoring will continue for the life of Dworshak Dam.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	Project Leader, Asst Project Leader, 2 Technicians, Director (3 mo), Secretary (3 mo), 2 Seasonal Bio-Aides	138,900.00
Fringe benefits		40,000.00
Supplies, materials, non-expendable property		6,000.00
Operations & maintenance		17,000.00
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		
PIT tags	# of tags:	
Travel		8,000.00
Indirect costs	29% of total above	62,100.00

Subcontracts	600 genetic samples @ \$30 each	18,000.00
Other		
TOTAL		290,000.00

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	350,000	400,000	1,000,000	750,000
O&M as % of total	7	7	15	15

Section 6. Abstract

The goal of this project is to support resident fish mitigation in Dworshak Reservoir that will provide a consumptive fishery (>0.5 fish/hr) that does not interfere with native species in the North Fork Clearwater basin. Hybridization with exotic trout has been documented as the greatest threat to the conservation of native westslope cutthroat trout in northern Idaho and western Montana. Resident fish mitigation releases rainbow trout into Dworshak Reservoir annually. These fish move considerable distances upstream into the free-flowing portions of the drainage. This project will use nuclear DNA analysis to determine the extent of introgression that has occurred in westslope populations in the North Fork Clearwater basin upstream of Dworshak Reservoir. Tissue samples from 20 cutthroat, rainbow, and hybrid trout will be collected from 100 sites in the basin. Sites will vary in stream size, channel type, and distance from the Reservoir. Fish will be collected from each site with an electroshocker using a three pass removal estimate. Population estimates of each species of fish and habitat characteristics will be measured at each site. If introgression threatens the genetic integrity of westslope cutthroat trout in the basin, we will recommend the development of a genetically pure westslope cutthroat trout broodstock derived from the North Fork Clearwater basin. Restoration of wild westslope populations will require survival and spawning success from the hatchery reared trout. Therefore, monitoring and evaluation will involve: identifying habitat use and spawning locations in the basin, evaluating habitat suitability, and comparing the survival and spawning success of hatchery versus wild trout.

Bull trout have also been identified as a species of concern, and are currently being considered for listing under the ESA. Bull trout activities can easily be coordinated with cutthroat trout activities in the basin. The effects of Dworshak Reservoir operations and mitigation on bull trout has not been addressed (Fickeisen and Geist 1994). Monitoring and evaluation will be incorporated in the westslope activities to identify seasonal movements within the basin and spawning sites. Other Reservoir mitigation activities, such as decreasing annual entrainment losses of kokanee salmon, could have positive effects on bull trout (Bennett 1997). By assessing the population status of bull trout in the basin, protection of native trout can be incorporated into the adaptive management strategy proposed for mitigation in the Reservoir.

Section 7. Project description

a. Technical and/or scientific background.

Hybridization with exotic trout is considered the greatest threat to the conservation of the native westslope cutthroat trout in northern Idaho and western Montana (Allendorf and Leary 1988). Westslope cutthroat trout is reduced substantially in its historic range (Allendorf and Leary 1988, Rieman and Apperson 1989). In Idaho, strong and genetically pure populations are thought to exist in less than 4% of its native range (Rieman and Apperson 1989). Although several studies have determined that genetically pure populations of westslope cutthroat trout remain in less than 2.5% of the historic range in Montana, little genetic sampling has been done in Idaho (Allendorf and Leary 1988, Rieman and Apperson 1989). Introduced rainbow trout, Yellowstone cutthroat, and golden trout will freely hybridize with westslope cutthroat trout producing fertile offspring. This extensive hybridization will infuse exotic genes into the native population, creating a hybrid swarm (Gyllensten et al. 1985, Allendorf and Leary 1988, Leary et al. 1995). The hybrid swarm permanently alters the genetic composition of the native trout, losing the local adaptations and reducing survival and fertility (Allendorf and Leary 1988, Leary et al. 1995).

The North Fork Clearwater basin is thought to have relatively strong populations of westslope cutthroat trout. However, rainbow and Yellowstone cutthroat trout have been widely introduced in the drainage. Furthermore, the completion of Dworshak Dam near the mouth of the North Fork Clearwater River has caused a large loss of riverine habitat and blocked anadromous runs of salmon and steelhead. The stocking of rainbow trout into Dworshak Reservoir is used to mitigate the losses caused by the dam. Ball and Pettit (1974) report the movement of hatchery stocked rainbow trout from Dworshak Reservoir to Kelly Creek, 88 km upstream. This extensive movement of hatchery rainbow trout threatens the indigenous westslope cutthroat trout in more than 75% of the drainage. Leary et al. (1995) suggest that, to prevent introgression, rainbow trout should not be stocked wherever native cutthroat trout populations exist, and mitigation programs should develop a local, native cutthroat trout broodstock from several populations within the drainage. Several studies have identified the need for a genetic inventory in the North Fork Clearwater basin with subsequent modifications to resident fish mitigation to preserve the native westslope cutthroat trout (Maiolie et al. 1989, Fickeisen and Geist 1993, Bennett 1997). Using the results of the genetic inventory, we will make management recommendations for resident fish mitigation in Dworshak Reservoir based on the persistence and wise management of wild, native trout populations in the drainage.

b. Proposal objectives.

Objective 1. Develop a genetics reference sample and compile background information for the basin.

Product 1. Report on background research on stocking activities and fish distribution in the North Fork Clearwater basin - COMPLETED (Weigel 1997).

Product 2. Create a genetic reference sample through subcontract with the University of Montana Fish Genetics Lab - COMPLETED (Annual Report submitted to NPT April 1997).

Objective 2. Collect and analyze tissue samples from cutthroat, rainbow, and hybrid trout from approximately 100 sites in the basin.

Product 1. Genetic identity/data of approximately 2,000 trout from the North Fork Clearwater basin.

Product 2. Report summarizing the genetic status of westslope cutthroat trout in the North Fork Clearwater basin with recommendations for Dworshak Resident Fish mitigation.

Objective 3. Develop and manage a genetically pure westslope cutthroat trout broodstock derived from the North Fork Clearwater basin.

Product 1. Genetically pure westslope cutthroat trout broodstock used to provide the 100,000 lbs. of trout for the Dworshak Resident Fish Mitigation program.

Assumption: Genetically pure populations of westslope cutthroat trout still exist in the North Fork Clearwater basin from which individuals can be collected for broodstock.

Objective 4. Monitor and evaluate the effects of Dworshak operations and mitigation on wild, native trout in the basin.

Product 1. Survival and spawning success estimates of hatchery-reared versus wild cutthroat trout.

Product 2. Describe the behavior, migrations, and suitable spawning habitat for westslope cutthroat and bull trout in the basin.

Assumption 1. Current habitat conditions in the North Fork Clearwater basin are suitable to support naturally reproducing westslope cutthroat and bull trout.

Assumption 2. Hatchery-reared westslope cutthroat trout will successfully spawn and will reverse introgression in the basin.

c. Rationale and significance to Regional Programs.

This project is related to other Dworshak Reservoir mitigation projects (project numbers 8740700 and 8709900) to implement resident fish mitigation that will provide a consumptive fishery (>0.5 fish/hr) but will not conflict with preservation of other native and wild fish. Maiolie et al. (1989) identified the need to investigate the effects of stocking rainbow trout, as Dworshak resident fish mitigation, on native westslope cutthroat trout populations in the North Fork Clearwater basin. The 1994 FWP measure number 10.3C.4 authorizes the genetic inventory of westslope cutthroat trout in the North Fork Clearwater basin, 10.3C.5 authorizes BPA to fund the NPT to implement the study, and 10.3C.7 establishes cost-sharing with the Corps of Engineers to stock and monitor resident fish introduced into Dworshak Reservoir. The CBFWA DAIWP (MYIP section 6.6.5.3.A) addresses two resident fish objectives: 1. To maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of native populations; and 2. To ensure population levels of native fish above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival. Furthermore, this project is an important component of the Corps of Engineers current

reevaluation of resident fish mitigation in Dworshak Reservoir. Applying current genetic principles to evaluate the basinwide effects of mitigation is on the forefront of resident fish research that can be applied to other mitigation activities in the Columbia basin.

d. Project history

This westslope cutthroat trout project has completed its second year of funding with the total cost of \$347,774. We have completed a background study and evaluation of current fish distribution in the North Fork Clearwater basin (Weigel 1997), and the genetic reference sample under subcontract with the University of Montana (submitted as an annual report to the NPT in April 1997). Currently, we have completed the first year of collection and analysis of tissue samples. Adaptive management generated from the results of the project will relate to the evaluation of stocking programs in relation to the conservation of native westslope cutthroat trout, a species recognized as a sensitive species by the state of Idaho and currently petitioned for listing under the ESA.

e. Methods.

Objective 1. Background information was compiled throughout the basin relating stocking histories to current fish distribution. From this information, suspected genetic status was discussed, and used to choose sample sites in the basin (Weigel 1997). Three fish genetics labs submitted proposals and costs. Traits of the nuclear DNA analysis were determined to be most suited to our goals, such as non-intrusive sampling and equal inheritance from the parents. We selected the University of Montana Fish Genetics Lab (F. Allendorf) using non-coding sequences of nuclear DNA to determine the extent of introgression in the basin.

Objective 2. Currently, the project collects tissue samples for genetic analysis, morphometric characteristics, habitat data, and population estimates. Fish sampled are usually collected using a backpack electroshocker. However, large mainstem streams and high mountain lakes are sampled by angling because excessive size, depth, or current makes electroshocking inefficient and dangerous. All trout from which tissue samples are collected are handled similarly (see below). An estimated ten sites out of 100 are angled. The tissue samples are genetically analyzed using non-coding sequences of nuclear DNA. Species specific markers have been identified in a reference sample previously completed. Morphometric characteristics will be analyzed with the genetic identification of the trout to describe the characteristics useful in visually identifying cutthroat, rainbow, and hybrid trout. The genetic identity will be compared to a visual identity assigned in the field to determine observer accuracy. Habitat data and population estimates will be used to monitor and evaluate the effectiveness of any changes in mitigation.

Data Collection

Fish are collected with a Smith-Root 15-D backpack electroshocker using a three pass removal method. A 50m site is blocknetted at the top and the bottom to prevent fish movement into and out of the site during sampling. Fish collected on each pass are held

separately in buckets until the sampling is complete. A small fin clip from the pelvic or caudal fin is collected from 20 cutthroat, rainbow, and/or hybrid trout at each site and preserved in 95% ethanol. Morphometric characteristics are recorded for each trout from which tissue is collected. These characteristics include: head and body measurements, spot pattern, spot shape, slash intensity, fin spotting, and presence/absence of hyoid teeth.

The location of each site is benchmarked with a metal tag, and marked on a topographic map. Five transects are measured at 10m intervals. Width, depth, sediment size, and cobble embeddedness are measured at each transect. Gradient, map elevation, Rosgen channel type, and proportion of cover types (wood, boulder, vegetation, etc) are measured over the site.

Data Analysis

The genetic results will be mapped over the basin in order to determine the extent of introgression. Morphometric characteristics will be modeled with the genetic identification of the trout using categorical and continuous variables. Data will be analyzed using ANOVAs, MANOVAs, logistic regression, and/or discriminant function analysis. Habitat data will be modeled by fish species and density using principal components analysis, factor analysis, and/or discriminant function analysis. The different statistical analyses will be evaluated for the data meeting the necessary assumptions. These analyses will describe the relative abundance of genetically pure westslope cutthroat trout, morphometric characteristics that differentiate between cutthroat, rainbow, and hybrid trout, and the habitat that is correlated with these trout. The genetic status of westslope cutthroat trout will be evaluated in a final report. This report will include recommendations for resident fish mitigation in Dworshak Reservoir, and identify possible sources for genetically pure westslope cutthroat trout broodstock.

Objective 3. If introgression is determined to be a significant threat to westslope in the North Fork Clearwater basin, we will develop a genetically pure westslope broodstock from pure populations in the basin. Assuming some genetically pure westslope cutthroat trout exist in the basin, we will collect juvenile trout or gametes from pure westslope cutthroat trout. Trout will be raised and spawned in the hatchery. The Montana State Fish Hatchery at Anaconda has developed a genetically pure westslope broodstock from pure populations in Montana. We may apply similar methods to this broodstock development program.

Objective 4. We will monitor and evaluate changes in mitigation in Dworshak Reservoir. Restoration of genetically pure westslope cutthroat trout in the basin can only be accomplished if the pure hatchery-reared westslope spawn. Hatchery-reared westslope cutthroat trout will pass on their genes to the wild, introgressed populations in the basin, and maintain naturally reproducing populations for a consumptive sport fishery. Therefore, we need baseline spawning habitat data to monitor and evaluate the success of the program. Migrations and spawning locations will be identified with radiotelemetry. After locating spawning areas, we will collect habitat data to determine the amount of quality spawning habitat present in the basin. Additionally, the effects of Dworshak operations and mitigation has not been addressed for bull trout. Therefore, bull trout can

be included in this phase for little additional cost. Bull trout monitoring and evaluation will include: redd surveys, identifying habitat characteristics of spawning areas, seasonal migrations in Dworshak Reservoir, potential of entrainment, and the effects of kokanee and westslope mitigation on bull trout.

f. Facilities and equipment.

The NPT will provide office space and shared office equipment (fax, photocopier, internet access, etc) for the project in the Orofino Field Office. The location of the Orofino Field Office reduces travel time to the field sites. The project has purchased a 4-wheeler, trailer, backpack electroshocker, and computer. Additionally, the project proposes to purchase an additional 4-wheeler and computer in 1998. The 4-wheelers are used for remote access, while the additional computer will be used by the full-time lead technician hired during 1997.

g. References.

Allendorf, F.W. and R.F. Leary. 1988. Conservation and distribution of genetic variation in a polytypic species, the cutthroat trout. *Conservation Biology*. 2:170-184.

Ball, K. And S. Pettit. 1974. Dworshak Fisheries Studies: Evaluation of the limnological characteristics and fisheries of Dworshak Reservoir. Idaho Department of Fish and Game, Job Performance Report. Project No. DSS-29-4, Job No. 4. 63-94 pp.

Bennett, D.H. 1997. Evaluation of current environmental conditions and operations at Dworshak Reservoir, Clearwater River, ID, and an analysis of fisheries management mitigation alternatives. Final Report to the U.S. Army Corps of Engineers. Walla Walla, WA. 45pp.

Fickeisen, D. H. and D. R. Geist 1993. Resident fish planning: Dworshak Reservoir, Lake Roosevelt, and Lake Pend Oreille. Project No. 93-026. Bonneville Power Administration. Portland, OR. 45pp.

Gyllensten, U., R.F. Leary, F.W. Allendorf, and A.C. Wilson. 1985. Introgression between two cutthroat trout subspecies with substantial karyotypic, nuclear, and mitochondrial genomic divergence. *Genetics*. 111:905-915.

Leary, R.F., F.W. Allendorf, and G.K. Sage. 1995. Hybridization and introgression between introduced and native fish. *American Fisheries Society Symposium* 15. Bethesda, MD. 91-101 pp.

Maiolie, M.A., D.P. Statler, and S. Elam. 1993. Dworshak Dam impact assessment and fishery investigation and trout, bass, and forage species. Combined Project Completion Report. Prepared for Bonneville Power Administration. Project Nos. 87-99 and 87-407. 92 pp.

Rieman, B.E. and K.A. Apperson. 1989. Status and analysis of salmonid fisheries. Westslope cutthroat trout synopsis and analysis of fishery information. Idaho Department of Fish and Game, Project F-73-R-11, Subproject No. II, Job No. 1.

Weigel, D.E. 1997. Genetic inventory of westslope cutthroat trout in the North Fork Clearwater basin, Idaho. Prepared for Bonneville Power Administration. Project No. 95-016-00. Contract No. 95BI61768. 13 pp.

Section 8. Relationships to other projects

This project parallels methodology established by ODFW in the Bull Trout Studies in Central and Northeast Oregon (project no. 9405400). We have consulted with ODFW on field methods while establishing our sampling protocol. The projects work in remote terrain using similar methodology while testing the genetic status of native trout. Additionally, we can compare bull trout status, behavior, migrations, and habitat to the Northeast Oregon conclusions.

Section 9. Key personnel

Dana Weigel, Project Leader
Nez Perce Tribe, Fisheries
Orofino Field Office
3404 Hwy 12
Orofino, ID 83544
(208)476-9502
weigeld@clearwater.net

EDUCATION

M.S. Fisheries University of Minnesota 1994
B.S. Aquatic Environments Allegheny College 1991

RESEARCH EXPERIENCE AND PUBLICATIONS

Research Assistant, University of Minnesota, Department of Fisheries and Wildlife, St. Paul MN, Sept 1991 - March 1994

Thesis Title: Physical and biological correlates of the distribution and abundance of brook, brown and cutthroat trout in a small stream.
Co-Author: Sorensen, P.W., T.E. Essington, J. Cardwell, and D.E. Weigel. 1995. Hybridization and spawning behavior of brook and brown trout in a small stream. Canadian Journal of Fisheries and Aquatic Sciences. 52:1958-1965.

Independent Research, Allegheny College, Meadville, PA, Sept 1990 - May 1991.

Undergraduate thesis title: Photosynthetic contribution to the carbon budget of a small forested stream.

TECHNICAL EXPERIENCE

Project Leader, Nez Perce Tribe, Orofino, ID, Sept 1996 - Present

Project: Genetic Inventory of Westslope Cutthroat Trout in the North Fork

Clearwater

Fisheries Biologist, Clearwater Biostudies Inc., Canby, OR, June 1996 - Sept 1996
Project: Stream Surveys under contract with the USFS Clearwater and Nez Perce National Forests

Fisheries Biologist, University of Idaho, Cooperative Fisheries Research Unit, Moscow, ID, April - June 1995
Project: Radiotelemetry of Adult Chinook Salmon at Ice Harbor Dam

Fisheries Biologist, M&M Environmental Enterprises, Boise, ID, June - Dec 1995
Project: Stream Surveys under contract with the USFS Payette National Forest

Fisheries Biologist, Vermont Natural Resource Council, Montpelier, VT, April - June 1995
Project: Prepare expert testimony evaluating FERC dam relicensing regulations, and Evaluate flow regulation studies and proposed fish passage facilities

Fisheries Biologist, USFS Intermountain Research Station, Boise, ID, Aug - Oct 1994
Project: Monitoring the movements and genetic exchange of resident and migratory bull trout

Fisheries Biologist, National Biological Survey, Cook, WA, April - July 1994
Project: Monitoring the movement of Chinook and steelhead smolts through reservoirs and dams on the Snake and Columbia Rivers using radiotelemetry and hydroacoustics

Research Assistant, Rocky Mountain Biological Lab, Gothic, CO, June - Sept 1991
Project: Evaluating the costs and benefits of paedomorphosis versus metamorphosis in tiger salamanders and identifying the species composition of invertebrates in high elevation ponds

TRAINING

University of Idaho, Applications of Multivariate Statistical Methods for Fish and Wildlife Professionals, 1997
USFWS, Fish Genetics, 1997

Duties: literature reviews, report writing, experimental design, data analysis, computer modeling, speaking to peer and local interest groups, budget planning and management, writing proposals, personnel management, planning logistics, provide expert testimony and scientific advice

Skills: identifying aquatic insects, fish, plankton, and plants, census fish, amphibians, and aquatic invertebrates, R1/R4, Hankin and Reeves, and transect stream survey methodology, snorkel, electroshock, Rosgen channel type, cobble embeddedness measurements, redd surveys, age scales, diet analysis, water chemistry analysis, chlorophyll extraction, carbon-14 counts, mapping, reach descriptions, radiotelemetry, hydroacoustics, acoustic doppler current profilers, GPS, trawl netting, fish handling and identification, boat operation and maintenance, Wolman pebble counts, mapping, PIT tagging

Sean Cross
Lead Fisheries Technician
Nez Perce Tribe
Orofino Field Office
3404 Hwy 12

Orofino, ID 83544
(208)476-9502
crosss@clearwater.net

EDUCATION

B.S. Aquatic Wildlife Biology, University of Montana 1996

TRAINING

Road Obliteration Course USFS 1997, Erosion and Sediment Control Course USFS 1997, Contracting Officer Representative Course USFS 1997, Watershed Inventory Methods Course USFS 1994, Professional Leadership and Development Course US Army 1990

TECHNICAL EXPERIENCE

Lead Fisheries Technician, Nez Perce Tribe, Orofino, ID, June 1997 - Present

Project: Genetic inventory of westslope cutthroat trout

Hydrologic and Fisheries Technician, USFS Clearwater National Forest, Powell, ID, Jan - May 1997

Project: Landslide inventory and road obliteration Fisheries Volunteer, Confederated Salish and Kootenai Tribes, Pablo, MT, May - Oct 1996

Project: Monitoring and evaluating stream and reservoir fisheries

Seasonal Hydrologic and Fisheries Technician, USFS Clearwater National Forest, Powell, ID summers 1993 - 1996

Project: Stream evaluations and habitat enhancement

Skills: identifying fish and aquatic insects, stream and watershed analysis, landslide evaluation, fish handling, gill netting, electroshocking, redd counts, snorkel, seine netting, boat/ATV operation and maintenance, Wolman pebble counts, cobble embeddedness measurements, Rosgen channel type, habitat measurements, monitoring installation and repair of habitat enhancement structures, riparian enhancement, instruct and supervise Salmon Corps participants, report writing, GIS mapping, data collection and entry, air photo interpretation, genetic sampling, PIT tags, Floy tags, radiotelemetry

Section 10. Information/technology transfer

Information from the project is distributed by Annual Reports submitted to BPA under the terms of our contract. Additionally, we plan to incorporate citizen education meetings, professional society meetings (such as Idaho Chapter of AFS), and inter-agency information sharing. Furthermore, the information gained from this project will be used by the Army Corps of Engineers for resident fish mitigation planning in Dworshak Reservoir.