Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

Section 1. General administrative information

Implement Fisheries Enhancement Opportunities :Coeur d'Alene Reservation

Bonneville project number, if an ongoing project 9004400

Business name of agency, institution or organization requesting funding
Coeur d'Alene Tribe

Business acronym (if appropriate) CDA Tribe

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
Not determined at this time			

NPPC Program Measure Number(s) which this project addresses.
10.8B.4

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

Other planning document references.
Coeur d'Alene Tribe Project Management Plan - Enhancement Of Resident Fish Resources Within The Coeur d'Alene Indian Reservation. Section 1 of this planning

document - Introduction/Purpose and Need - provides historical justification for tribal dependence on resident fish resources and identifies the need for enhancement.

Subbasin.
Coeur d'Alene Subbasin Upper Columbia

Short description.
Habitat restoration, purchase critical watershed areas to protect quality habitat, develop an educational outreach program, develop interim tribal harvest opportunities, construct and operate a hatchery, and 5 year monitoring and evaluation program.

Section 2. Key words

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

Other keywords.
DNA, stock identification, life history, sampling, ecological interactions

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
4401	Lake Creek Land Acquisition	Purchases critical watershed areas in the Lake Creek Drainage for protection of upland and riparian areas deemed critical for restoration of fish and wildlife habitat in the Lake Creek Drainage.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Riparian Enhancement	a	Implement riparian and upland enhancement projects in target watersheds
2	Lateral water development	a	Develop sites in target watersheds that will provide high quality summer and/or winter rearing habitat for juvenile cutthroat trout.
3	Water storage enhancement	a	Implement wetland enhancement projects in target drainages
4	Monitoring and Evaluation	a	Monitor the movement of adultand juvenile fish within all target watersheds. Install and maintain spring migration traps
4	Monitoring and Evaluation	b	Track abundance and distribution of cutthroat trout in all target watersheds.
4	Monitoring and Evaluation	c	Monitor water temperature and stream flow at selected sites in each target watershed
4	Monitoring and Evaluation	d	Evaluate project effectiveness for all ongoing and completed restoration projects. Evaluations to include: 1) utilization by cutthroat trout; 2) document stability of instream structures; 3) growth and survival of riparian plantings; 4) riparian function
5	Develop Interim Harvest Opportunities	a	Prepare, stock and maintain existing ponds, as well as develop additional pond locations.
5	Develop Interim Harvest Opportunities	b	Evaluate the effectiveness of stocking program through creel survey information, population estimates and other information.
6	Education Outreach Program	a	Continue development of educational forum for the local community. Interact with area schools to enlist participation in the program. Coordinate

			community activities that provide information and integrate projects
6	Education Outreach Program	b	Form functional watershed work groups comprised of private landonwers, industry and agency interests to develop restoration and cooperative opportunities
6	Education Outreach Program	c	Produce quarterly newsletter detailing watershed and restoration activities
7	Supplementation Feasibility	a	Identify limiting factors for cutthroat and bull trout in Lake Coeur d'Alene. Evaluate Predator-prey relationships. Identify and describe habitat types and fish assemblages found within nearshore areas of Lake Coeur d'Alene
7	Supplementation Feasibility	b	Conduct baseline genetic analysis of cutthroat trout from each target watershed
7	Supplementation Feasibility	c	Complete data analysis of above tasks to determine if supplementation is necessary for rebuilding stocks to harvestable levels. Determine feasibility of re-introduction of bull trout to Tribal Waters.
7	Supplementation Feasibility	q	If supplementation is necessary develop bio-engeneering criteria for pre-design phase of hatchery construction. Selection options for location and type of facility and complete NEPA requirements for construction.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	6/1996	11/2002	40.00%
2	6/1996	11/2002	5.00%
3	6/1996	11/2002	5.00%
4	6/1996	11/2002	15.00%

5	6/1997	11/2007	5.00%
6	6/1997	12/2007	10.00%
7	10/1997	1/2000	20.00%
			TOTAL 100.00%

Schedule constraints.
1)Adequate landowner participation 2.) Supplementation feasibility study completed on time 3.) Hatchery NEPA requirements completed on time 4.) Adequate budget to implement interrelated objectives/tasks.

Completion date.
2007 except for hatchery O&M.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel		$274,100
Fringe benefits		$95,935
Supplies, materials, non-expendable property		$60,775
Operations & maintenance		
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	hatchery slted for this year/scheduling constraints may limit the need for this amount.	$1,200,000
PIT tags	# of tags:	
Travel		$25,000
Indirect costs	currently calculated at 31.6% of budget minus capitat and subcontracts	$154,248
Subcontracts	Includes contracting work for hatchery masterplanning, restoration activities, genetic evaluations,	$16,500
Other	includes vehicle costs, communications, etc.	$32,316
TOTAL		$1,858,874

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	$894,000	$894,000	$794,000	$794,000
O&M as % of total	27.96%	27.96%	31.48%	31.48%

Section 6. Abstract

The Bonneville Power Administration is funding necessary stream habitat improvement projects on tributaries within the Coeur d'Alene Indian Reservation to facilitate recovery of westslope cutthroat trout and bull trout populations. Baseline stream surveys conducted from 1990-1994 have identified several population limiting factors, including: high summer water temperatures, suboptimal baseflows, reductions in pool volume, and low abundance of woody debris. Critical habitat areas have been identified based on existing land-use patterns and cutthroat trout abundance and distribution. Recommendations for treating limiting factors are presented as a three phase implementation process. Phase one emphasizes watershed restoration techniques including: 1) changing land use practices that are causing habitat degradation; and 2) reestablishing riparian/stream linkages. Phase two involves active manipulations of habitat structure that address site specific problems. Phase three evaluates alternatives for supplementation and construction of supplementation facilities. Restoration strategies combine: conservation of remaining high quality habitat; reclamation of degraded riparian and upland areas; development of interim harvest opportunities; and increasing public awareness, landowner involvement and public education.

Section 7. Project description

a. Technical and/or scientific background.

In 1987, the Northwest Power Planning Council amended the Columbia River Basin Fish and Wildlife Program and recommended that the Bonneville Power Administration (BPA) fund a baseline stream survey of tributaries located on the Coeur d'Alene Indian Reservation and provide recommendations on ways to improve the fisheries for the Coeur d'Alene Tribe. In 1994, the Northwest Power Planning Council adopted the recommendations set forth by the Coeur d'Alene Tribe to improve the Reservation fishery. These actions included: 1.) Implement habitat restoration and enhancement measures in Lake, Benewah, Evans and Alder creeks; 2.) Purchase critical watershed areas for protection of fisheries habitat; 3.) Conduct an educational/outreach program for the general public within the Coeur d'Alene Reservation to facilitate a "holistic" watershed protection process; 4.) Develop an interim fishery for tribal and non-tribal members of the reservation through construction, operation and maintenance of trout ponds; 5.) Design, construct, operate, and maintain a trout production facility; and 6) Implement a five-year monitoring program to evaluate the effectiveness of the hatchery and habitat improvement projects.

A conceptual approach to the restoration of fish habitat has been adapted from various sources as a guide for management efforts on the reservation (Lillengreen, et. al. 1998). The conceptual model is based on the ecological processes that shape riparian/stream ecosystems and focuses on 1) removing or modifying those land use impacts that are causing habitat degradation, 2) reestablishing riparian/stream linkages, and 3) restoring natural ecosystem processes.

Community support is an essential component of the overall Coeur d'Alene Tribal fisheries restoration program. Modifying land use impacts over the long term can best be achieved through public involvement and education. Involvement satisfies an essential information need and as local communities become better informed of the issues affecting them, they are more willing to affect change that benefits common good and the good of the ecosystem. Similarly, education can create opportunities for cooperation by empowering the individuals engaged in the process. To date, Tribal staff have convened and facilitated community meetings in priority watersheds, and frequently joined community groups and small gatherings of influential property owners for round table discussions investigating restoration opportunities. Private property owners in these same watersheds have agreed to form watershed working groups to formulate problem lists and develop work plans to addresses environmental issues. These types of activities will continue through FY2002 at a minimum.

Reestablishing riparian/stream linkages will be achieved through purchase of critical habitat areas and through negotiation of long-term conservation easements with private landowners. Critical habitat areas have been delineated in each of the target watersheds using GIS technology. Landowners in these areas are being made aware of program goals and objectives and are slowly becoming more involved in restoration activities. The easements signed to date outline the development of conservation oriented management plans, maintenance of exclusion fences and riparian plantings, and continued monitoring of habitat improvements. Additional contracts will be negotiated with private landowners in FY99 and outyears.

Finally, ecosystem processes will be restored, in part, by implementing active restoration techniques. Active restoration is defined as those activities that encompass mechanical, chemical, or biological manipulations of the ecosystem in order to achieve the desired future condition. This includes, but is not limited to, the reintroduction of native species, structural habitat additions, the use of prescribed fire, and chemical manipulations. The National Research Council (1992) has documented successful use of active restoration techniques for stream ecosystems. Many of these tested techniques are being employed by the Coeur d'Alene Tribe Fish and Wildlife Program. Restoration sites have been implemented in each of the target watersheds with the cooperation of private landowners. These sites serve to demonstrate the benefits of restoration work and encourage participation from neighboring landowners. Implementation activities, as recommended in the management plan for the Coeur d'Alene Indian Reservation (Lillengreen 1998), will continue in FY1999 and outyears.

b. Proposal objectives.

These can be found in Section 10.8.B. of the NPPC's program. Section 10.8.B. includes the following information:

1. Enhance fish habitat on Alder, Benewah, Evans, and Lake creeks to achieve interim 25%, 50%, and 75% habitat improvement targets.

2. Purchase critical areas (riparian corridors and associated uplands)within target watersheds to create linkages among high quality habitats.
3. Construct and operate a low-capital trout hatchery, if necessary, to supplement cutthroat trout populations in the target watersheds.
4. Provide interim harvest opportunities to the reservation community through the use of trout ponds.
5. Achieve harvest and escapement targets as outlined in section 10.8.B. of the NPPC Fish and Wildlife Program.

c. Rationale and significance to Regional Programs.

Fisheries resources are an integral part of the Coeur d' Alene Tribe's cultural heritage. Anadromous and resident salmonids were a critical component of the tribe's annual subsistence requirements. The Coeur d'Alene Tribe, however, lost their salmon fishery with the construction of the Monroe Street Dam in the city of Spokane, and Little Falls Dam farther downstream in the Spokane River. The anadromous fishery was further extirpated by the construction of Chief Joseph and Grand Coulee Dams on the Columbia River. These actions forced the Coeur d'Alene Tribe to rely solely on the resident fish resources of Lake Coeur d'Alene.

Historical evidence suggests that cutthroat trout were an abundant and important resident fishery for the Coeur d' Alene Indians. The Coeur d' Alene Indians maintained several semi-permanent and permanent fishing camps along the Spokane River near Coeur d' Alene Lake (Peltier, 1975). Peltier (1975) goes on to state that the harvest of large salmon and cutthroat trout in the river, and bull trout from the lake, contributed significantly to their overall subsistence needs. A traditional fish trap was operated on the Coeur d' Alene River for over 50 years until it was inundated by the construction of Post Falls Dam in 1903 (Scott, 1968; and Scholz et. al., 1985). This trap caught thousands of trout and whitefish annually. Successful harvest of resident species continued for many years after that. In 1967, the harvest of fish (total number of fish taken) from Coeur d' Alene lake ranked second only to Pend Oreille Lake (Mallet, 1968). Historically, Coeur d' Alene tribal fishers caught around 42,000 cutthroat per year (Scholz et. al., 1985). This number had dropped dramatically to 3,329 fish in 1967 (Mallet, 1968). In recent years, the number of cutthroat returning to spawn was the lowest ever recorded and in some tributaries the runs have vanished.

Adfluvial westslope cutthroat trout and bull trout are species of special concern in the region. Populations of these fishes on the reservation are significantly reduced from historic levels and when compared with other stream systems in the region. Land use within the target watersheds consists primarily of managed forest (53%), agriculture (25%), and grazed pasture (22%). Furthermore, approximately 80 percent of land ownership within the target watersheds consist of small (<400 acres) private lots. All current land uses exert some adverse impact on trout populations. Over harvest and a lack of education in regards to native species conservation has also been responsible for recent declines in population numbers. Because of the severity of habitat loss and a checkerboard ownership pattern, restoration efforts must be approached on a watershed

scale. Three life history stages, juvenile rearing, lake residence, and adult spawning, have been identified as critical in determining survivability of adfluvial cutthroat stocks. The linkages between habitat quality and critical life history stages are the focus for rebuilding sustainable and harvestable populations.

This project shares the FWP objectives of: maintaining biological diversity in the Upper Columbia River basin; maintaining genetic integrity by preserving wild fish stocks; providing needed habitat protection; and increasing run sizes and resident fish populations by implementing effective restoration projects. Furthermore, this project serves as a model for adaptive management by implementing projects based on baseline investigations and limiting factors analysis, sharing data and objectives with partnership agencies and private landowners, and incorporating effectiveness and trend monitoring to evaluate project responses.

d. Project history

In 1987, the NPPC amended the Columbia River Basin Fish and Wildlife Program to include a baseline stream survey of tributaries located on the Coeur d'Alene Indian Reservation [Section 903 (g)(1)(B)]. Habitat evaluations and fish population surveys were conducted from 1990 through 1994. In 1994-95, final recommendations for restoration priorities were submitted to the NPPC for approval and adoption into the Council's Program. Planning and implementation efforts were initiated beginning in 1995, with NEPA analysis delayed until 1996. The first demonstration projects were initiated with the support of private landowners in 1995. Habitat restoration efforts and development of public participation/education continued through1997. Trout pond management and hatchery planning continues as part of the interim harvest program and supplementation feasibility study.

On going data collection efforts in combination with baseline information help to promote an adaptive management strategy in this project. Habitat and population information collected during the initial baseline investigations was used to produce a limiting factors analysis. This analysis, in turn, was used in conjunction with existing data on land use and vegetation coverage to identify high priority areas for treatment and conservation. Ongoing studies examining trout migration, habitat use, incubation success, and genetic variability provide data used to refine treatment priorities. Program data and objectives are shared with partnership agencies and private landowners so that a watershed base approach to habitat conservation will be encouraged.

Four years of data were accumulated and analyzed to recommend the best alternative to rebuild a self-sustaining fishery for the Coeur d'Alene Tribe. Fish and macroinvertebrate population distribution and abundance has been described, in-stream and riparian habitats have been quantified, and limiting factors related to land use patterns have been evaluated. A list of project reports follows:

Fisheries Habitat Evaluations on Tributaries of the Coeur d'Alene Indian Reservation. Annual Reports 1990, 1991, 1992, 1993-94.

Final Reports 1995 (Draft)

Coeur d'Alene Tribe Project Management Plan - Enhancement of Resident Fish Resources Within the Coeur d'Alene Indian Reservation, 1997 (Draft)

e. Methods.

Past evaluations of stream systems on the Coeur d' Alene Indian Reservation have established the need for implementation of habitat enhancement and restoration projects (Lillengreen et. al., 1993). Initial habitat surveys identified stream reaches in Lake Creek, Benewah Creek, Alder Creek, and Evans Creek that are severely degraded due to past land use practices. Limiting factors for these target watersheds and the recommendations for enhancement that will be implemented under this proposal are listed below. The treatment recommendations are presented as a two phase implementation process. Phase 1 emphasizes passive restoration techniques and entails, 1) changing land use practices that are causing habitat degradation, and 2) reestablishing riparian/stream linkages. Phase 2 involves active manipulations of habitat structure that address site specific problems which remain following Phase 1 implementation. The ultimate goal is to promote, to the extent feasible, the restoration of natural ecosystem functions and processes.

- Optimal maximum water temperatures for embryo, juvenile and adult life history stages are regularly exceeded. Water temperatures which exceed the lower incipient lethal level for cutthroat trout have been recorded (Lillengreen et. al., 1993).
  Recommendations: Phase 1) Increase the amount of stream shading through riparian vegetation management. Techniques include, but are not limited to: riparian planting, establishing riparian buffer strips, and fencing. Phase 2) Install bank cover and instream structures, where appropriate, which can serve as thermal refugia for trout.

- Optimal flows for westslope cutthroat trout are rarely achieved due to the inability of the watershed to retain moisture. Measured base flows were 13 and 25 percent of average annual flow in 1991 and 1992, respectively (Lillengreen et. al., 1993).
  Recommendations: Phase 1) Promote water retention time in upland areas by increasing riparian and upland vegetative cover. Establish riparian buffer strips in forested and nonforested areas. Coordinate upland vegetation management with Tribal Forestry program directors. Phase 2) Develop an integrated series of water retention structures that will allow for release of stored water during critical summer rearing periods.

- Cumulative effects of sediment loading has decreased the amount of pool habitat present, which in turn limits overwintering and rearing opportunities for fish.
  Recommendations: Phase 1) Identify sediment sources and reduce input of sediment into stream system. Stabilize source areas through revegetation and use of check or retention structures. Implement BMPs (Best Management Practices) for timber, agriculture, and grazing land uses. Institute monitoring program to evaluate

BMP effectiveness. Phase 2) Install instream structures (e.g., bedload drop structures, cross-channel revetments, current deflectors) to create additional pool habitat and off-channel rearing habitat. Consider sediment removal from selected areas after sediment recruitment has been abated.

- Streams lacks habitat diversity and complexity which limits the natural carrying capacity of stream.
  Recommendations: Phase 1) Create short- and long-term sources of recruitable large woody debris which will naturally improve habitat diversity and complexity. Locate sites within the floodplain where large woody debris can be placed for natural recruitment into the stream channel during flood events. Plant a mix of conifers and hardwoods in riparian areas. Emphasis should be placed on species diversity to ensure continued, long term sources of wood. Phase 2) Install instream structures (e.g., cross-channel revetments, current deflectors, and half logs where gravels are present) to create additional pool habitat and off-channel rearing habitat, and to enhance instream cover opportunities.

- Severity of some peak flow events has accelerated bedload movement, resulting in increased potential embryo mortality and reduced spawning success.
  Recommendations: Phase 1) Promote water retention time in upland areas to reduce severity of peak flows. Establish floodplain buffer strips in forested and nonforested areas and reestablish connection with existing overflow channels. Coordinate upland vegetation management with Tribal Forestry program directors. Stabilize stream channels and develop water retention structures where feasible. Phase 2) Implement active bank and streambed stabilization program in high priority areas. Techniques to be used include, but are not limited to, bank sloping, natural revetment, and construction of drop structures to encourage gravel retention.

Several key steps are essential to the planning and prioritization of rehabilitation efforts on the Coeur d' Alene Indian Reservation. These steps define a process that guides projects from their inception through implementation, monitoring and evaluation. Coordination with program managers and the Tribal Council is necessary during each step of the planning process to ensure that projects comply with restoration goals and objectives and the management actions of other Natural Resource Department programs. Key steps are identified and described below.

- Identify stream reaches needing some level of enhancement based on physical and biological conditions, and prescribe appropriate restoration techniques.
- Prioritize restoration projects using a cost/benefit analysis that considers the potential for long-term ecological recovery and landowner participation.
- Discuss restoration efforts with tribal officials, private landholders, resource managers, and other interested parties, and negotiate landowner agreements.
- Review past data collection efforts for the project site and collect further baseline information, when needed, to facilitate implementation and effectiveness monitoring.

- Develop project specific goals and objectives that are quantifiable and measurable. These objectives should be consistent with overall program objectives and should facilitate the implementation of monitoring and evaluation procedures.
- Coordinate the implementation of projects with the appropriate regulatory agencies and complete all pertinent applications and permits.
- Implement restoration projects using techniques based on the best available science which will mitigate for factors that limit the productivity of native aquatic communities and enhance the function of ecological processes.
- Begin monitoring and evaluation procedures that will effectively determine project effectiveness as it relates to overall program goals and project specific objectives.

Approach to Interim Harvest Opportunities

Development of interim harvest opportunities will consist of constructing a "put and take" fishery located at several sites within the reservation boundaries. Hatchery reared fish will be stocked into several man-made ponds to serve as an alternative harvest base and to promote the recovery of resident wild fish in selected rivers and streams. To minimize the impact of stocking on existing native fish stocks, constructed ponds will be isolated from the rivers and streams on the reservation. Estimates indicate that at least five ponds should be developed to ensure adequate fishing opportunities for tribal members. One pond is currently in service, with the remaining ponds scheduled for completion by the end of FY 1999.

The primary management goal to determine stocking strategy will be angler satisfaction and success. Angler satisfaction and success is directly correlated to catch and/or harvest rates and fishing effort. Researchers have shown that mean catch rates for streams in the western United States peak at about 0.6-0.7 fish/hour, and catch rates needed to achieve excellent angler satisfaction ratings are much lower (Weithman and Katti 1979, Hicks et. al. 1983, Miko et. al. 1995) Furthermore, stocking densities of 1400 fish/ha will provide good to excellent angler satisfaction ratings. At these stocking densities, anglers would be satisfied with their trip quality even if they were dissatisfied with their fishing success. The management strategy employed by the Coeur d'Alene Tribe will be to provide fish catch rates of about 0.5 fish/hour. This is a conservative management strategy, since catch rates of 1.0 fish/hour are currently being achieved at ponds located on the reservation.

Conceptualized Approach to Supplementation Opportunities

The linkages between habitat components, life history, and optimum production of westslope cutthroat trout are often poorly understood. Resource management decisions are frequently based on socio-economic demands rather than on what is best for the natural resource. Langton et. al. (1996) describes instances where economic pressures have subverted ecologically based resource decisions. This ultimately leads to over exploitation of the fisheries resource and, in some instances, widespread stock collapses.

Therefore, it is in the common best interest to describe critical life history phases and the extent of essential habitat for the target species before resource management decisions are made. A conceptualized approach to supplementation on the Coeur d' Alene Indian Reservation has been developed with this concept in mind. The approach is presented as a flow diagram of interrelated actions designed to answer the questions of whether supplementation is necessary to rebuild cutthroat trout stocks and how supplementation should take place.

The decision making process consists of three inventory and assessment based tasks. The tasks are defined as: 1) determine critical life history stages; 2) quantify available habitat and potential species interactions; and 3) assess critical habitat parameters, including water quality, primary, and secondary productivity. These tasks have been devised to help answer the following questions:

1) Is there a production bottleneck in any of the critical life history stages of adfluvial cutthroat trout?
2) What are the competitive limitations within the lake system?
3) What is the carrying capacity of Lake Coeur d' Alene and the target tributaries?

The focus of inventory and assessment is to quantify essential habitat and identify limiting factors affecting adult westslope cutthroat trout in Lake Coeur d' Alene. The southern end of the lake will be mapped, and the distribution of cutthroat trout will be plotted using standard population sampling techniques (e.g., electroshocking, netting, etc.). Calculating the relative abundance of cutthroat trout in distinct habitat areas will help to describe the adult life cycle and quantify the extent of essential habitat.

Interactions between cutthroat trout and other species will be examined to determine whether competition acts to limit population size. Changes in the fish assemblage within the lake are well documented and tribal biologists have postulated that interaction with exotic species could be contributing to population declines.

Water quality will be monitored within essential habitats to identify possible abiotic limiting factors. Detrimental changes in the water quality of Lake Coeur d' Alene are occurring in an ever increasing pace. For example, non-point source nutrient input from development of highly erodable soils of the southwest section of the Lake Coeur d'Alene Basin has caused accelerated eutrophication during late summer months. Finally, a comparison of optimal habitat conditions with existing measured conditions and estimated pre Euroamerican conditions will be made.

Information obtained from work in Lake Coeur d' Alene will provide the framework for an objective, biologically sound decision making process regarding cutthroat trout supplementation on the Coeur d' Alene Indian Reservation. Additional information will complement existing data on the life history phases of stream dwelling trout to determine the proper course of action for enhancement. The ultimate objective is to determine if

supplementation is a cost effective and scientifically valid way to restore westslope cutthroat trout in the Coeur d' Alene system.

Results from the analysis of inventory data will help answer the question of whether existing natural populations could provide enough brood stock to support a supplementation facility. Answers to this question require that information on tributary and lake carrying capacity be synthesized with estimates on the desired level of harvest. Furthermore, the use of existing cutthroat populations as brood stock necessitates an electrophoretic analysis of genetic variability. This type of analysis is commonly used to evaluate the phylogeny of fish stocks and will provide critical information for determining the pathway for rebuilding native fish populations.

Approach to Public Involvement and Education

Two parallel processes are being used to approach public involvement and education. One process will focus on addressing methods of fostering landowner cooperation and on modifying land use practices that impact fisheries habitat. The second process will focus on promoting general public awareness of fish habitat and watershed health issues and increasing public awareness of the Coeur d'Alene Tribe's compensatory harvest program.

Formulation of watershed working groups, comprised of local landowners, special interest groups (primarily active sportsman's groups in the local watersheds), and interested agencies, is the primary method being used to enlist landowner cooperation. The watershed working groups will be responsible for assisting in the identification of problems in the watershed and developing long-term methods of improving fisheries habitat. These working groups will also be responsible for engendering public support and cooperation for the restoration program. The watershed groups will help identify and solicit other sources of revenue to expand the restoration effort.

The second process will involve a "public relations" campaign or "marketing program". This process will focus on educating the general public of the importance of fish habitat and watershed health issues. Objectives will be achieved by preparing presentations pertaining to the needs of and protection of fisheries habitat. Presentations will target civic organizations, local schools, the general public and other interested parties. Field trips to showcase restoration projects and a quarterly newsletter will be published and distributed.

Approach to Monitoring and Evaluation

The purpose of monitoring streams on the Coeur d'Alene Indian Reservation is to obtain information for use in evaluating the responses of native cutthroat trout populations to riparian and stream management practices. The fundamental objectives of the monitoring and evaluation program are to: 1) Establish a record of mitigation for cutthroat trout populations and the aquatic/riparian interface; 2) Account for enhancement costs; and 3) Acquire new knowledge about the physical and/or biological effects and interactions of stream enhancement measures. The monitoring program combines baseline monitoring,

implementation monitoring, effectiveness monitoring and project monitoring. Each of these strategies is defined below.

- *Baseline monitoring*. Baseline monitoring is used to characterize existing habitat or population conditions, and to establish a data base for planning or future comparisons. The need for baseline monitoring is determined prior to implementation of individual projects and is based on data availability.

- *Implementation monitoring*. This type of monitoring assesses whether activities were carried out as planned. The assessment is an administrative review and does not involve any detailed field measurements. This assessment is completed for each implementation activity and the results summarized in annual reports. An annual review of implementation assessments can then be undertaken to facilitate an adaptive approach to managing implementation activities.

- *Effectiveness monitoring*. Effectiveness monitoring is used to evaluate whether the specified activities had the desired effect. Effectiveness monitoring is used in evaluating individual restoration projects. Evaluating individual projects may require detailed and specialized measurements best made at the site, or immediately adjacent to the management practice. Effectiveness monitoring may include: population assessments that describe habitat utilization; physical habitat assessments that describe changes to channel morphology, hydrology, and riparian function; or water quality assessments that document fluctuation in temperature or dissolved oxygen. Additionally, effectiveness monitoring is used when assessing the performance of artificial habitat structures

Project monitoring. This type of monitoring assesses the impact of several enhancement projects on the function of ecological processes within a target drainage and the overall response of cutthroat trout populations. Often this assessment will be done by comparing data taken upstream and downstream of a series of interrelated enhancement projects, or the comparison may be on a before and after basis. The scope of this type of assessment necessitates a long term commitment to monitoring in order to compensate for the inter-annual variability of natural systems. Monitoring undertaken at this level includes annual assessments of fish population abundance and distribution as well as drainage specific water quality analysis.

f. Facilities and equipment.

A list of standard field equipment used for monitoring and evaluation is provided below. This list is by no means comprehensive, but is judged to be sufficient to show adequacy for the requirements of this proposal.

Custom Built Aluminum Electroshocking Boat (20 ft.);
Smith-Root Type VII-POW Electrofisher;
Trimble Navigation GPS Pathfinder Basic Plus;
Advanced Telemetry Systems Model R2100 Receiver;
Advanced Telemetry Systems Model DCCII Data Collection Computer;
Juniper Systems Pro2000 Field Computer;

Gurley Model 1100 Digital Flow Meter;
Hydrolab H2O Multiparameter Water Quality Monitoring Instrument;
HACH Model 2100P Turbidimeter;
Ryan RL100 Temperature Monitors;
Topcon AT-G4 Auto Level.

No additional high cost equipment is to be purchased with project funds.

g. References.

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Scott, O. 1968. Pioneer Days on the Shadowy St. Joe. Caxton Printers. Caldwell, ID. 372 pp.

Weithman, S. A., and S. K. Katti. 1979. Testing of fishing quality indices. Transactions of the American Fisheries Society 108:320-325.
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Section 8. Relationships to other projects

Examples of collaborative efforts are numerous and include private landowner, industry, and agency participation in restoration activities. Much of the restoration activities are being conducted on private land within the reservation boundaries and will result in long-term landowner contracts and/or conservation easements. Watershed working groups are being developed to serve as educational forums which will encourage long-term support from private landowners and the timber industry. Working groups are tasked with identifying issues of concern related to natural resource management, and with developing work plans to address these issues. Local school districts are participating in program sponsored outreach efforts and often donate time and labor at restoration sites. Washington State University, through its environmental projects program, has participated in implementing individual restoration projects. The EPA is working with the Tribe under sections 319 and 106 of the Clean Water Act to reduce non-point source pollution and gather baseline water quality data on the reservation. Additionally, local soil conservation districts have received State Agricultural Water Quality Program (SAWQP) grants to fund projects which reduce non-point source pollution from cropland erosion. Fish and Wildlife Program staff are coordinating stream restoration efforts with this agency so that critical areas receive priority treatment

Section 9. Key personnel

Angelo J. Vitale
Aquatic/Terrestrial Biologist
Mr. Vitale has over eight years professional experience in the evaluation and management of aquatic and terrestrial ecosystems. He currently serves as the stream habitat restoration project coordinator for the Coeur d' Alene Indian Tribe. In this position, he is responsible for coordination and implementation of BPA funded habitat restoration projects. Much of his time is spent developing public awareness of restoration opportunities and benefits and implementing watershed restoration projects. Principle responsibilities include supervision of technical staff, preparation of implementation and monitoring plans, annual reports, and budgets, and data reduction and analysis. In other positions, he has conducted instream flow analysis for site specific studies and basin wide projects, mapped fisheries habitat characteristics, studied fish population characteristics, conducted watershed analysis using Timber-Fish-Wildlife ambient monitoring methodologies, and evaluated the potential impacts of forest management practices on aquatic resources. He also has extensive experience identifying, mapping and interpreting plant community assemblages and conducting site specific surveys for candidate threatened and endangered wildlife species.

Education:
B.S.; University of Idaho; Biology/Botany; 1991

Employment History:
Years of Experience: 10

Employer— Coeur d'Alene Indian Tribe
Dates of Employment— 1995 - Present
Title— Stream Restoration Project Coordinator

Employer— Integrated Resource Management
Dates of Employment— 1995
Title— Project Scientist

Employer— EA Engineering, Science, and Technology, Inc.
Dates of Employment— 1991-1995
Title— Fisheries Scientist

Employer— University of Idaho
Dates of Employment— 1990-1991
Title— Research Assistant

Employer— Idaho State University
Dates of Employment— 1988-1989
Title— Research Assistant

Technical Publications and Presentations:
Peterson, C.R. and A.J. Vitale. 1989. Measuring the activity patterns of free-ranging animals with radiotelemetry. *American Zool.* 29(4):43A.

Vitale, A.J. 1989. Measuring the activity patterns of free-ranging garter snakes with radiotelemetry. Presented to Idaho Academy of Sciences. May.

Klowden, M.J. and A.J. Vitale. 1991. A bioassay for cobra cardiotoxin activity using semi-isolated cockroach heart. *In press*: *Toxicon.*

Lillengreen, K., A.J. Vitale, R. Peters. 1996. Fisheries habitat evaluation on tributaries of the Coeur d' Alene Indian Reservation: 1993, 1994 Annual Report. U.S. Department of Energy, Bonneville Power Administration. Project Number 90-044. September, 1996.

Vitale, A.J. 1997. Restoration planning and implementation: Using watershed analysis to identify effective restoration tools. Presented at Landscape Connections: Restoring Ecological Integrity in the Inland Northwest, Washington State University, Pullman, WA. September.

Lillengreen, K., A.J. Vitale, R. Peters. 1998. Coeur d'Alene Tribe project management plan - enhancement of resident fish resources within the Coeur

d'Alene Indian Reservation. *In press*: U.S. Department of Energy, Bonneville Power Administration.

Ron Peters
Fisheries Biologist/Limnologist

Mr. Peters has over eight years professional experience in the evaluation and management of aquatic ecosystems. He currently serves as the tribal fisheries harvest biologist and water quality specialist. In this position, he is responsible for coordination and implementation of BPA funded harvest enhancement projects and is responsible for the all aspects of the water quality monitoring and analysis efforts undertaken by the tribe. Principle responsibilities include supervision of technical staff, preparation of implementation and monitoring plans, annual reports, and budgets, and data reduction and analysis. In other positions, he was the lead technical person in charge of management of the Quinault River sockeye salmon run. His duties included collecting, recording, and interpreting information relating to the enhancement and preservation of the Quinault River sockeye salmon run. He was also lead investigator in charge of the Quinault Indian Nation Water Quality Laboratory where primary duties included oversight of all activities, development of experimental design, quality control, and data analysis.

Education:

B.S.; Eastern Washington University, Zoology/Fisheries Management; 1987
M.S.: Eastern Washington University, Fish Pathology/Fisheries Management;1995

Employment History:

Years of Experience: 8.5

Employer— Coeur d'Alene Indian Tribe
Dates of Employment— May 6 1996 - present
Title— Tribal Biologist

Employer— Quinault Indian Nation
Dates of Employment— January 6, 1992 to May 6 1996
Title— Fisheries Biologist

Employer—.Upper Columbia United Tribes Fisheries and Wildlife Research Center
Dates of Employment— June 1, 1991 - January 5, 1992
Title— Research Associate

Employer—.Eastern Washington University
Dates of Employment— September 1989 - June 1, 1991
Title— Research Assistant

Technical Publications and Presentations:

Peters, R. 1994. Hydroacoustic estimate of escapement of Quinault River sockeye salmon. Presented to North Pacific International Chapter American Fisheries Society. March.

Lillengreen, K., A.J. Vitale, R. Peters. 1996. Fisheries habitat evaluation on tributaries of the Coeur d' Alene Indian Reservation: 1993, 1994 Annual Report. U.S. Department of Energy, Bonneville Power Administration. Project Number 90-044. September, 1996.

Lillengreen, K., A.J. Vitale, R. Peters. 1998. Coeur d'Alene Tribe project management plan - enhancement of resident fish resources within the Coeur d'Alene Indian Reservation. *In press*: U.S. Department of Energy, Bonneville Power Administration.

Tom Hoppensteadt

Mr. Hoppensteadt has 14 years of professional experience in analysis, management and monitoring of terrestrial and aquatic ecosystems. He is a certified biology teacher with particular expertise teaching students about ecological systems through hands-on field investigations. Currently, he serves as the outreach specialist for the Coeur d'Alene Tribe's Fish, Water and Wildlife Program. In this position, he is responsible for ensuring that the public has an accurate awareness of the goals, objectives, and activities of the Tribe's Fish, Water and Wildlife Program. Additionally, he is responsible for the formation and coordination of functional watershed work groups designed to engage area landowners in restoration projects. In past positions he developed predictive models for fish and wildlife habitat. He served as chairman of the Washington State Timber, Fish and Wildlife, Cooperative Monitoring, Evaluation and Research, Wildlife Steering Committee, and was the primary author. He was responsible for implementing the pilot project for the Wildlife Habitat Watershed Analysis Techniques Methodology. He has extensive experience in environmental education, habitat mapping and analysis, and species occurrence surveys.

Education:

BA; University of Montana, Zoology/ Environmental Studies; 1983
Secondary Ed. Certification (grades 4-12); Eastern Washington University, Biology; 1996
Continuing Education towards M.S. degree; Eastern Washington University - current ; Central Washington University 1994/95.

Employment History:

Years of Experience: **14**

Employer— Coeur d'Alene Indian Tribe
Dates of Employment— January 21, 1997- present
Title—Fish and Wildlife Outreach Specialist

Employer— Yakama Indian Nation
Dates of Employment— June 1992 - October 1996
Title—Wildlife Habitat Biologist

Employer— Tulalip Tribes
Dates of Employment— December 1989 - May 1992
Title—Fish and Wildlife Habitat Biologist & Shellfish Biologist

Employer— US Forest Service
Dates of Employment— June 1989 - November 1989
Title—Wildlife Technician

Employer— Town of Barnstable
Dates of Employment— June 1984- May 1989
Title—Chief Ranger & Natural Resource Officer

Section 10. Information/technology transfer

Information gathered through program efforts is distributed in a variety of public forums. The Fish and Wildlife Program publishes a quarterly newsletter which provides non-technical information to interested and affected parties. The Program coordinates Water Awareness Week in the local school districts in order to educate children in technological applications and proper watershed function. Activities associated with Water Awareness Week are generally conducted at BPA funded restoration project sites. Program staff present technical papers at meetings of the American Fisheries Society and other regional workshops. The Coeur d'Alene Tribe will host a technical workshop in FY 1998 to showcase program activities to regional managers. Finally, technical information is published in annual reports printed by the Bonneville Power Administration.