PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Resident Fish Stock Status Above Chief Joseph And Grand Coulee Dams

BPA project number: 9700400
Contract renewal date (mm/yyyy): 3/2000 ☐ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Kalispel Tribe of Indians

Business acronym (if appropriate) KNRD

Proposal contact person or principal investigator:

Name	Jason R. Scott
Mailing Address	P.O. Box 39
City, ST Zip	Usk, WA 99180
Phone	(509) 445-1147
Fax	(509) 445-5302
Email address	jscott@knrd.org

NPPC Program Measure Number(s) which this project addresses
10.8.26B

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references
Resident Fish Managers multi-year implementation plan, Blocked area management plan (in press), Kalispel Natural Resource Department Fish and Wildlife Management Plan (1997), Northwest Power Planning Council Fish and Wildlife program (1995)

Short description
Assess the stocks and status of all 39 resident fish species known to exist in the blocked area. Investigate interactions between species and habitats. Recommend and implement management actions for blocked area fisheries based on investigations.

Target species
All 39 fish species known to exist in the blocked area

Section 2. Sorting and evaluation

Subbasin

Evaluation Process Sort

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

Section 3. Relationships to other Bonneville projects

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

Project #	Project title/description
	Upper Columbia Subregion umbrella project (CBFWA)
	Pend Oreille Subregion umbrella project (CBFWA)

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9500100	Kalispel Resident Fish Project	Information exchange/equipment sharing/blocked area coordination
5528100	Lake Roosevelt kokanee net pens	Information exchange/blocked area coordination
8503800	Colville Tribal fish hatchery	Information exchange/blocked area coordination
9001800	Habitat improvements-Lake Roosevelt	Information exchange/blocked area coordination
9104600	Spokane Tribal hatchery (Galbraith Springs) O&M	Information exchange/blocked area coordination
9104700	Sherman Creek hatchery O&M	Information exchange/blocked area coordination
9404300	Lake Roosevelt Monitoring/data collection program	Information exchange/blocked area coordination

9501100	Chief Joseph kokanee enhancement project	Information exchange/blocked area coordination
9502800	Assessment of fishery improvements in Moses Lake	Information exchange/blocked area coordination
9506700	Lake Roosevelt rainbow trout net pens	Information exchange/blocked area coordination
9700300	Box Canyon Watershed project	Information exchange/blocked area coordination
8810804	Streamnet	Information exchange
	Phalon Lake project proposal	Information exchange/blocked area coordination
8605000	White Sturgeon mitigation & Restoration in the Columbia and Snake Rivers	Information exchange/blocked area coordination

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1997	Coordinated methods for blocked area fisheries assessments	Yes, blocked area fisheries research results will be comparable.
1997	Formalized blocked area coordination group represented by the Kalispel Natural Resource Department, Washington Department of Fish and Wildlife, Spokane Tribe or Indians, and Confederated Tribes of the Colville Reservation. Draft MOA.	Yes, this group decides the project direction, projects to be conducted, and interprets project results.
1998	Constructed data storage and analysis system	Yes, constructed a system with the ability to store and analyze blocked area fisheries information.
1998	Box Canyon Reservoir migratory salmonid progress report.	No, this research is on schedule. The biological objective is to summarize salmonid migrations throughout the reservoir. The report (biological objective) will be generated after one more year of data collection.
1998	Spokane River assessment, previously collected data, data gaps, recommended research.	This accomplishment will be complete by the end of 1998 outlining fisheries and invertebrate productivity of the Spokane River and principle tributaries.
1998	Known Blocked Area fish distribution	Yes, this accomplishment is

	analysis based on previously collected data.	synthesizing known distribution throughout the blocked area.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Describe adfluvial salmonid migrations in tributaries to Box Canyon Reservoir of the Pend Oreille River.	a	Place upstream and downstream migratory traps and weirs in selected tributaries to Box Canyon Reservoir
		b	Monitor traps daily for fish movements.
		c	Maintain traps and weirs daily.
		d	Input, analyze and report research results
2	Estimate the species presence and relative densities in Boundary Reservoir of the Pend Oreille River.	a	Divide Boundary Reservoir into reaches and associated sample sites.
		b	Using fish capture techniques (electrofishing, gill netting, beach seining, trapping, and set lines) sample available reservoir habitats seasonally (see methods).
		c	Input collected data.
		d	Analyze and report results/progress
3	Estimate the species presence and relative densities below Boundary Dam of the Pend Oreille River.	a	Divide Pend Oreille River below Boundary Dam into reaches and associated sample sites.
		b	Using fish capture techniques (electrofishing, gill netting, beach seining, trapping, and set lines) sample available reservoir habitats seasonally (see methods).
		c	Input collected data.
		d	Analyze and report results/progress.
4	Compile stocking and baseline ecological information for Yocum and Half Moon Lakes.	a	Collect baseline ecological information on Yocum and Half Moon Lakes including: water chemistry and macroinvertebrate densities.
		b	Compile WDFW stocking records for the lakes
		c	Report based on collected

			information, establish biological objectives and prescribe management strategies.
5	Describe migration patterns of resident fish species in Box Canyon Reservoir.	a	Capture and tag brown trout, westslope cutthroat, rainbow trout, mountain whitefish, largemouth bass, and brook trout with radio transmitters (see methods).
		b	Track fish movements throughout their range for the life of the transmitting tag
		c	input data for analysis
		d	Analyze and report research progress/results
6	Assess fish community and habitat in selected tributaries of the Spokane River and Lake Roosevelt	a	Conduct instream habitat assessments using 30 meter transect methodology (see methods).
		b	Using snorkel and electrofishing methods estimate the density of fish in selected tributaries.
		c	Input, analyze, and report research progress/results/recommendations
7	Project administration, organization, coordination.	a	Ensure project is achieving objectives. Submit quarterly progress reports to BPA. Budget tracking, etc.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	3/1998	3/2000	Estimation of annual adfluvial migrations in tributaries of Box Canyon Reservoir		15.00%
2	6/1999	6/2001	Species present and relative density estimate for Boundary Reservoir fish community		20.00%
3	6/1999	6/2001	Species present and relative density estimate for the fish community below Boundary Dam		20.00%
4	2/1999	2/2000	Recommendations for setting biological	The next step will be to	10.00%

			objectives and management strategies for the two lakes	implement strategies to meet objectives	
5	11/1998	3/2001	Report describing migration patterns, summer Reservoir habitats, spawning grounds, and entrainment over Box Canyon Dam. Recommendations for enhancement	Implementation of recommended enhancements. This information will be used with data gathered in objective 1.	10.00%
6	6/1999	11/2000	Report describing fish community and habitat characteristics. Recommendations will be made based on enhancement of habitat limiting factors.		10.00%
7	1/1999	3/2000			15.00%
				Total	100.00%

Schedule constraints

Weather, funding, equipment functioning, permit approval. It is impossible to identify all constraints and problems that may occur. While we will make every attempt to stay on schedule, unforseen events, equipment failure, etc. will delay progress.

Completion date

To be announced based on phases two and three.

Section 5. Budget

FY99 project budget (BPA obligated): $405,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	Project manager/biologist, research biologist, data manager, 2 scientific technicians	%30	126,317
Fringe benefits		%9	39,856
Supplies, materials, non-expendable property		%3	14,014
Operations & maintenance		%0	0

Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%1	4,248
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags:	%0	0
Travel		%3	14,130
Indirect costs	20% of all except capital and subcontracts	%11	44,479
Subcontractor	WDFW	%15	65,000
Subcontractor	STOI	%14	58,876
Subcontractor	CCT	%6	26,000
Other	Office lease, vehicle lease, utilities, etc.	%7	28,080
TOTAL BPA FY2000 BUDGET REQUEST			$421,000

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
Pend Oreille Public Utility District #1	Box Canyon Reservoir adfluvial trapping equipment and staff and radio telemetry equipment and staff.	%33	300,000
Seattle City Light	Boundary Reservoir and below Boundary Reservoir assessments equipment and staff.	%22	200,000
		%0	
		%0	
Total project cost (including BPA portion)			$921,000

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$438,000	$438,000	$455,520	$455,520

Section 6. References

Watershed?	Reference
☐	Ashe, B.L., K.L. Lillengreen, J.J. Vella, L.O. Clark, S. Graves, M.R, Barber, G.J. Nenema, Jr., and A.T. Scholz. 1991. Assessment of the fishery

	improvement opportunities on the Pend Oreille River. Upper Columbia United Tribes Fisheries Center. BPA Ann
☐	Bean, B.A. 1894. Notes on Williamson's whitefish and breeding colors from the Little Spokane River, Washington and remarks on distribution of the species. Misc. doc No. 200. U.S. Senate.
☐	Bennett, G.W. 1971. Management of lakes and ponds, Second edition. Van Nostrand Reinhold Company. New York. NY.
☐	Bennett, D.H. and M. Liter. 1991. Water quality, fish and wildlife characteristics of Box Canyon Reservoir, Washington. Department of Fish and Wildlife Resources College of Forestry, Wildlife and Range Sciences University of Idaho, Section 3: Fish Compl
☐	Bonga, D. 1978. Kalispel Indians: A fishing tribe. Kalispel Tribe internal report.
☐	Cederholm, C.J., D.B. Houston, D.B. Cole, and W.J. Scarlett. 1989. Fate of coho salmon (Oncorhynchus kisutch) carcasses in spawning streams. Canadian Journal of Fisheries and Aquatic Sciences. 46:1347-1355.
☐	Espinosa, A. 1988. Clearwater Stream Survey Methodology. Clearwater National Forest, Orofino, Idaho.
☐	Gilbert, C.H. and B.W. Evermann. 1895. A report on investigations in the Columbia River Basin with descriptions of four new species of fish. Bulletin U.S. Fish Commission 14:169-207.
☐	Hewes, G.W. 1973. Indian fisheries productivity in precontact times in the Pacific salmon area. Northwest Anthropological Research Notes. 7(2): 133-155.
☐	Independent Science Review Panel. 1998. Review of the Columbia River Basin Fish and Wildlife Program for Fiscal Year 1999. Report to the Northwest Power Planning Council. Document number ISRP 98-1.
☐	Kalispel Natural Resource Department, and Washington Department of Fish and Wildlife. 1996. Kalispel Resident Fish Project 1995 Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, contract
☐	Kalispel Natural Resource Department, and Washington Department of Fish and Wildlife. 1997. Kalispel Resident Fish Project 1996 Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, contract
☐	Kalispel Natural Resource Department, and Washington Department of Fish and Wildlife. In press. Kalispel Resident Fish Project 1997 Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, cont
☐	Kline, T.C. Jr., J.J. Goering, O.A. Mathisen, P.H. Poe, and P.L. Parker. 1990. Recycling of elements transported upstream by runs of pacific salmon: 1. ? 15N and ? 13C evidence in Sashin Creek, southeastern Alaska. Canadian Journal of Fisheries and Aquati
☐	Mills, L.S., M.E. Soule, and D.F. Doak. 1993 The keystone-species concept in ecology and conservation. BioScience 43:219-224.

☐	Murphy, P. and C.W. Huntington. 1995. Updated Stream Survey Methodology for the Clearwater National Forest. Internal Document. Clearwater National Forest, Orfino, Idaho.
☐	Osterman, D.R. Jr. 1995. Ethnoichthyology of the Spokan Indian People. Master's Thesis for Eastern Washington University. Cheney, Washington.
☐	Reese, K.P. and J. Hall. 1991. Water Quality, Fish and Wildlife Characteristics of Box Canyon Reservoir, Washington. Department of Fish and Wildlife Resources College of Forestry, Wildlife and Range Sciences University of Idaho, Section 4: Wildlife and
☐	Scholz, A.T., K. O'Laughlin, D. Geist, D. Peone, J. Uehara, L. Fields, T. Kleist, I. Zozaya, T. Peone and K. Teesatuskie. 1985. Compilation of information on salmon and steelhead total run size, catch and hydropower related losses in the Upper Columbia
☐	Scott, J.R. In Press. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams project. 1997 Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract number 97-BI-35900.
☐	Underwood, K.D., and J.P. Shields. 1996. Lake Roosevelt fisheries and limnological research 1995 annual report. U.S. Department of Energy, Bonneville Power Administration contract No. DE-8179-88DP91819. Portland, OR.
☐	Willson, M.F., and K.C. Halupka. 1995. Anadromous fish as keystone species in vertebrate communities. Conservation Biology. 9:489-497.

PART II - NARRATIVE

Section 7. Abstract

The Resident Fish Stock Status above Chief Joseph and Grand Coulee Dams Project (JSAP) is a management tool using ecosystem principles to manage artificial fish assemblages in altered environments existing in the Columbia River System above Chief Joseph and Grand Coulee Dams (blocked area). The three-phase approach of this project will enhance the fisheries resources of the blocked area by identifying data gaps, filling data gaps with research, and implementing management recommendations based on research results. The Blocked Area fisheries information housed in a central location will allow managers to view the entire system while making decisions, rather than basing management decisions on isolated portions of the system.

The JSAP (NWPPC program measure 10.8B.26) is designed and guided jointly by fisheries managers in the blocked area and the Columbia Basin blocked area management plan (1998). The initial year of the project (1997) identified the need for a central data storage and analysis facility, coordination with the Streamnet project, compilation of blocked area fisheries information, and a report on the ecological condition of the Spokane River System. These needs were addressed in 1998 by acquiring a central location with a data storage and analysis system, coordinating a pilot project with Streamnet, compiling fisheries distribution data throughout the blocked area,

identifying data gaps based on compiled information, and researching the ecological condition of the Spokane River. Data gaps identified in 1998 will be the basis for the 1999 scope of work and focus mainly on baseline data collection.

Section 8. Project description

a. Technical and/or scientific background

The Joint Stock Assessment Project area (blocked area) has been divided into 32 unique water body areas covering 9.3 million acres with elevations ranging from 1000 feet above mean sea level to 7200 feet above mean sea level. The project boundary is defined as all water body areas lying upstream of Chief Joseph Dam on the Columbia River System within the State of Washington. The northern and eastern boundaries lie within the Northern Rocky Mountains, while the southern and western boundaries lie within the volcanic soils of the Columbia Plateau. Recent Ice ages have played a large part in determining the hydrographic characteristics of the area. Scouring and subsequent melting created many of the lakes in the northern portion of the project area. Torrential floods generated from multiple ice dam breaks of ancient Lake Missoula occurred during the Pleistocene epoch which formed many of the coulees and deposited large amounts of gravel, characteristic of the "channeled scablands" of the northern Columbia Plateau.

The area currently known as the blocked area was a highly productive, stable ecosystem prior to hydroelectric development (Scholz et al. 1985). This area contained healthy, native, self-sustaining populations of resident fish, wildlife, and anadromous fish. The native fish assemblage consisted of resident salmonids (trout, whitefish, char), anadromous salmonids (salmon, steelhead), catostomid (suckers), and cyprinid (minnows) very well adapted to pristine riverine conditions.

The amount of the anadromous fish resources was enormous throughout pre-dam history (Scholz et al. 1985, Osterman 1995, and Hewes 1973). Scholz et al. (1985) conservatively estimated the total salmon and steelhead escapement above the current Grand Coulee Dam location was between 1.1 million and 1.9 million fish annually. This estimate was calculated after Upper Columbia stocks targeted by lower river fisheries had been harvested, thus the anadromous fish production in the Upper Columbia was far greater than estimated escapements. This abundant resource supported the Upper Columbia ecosystem by transporting nutrients back to the Upper Columbia. The large nutrient transport by anadromous fish to the Upper Columbia played a functional role in supporting resident fish, wildlife, riparian communities, and human populations, thus making anadromous fish the keystone component (Willson and Halupka 1995; Cederholm et al. 1989; Kline et al. 1989; and Mills et al. 1993) in the Upper Columbia System. Anadromous fish provided 18,000,000 pounds annually to an indian population of 50,000 individuals (Scholz et al. 1985).

The resident fish population was also very abundant in the Upper Columbia area (Scholz et al. 1985, Osterman 1995, and Bonga 1978). For example, in a U.S. Fish Commission Survey, Bean (1894) and Gilbert and Evermann (1895) noted that cutthroat trout and mountain whitefish were abundant in the Spokane River System. Gilbert and Evermann (1895) also noted that bull trout were abundant in the Pend Oreille River in an 1894 survey of that stream. To provide an idea of the numbers of resident trout found in

these systems Lt. Abercrombie (U.S. Army) reported that a party of three anglers caught about 450 cutthroat trout in one afternoon fishing on the Spokane River near the City of Spokane Falls in August, 1877 (Scholz et al. 1985). Indian people harvested an estimated 153,000 resident fish accounting for 360,000 pounds of resident fish annually (Scholz et al. 1985).

The fish assemblage existing today in the blocked area is drastically different than pre-dam development. Anadromous fish, the keystone component of the Upper Columbia, are extinct due to the construction of Grand Coulee Dam. Thirty-nine (39) resident fish species are known to exist in the blocked area, the majority of which are not native. This largely non-native assemblage is, in part, the product of authorized and unauthorized introductions. Of the remaining native resident species bull trout (*Salvelinus confluentus*) are listed as threatened, westslope cutthroat trout (*Onchorhynchus clarki lewisi*) are petitioned for listing, and white sturgeon (*Acipencer transmontanas*) are likely to be petitioned for listing under the Endangered Species Act (1973). Dynamics of the current system have been developing over the last five decades, and have not reached equilibrium. Managers today are unclear of simple ecological aspects of the system such as distribution and range of the 39 known species.

The construction of Grand Coulee Dam eliminated over 1,140 linear miles of anadromous fish spawning and rearing habitat in the Upper Columbia River System (Scholz et al. 1985). In addition to the blockage and loss of habitat, dams and impoundments have created vast changes in the environment. Free-flowing rivers with rapids and gravel bars for spawning and incubation have been replaced with a series of reservoirs and impoundments. These severe habitat alterations have created habitat conditions more suitable for non-native species than for native species. This condition has allowed non-native species to thrive, effectively displacing native species.

The Upper Columbia blocked Area Management Plan (1998) states the overarching vision of the Blocked area fish managers is to achieve a healthy Columbia River ecosystem that supports viable and genetically diverse fish species that in turn provide direct benefits to society, including harvest. The Blocked Area fish managers have further defined two alternative visions for the currently Blocked Area:

(1) Development of a stable Upper Columbia River producing sustainable resident fish populations and harvest, equal to the level of historical (pre-dam) conditions, and/or
(2) Re-introduction of anadromous salmon and steelhead runs above Chief Joseph and Grand Coulee dams in areas where they historically occurred and to restore anadromous and resident fish abundance and harvest to historical levels.

The managers are charged with providing subsistence and recreational fisheries in the Blocked Area given historical expectations and current environmental conditions. This task is extremely unique in that nearly every variable throughout the system is artificial from the species assemblage, to the available habitats, to River level fluctuations. The JSAP has been designed to function as a tool for Blocked Area fish managers. This tool will focus on understanding the dynamics of fish and their habitats throughout the Blocked area and recommend management action based on the best available science and the condition of the entire Blocked Area ecosystem. The JSAP allows managers to view the Blocked Area as a system by compiling previously collected data, organizing available data, identifying areas needing data, performing necessary research, and

recommending management actions. An example of how this has worked throughout the projects brief history is the managers identified a need in 1997 to compile existing information about fish resources throughout the Blocked Area (Scott, 1998). This analysis was completed in 1998 and revealed that virtually no information exists on the fish assemblage in Boundary Reservoir of the Pend Oreille River (JSAP 1998 annual report, in press). Managers acknowledge that to effectively manage the fishery, information such as species presence and relative densities are required at a minimum. Research has been recommended by the managers to fill the data gap in the 1999-2000 project scopes of work. It is important to realize that this project has been set up to centrally accommodate all managers avoiding effort duplication, and ensuring Area wide coordination at achieving the stated vision.

b. Rationale and significance to Regional Programs

In 1980, the United States Congress enacted the Northwest Power Planning and Conservation Act (PL 96-501, 1980), which established the Northwest Power Planning Council (NPPC). The NPPC was directed by Congress to develop a regional Power Plan and also the Columbia River Basin Fish and Wildlife Program (FWP) to restore or replace losses of fish caused by construction and operation of hydroelectric dams in the Columbia River Basin. In developing the FWP, Congress specifically directed NPPC to solicit recommendations for measures to be included in the Program from the region's fish and wildlife agencies and Indian tribes. All measures adopted by the Council were also required to be consistent with the management objectives of the agencies and tribes [Section 4.(h)(6)(A)], the legal rights of Indian tribes in the region [Section 4.(h)(6)(D)] and be based upon and supported by the best available scientific knowledge [Section 4.(h)(6)(B)]. The JSAP specifically addresses Council measure 10.8B.26.

In 1993 blocked area managers identified a need for a coordinated approach to fish management in the blocked area. This coordinated approach included a baseline stock inventory of the resident fish species inhabiting the blocked area and is the basis for measure 10.8B.26. This need has also been recognized by the Independent Science Review Panel (ISRP) in their 1998 report stating: "The ISRP was critical of the lack of baseline inventory information on native resident fish stocks in the Columbia Basin. We recommended that the Council require a basinwide inventory of remaining native resident fish populations and their status. The inventory would be used to identify opportunities to restore and rebuild native resident fish populations and to set priorities." (ISRP, 1998). Recommendations made by the ISRP are very similar to the way in which the JSAP has been developed.

The JSAP is centered around the concept in the Council's program that management actions should be based upon and supported by the best available scientific knowledge [Section 4.(h)(6)(B)] and the stated vision of the the Upper Columbia blocked Area Management Plan (1998). By integrating information the JSAP uses information collected by all blocked area projects and other sources to identify data gaps and fill necessary voids. The information collected by the JSAP combined with information collected by other projects and sources increases the scientific knowledge of the whole system. This increased knowledge allows for better educated decisions on fish management actions, greatly increasing the chances for native fish recovery and

providing successful subsistence and recreational fisheries. Because blocked area managers implementing projects addressing specific Council Program measures will use this information, success of the JSAP increases the likelihood of other project success including the Streamnet project.

c. Relationships to other projects

Projects listed in section three and projects listed below have symbiotic relationships with the JSAP. Information gathered by other projects has been provided to the JSAP for synthesis. Synthesized information consists of habitat information, fish distribution information, stocking histories, and results of enhancement monitoring and evaluations. The JSAP project is successful when managers use synthesized information to successfully implement management recommendations and ultimately achieve stated goals and objectives in the Upper Columbia blocked area management plan, Upper Columbia subbasin umbrella project and Pend Oreille subbasin project. Managers using synthesized information for recommendations depend on the JSAP to provide accurate and precise synthesis of available information. Likewise, the JSAP depends on quality data collection procedures used by individual projects. Thus, the symbiotic relationships between projects have positive synergistic effects on successful implementation of management actions in the blocked area by making the best available science available.

The relative benefit to cost for the (JSAP) is excellent due to the relationships with other projects and organizations. Equipment and resources already developed and/or acquired by each manager will be available for use by the project versus establishing new equipment and techniques for the project. In addition to the four managers in the blocked area a significant amount of data has been collected by or is being collected by many other groups. Still in the project infancy, we have made a data coordination link with these groups. This coordination link will use data collected by these groups for JSAP purposes. Again, this unique coordination is large cost savings for the project while providing a critical component to a project aiming to manage the blocked area as an ecosystem. The following is a list of non-managing entities and summaries of data coordination.

- Washington Trout: This group will be documenting native trout populations (BPA project # 9033) throughout Washington. Coordination and collection of collected data will be imported to the JSAP database for manager analysis and interpretation. Coordination has been between Nick Gayeski of Washington Trout; Craig Burley, WDFW; and Jason Scott KNRD/JSAP project manager.
- Streamnet: The Streamnet staff has been consulting with this project a great deal on data exchange formats, and other critical steps needed for project success.
- Seattle City Light(SCL)/R2 consultants: The JSAP and Seattle City Light have recognized that fisheries information in the Lower Pend Oreille River is virtually non-existent. Filling the data gaps in the lower Pend Oreille has been identified as a priority by managing agencies (KNRD, WDFW, and USFWS) as well as non-managing entities (SCL, USFS). This identified need has presented an opportunity for cost sharing the needed research. Research coordination has been between Al Solonsky, SCL; Ed Connor, R2 consultants; Curt Vail, WDFW; Howard Browers, USFWS; Tom Shuhda, USFS; and Jason Scott KNRD/JSAP project manager.

- Pend Oreille PUD (PUD)/Cascade Environmental Services (CES): Managers (KNRD, WDFW, and USFWS) have recognized a data gap for Box Canyon Reservoir Fisheries. A cost sharing opportunity has been identified to conduct coordinated migration research in Box Canyon Reservoir and tributaries. Research coordination is between John Blum, CES; Pat Buckley, PUD; Curt Vail, WDFW; Tom Shuhda, USFS; Howard Browers, USFWS; and Jason Scott KNRD/JSAP project manager.
- USFS (Colville National Forest): A significant amount of fisheries information has been collected by the Forest Service on instream habitat and fish distribution. All the tributaries on the Forest are included in the blocked area and will be a large part of the tributary distribution data for the project. Coordination is between Tom Shuhda and Karen Honeycutt, CNF; Curt Vail, WDFW; and Jason Scott KNRD/JSAP project manager.
- BC: British Columbia and BC Hydro have a substantial amount of data on functions of the Canadian portion of the Columbia River watershed. Representatives are aware of the project and are very interested in being involved.

d. Project history (for ongoing projects)

The JSAP was proposed in 1993 by the four blocked area managers to address the need of coordinated ecosystem management in the blocked area. The project was adopted into the Council's (1995) program as measure 10.8B.26. This measure specifically refers to the JSAP.

This project was one of four resident fish projects placed on a pending list for funding in 1997. Original funding projections for the 1997-planning phase of the project, after a four-percent across the board cut, was $56,250. This budget would cover planning and organization of subsequent phases of the project. The project began 1997 partially funded at $17,280. Through the quarterly review process and other accounting processes, money became available to fully fund the project to $56,250 for 1997, $390,000 in 1998, and $405,000 in 1999.

The planning and organizational phase of the project (1997) served as a setup for the project. In this setup, a formalized blocked area coordination group was formed. This group consists of members of the Kalispel Natural Resource Department, Washington Department of Fish and Wildlife, Spokane Tribe of Indians, and Confederated Tribes of the Colville Reservation. Another accomplishment achieved in 1997 was coordinated methods for blocked area fisheries assessments. These coordinated methods are primarily focused on baseline data collection of species assemblages and habitat characteristics in streams and reservoirs (Scott, 1998). These methods were designed so that data collected in the future is comparable to data previously collected. Coordinated methods allow for comparable results and monitoring over time. The 1997 JSAP also identified project needs that were addressed in 1998.

Several needs were addressed in 1998, including construction of central storage/analysis system. A central data storage and analysis system constructed in 1998 has the ability to store and analyze data collected throughout the blocked area. This system is located in a central location with access available to blocked area managers.

A report describing the ecological condition of the Spokane River System from previously collected data was an identified need in 1997 that was addressed in 1998. This approach of compiling previously collected information prior to conducting further research is consistent with the JSAP design. A significant amount of data has been collected on the fish assemblages throughout the Spokane River System; however, this data is not available to managers. Dr. Allan Scholz of Eastern Washington University was hired as a subcontractor to compile the existing Spokane River fisheries information and report his findings. Results of this report are unavailable at the time this proposal was being prepared.

A blocked area known fish distribution map is currently being generated based on previously collected data. These data have been collected by the four managers and Colville National Forest, Pend Oreille PUD, Seattle City Light, and Washington Water Power. To accomplish this, the blocked area has been broken up into 32 unique water body areas (JSAP 1998 annual report, in press). The analysis includes mapping the areas where each species is known to be present (JSAP 1998 annual report, in press). This analysis allows managers to identify areas where data is lacking. Lacking information (data gaps) is the basis for objectives outlined in subsequent years scopes of work. The product generated from this task will be provided to streamnet and updated annually.

Another accomplishment of 1998 is a progress report on adfluvial salmonid migrations in Box Canyon Reservoir tributaries. Traps and weirs were placed at stream mouths at the beginning of April. Traps and weirs have been functioning since they were placed with the exception of two weeks beginning 26 May where a severe flash flood event caused traps, weirs, and roads to fail. This research is scheduled to continue and results of the 1998 progress are unavailable at the time when this proposal is being prepared. However, brief examination of the data suggest a substantial adfluvial brown trout (*Salmo trutta*) population using tributaries for spawning. This run seems to begin in early October and at the time this proposal is being prepared (mid November) is still going. Research progress will be reported in the 1998 annual report (Scott et al. in press).

e. Proposal objectives

The JSAP project is being proposed as a research/monitoring project. Research, traditionally, is experimental testing of a hypotheses generated based on existing knowledge of the particular problem. The problems identified in the blocked area are that baseline information is lacking, thus eliminating the possibility of forming hypotheses. These problems require descriptive research rather than experimental research, thus, hypothesis-testing research is not proposed herein. Hypothesis-testing studies will be recommended in future proposals based on descriptive research findings. Objectives outlined in this proposal focus on baseline data collection that will allow managers the ability to form and test legitimate hypotheses. Six measurable objectives are proposed, including:

1. Describe adfluvial salmonid migrations in tributaries to Box Canyon Reservoir of the Pend Oreille River. The product of this research will be a report describing both upstream and downstream movements of fish populations in tributaries of the Pend Oreille River. This study was identified

as necessary because if bull trout in the system are adfluvial, it is imperative that managers know watersheds being utilized.

2. Estimate the species present and relative densities in Boundary Reservoir of the Pend Oreille River. The product of this research will be a report describing the species assemblage existing in Boundary Reservoir. To effectively recommend biological objectives and management actions for the Reservoir it is necessary to know what currently exists and at what relative densities. Included in the product will be recommendations for biological objectives and future research needs.
3. Estimate the species present and relative densities below Boundary dam of the Pend Oreille River. The product of this research will be a report describing the species assemblage existing below Boundary dam. To effectively recommend biological objectives and management actions for the River it is necessary to know what currently exists and at what relative densities. Included in the product will be recommendations for biological objectives and future research needs.
4. Compile stocking and baseline ecological information for Yocum and Half Moon Lakes. The goal of this research is to improve the fisheries in these lakes by providing specific information about the ecology of each lake. Understanding of ecological conditions will allow managers to improve management strategies and biological objectives of each respective lake.
5. Describe migration patterns of resident fish species in Box Canyon Reservoir. Reports by Ashe et al. (1991), Bennett and Liter (1991), and Reese and Hall (1991) suggest that Box Canyon Reservoir contain summertime habitat conditions unsuitable for salmonid survival. However, field surveys by the Kalispel Natural Resource Department (unpublished) and Ashe et al. (1991) found threatened bull trout, brown trout, and mountain whitefish to be present in the Reservoir. Salmonids in the Reservoir are thought to be adfluvial. The product of this research will be to identify tributary systems and reservoir habitats used by adfluvial salmonids throughout the reservoir. Identifying these areas will highlight areas for protection and enhancement.
6. Assess fish community and habitat in selected tributaries of the Spokane River and Lake Roosevelt. The product will be report describing the fish community and habitat conditions in selected tributaries. This information will highlight areas for protection and enhancement of native salmonids.

f. Methods

Objective 1

Traps and weirs have been installed at the mouth of ten major tributaries to Box Canyon Reservoir. These ten tributaries have been selected based on previously conducted habitat assessment results (KNRD, 1995, 1996, 1997), fish assemblage surveys in tributaries (KNRD 1995, 1996, 1997), and connectivity with the reservoir. These reports indicate that the selected tributaries are the most likely tributaries for containing populations of migratory native and non-native salmonids. The ten tributaries

being trapped range from the southern end of the Reservoir (Indian Creek), to the northern end (Cedar Creek), on both the east and west sides of the Reservoir. Traps are placed as close to the mouth as possible to ensure that migratory fish do not enter the tributary and spawn downstream of the trap location.

Trap weir panels (4' tall, 4' long) are constructed using one-inch angle iron frames and 0.5 inch hardware cloth stretched between the frame. Weir panels are placed together across the stream creating a barrier to migrating fish. Weir panels are placed at a 45^0 angle to the flow from the bank to the trap. Placing weirs at an angle functionally "funnels" migrating fish into the appropriate trap. The use of 0.5 inch hardware cloth was chosen for two main reasons:

1. Both upstream and downstream fish can not pass the weir and it does not function as a gill net for fish. However, the use of 0.5 inch gaps will allow migrating young of the year (YOY) to pass undetected and unharmed. Allowing YOY fish to pass has been examined and considered acceptable because the main objective of the research is to estimate the adult population migrating from the reservoir to the tributaries. We do have downstream traps that capture post spawning adults and outmigrating juveniles greater than age one.
2. Mesh size any smaller than 0.5 inches clogs with stream detritus easily causing the weir to function more as a dam than a weir. The 0.5 inch mesh size allows more detritus to pass reducing the risk of weir blowout.

Upstream migrant traps are constructed with a 0.5 inch rebar frame, a wire mesh front and bottom, rubber coated wire mesh sides, 0.5 inch plywood hinged top, and 0.5 inch plywood back, (facing upstream) that will be angled at a 45^o downward to the substrate and trap bottom. The trap door will be placed downstream against 0.75 inch rebar anchored in the stream. The trap will be placed in a pool tail out area to decrease water velocity in the trap. The weir will start on each side of the trap door and extend to the stream bank.

Downstream migrant traps will be constructed very similarly to the upstream traps. The trap will be a rectangular box frame made out of 0.5 inch rebar. Rubber coated hardware cloth will be stretched around the rebar frame on all four sides and the bottom. The top will be hinged 0.5 inch marine grade plywood. The trap will be anchored to the stream bottom using steel fence posts and 0.75 inch rebar. An eight inch (inside diameter) PVC pipe enters the upstream end of the downstream migrant trap above the water level in the trap. The pipe is connected to an aluminum funnel located in the downstream end of the weir. The funnel channels water into the pipe at an increased velocity forcing downstream migrants into the trap.

Traps will be checked once daily. Each time the traps are checked, any debris caught in the weir or trap will be removed and inspections will be conducted to identify needed maintenance. All salmonids except bull trout that enter the traps will be tagged with fingerling tags and released in the appropriate direction of the weir (upstream or downstream). Tagged fish will be weighed to the nearest gram and measured to the nearest millimeter (fork length) before being released. Scale samples may be taken to determine age structure. Anal fin samples will be collected from all bull trout captured and stored in 100% ethanol for genetic analysis. Air temperature, water temperature, stream elevation (flow), and time of day will be recorded at the time each trap site is checked.

These data will be analyzed to estimate the adfluvial spawning population that exists in the Box Canyon Reservoir watershed. Additional information that is expected from the research is run timing of migratory fish, how much time do adults spend in the tributary system, timing of juvenile (≥ age 1) outmigrations, potential environmental stimuli causing migrations. These baseline data will help fish managers identify areas for enhancement, restoration, and hypotheses for needed future research.

Objective 2 & 3

Boundary Dam breaks the Lower Pend Oreille River into two distinct parts. These two parts have drastically different habitat characteristics, thus will be studied separately using similar methods. The methods chosen are derived from similar studies conducted on Box Canyon Reservoir by Ashe et al. (1991) and Bennett and Liter (1991). Each stretch will be broken into reaches based on physical habitat characteristics. Each reach will then be divided into 0.5 mile sampling sites. Before each sampling season; spring (April-June), Summer (July/August), fall (September-November), winter (December-February) three sites within each reach will be randomly selected and sampled for each given reach. Three gear types will be used to minimize sampling bias and obtain a representative sample of the fish community including electrofishing, experimental gill netting, and beach seining. Collected fish will be identified to species, measured for length to the nearest millimeter, and weighed to the nearest gram. Data will be analyzed and reported to describe the fish community present and relative densities in both of the bodies of water.

Objective 4

Determining lake ecology will be done by estimating fish populations, macroinvertebrate populations, and qualitative measurements of lake morphology, lake nutrient concentrations, phytoplankton, and macrophyte communities.

Estimating fish populations in the lakes will be done using electrofishing, gill netting, and beach seining. Random sampling strategies on each lake will be designed (as described in Ashe et al. 1991) to estimate total number of fish in each lake, percentage of each species in the assemblage by number and mass, and density of fish (fish/acre and pounds/acre). Sampling strategies for each lake will be used in preliminary studies and monitoring studies.

Zooplankton populations will be sampled using a Wisconsin vertical plankton tow with an 80 µm silk mesh and bucket and a radius of 14.5 cm using methods described in Underwood and Shields (1996). Results will be quantified by density (pounds/acre). Because fish production seems to be related to surface acre (Bennett, 1971), density will be calculated on a per surface acre basis. Species composition will be of a qualitative nature, and any identification will be incidental. Samples of each tow will be kept and fixed for later identification if it is determined to be necessary. The main objective of sampling zooplankton is estimating the density of food. Bennett (1971) states that fish populations in most lake environments are limited by food.

Qualitative description of the lake morphology will take place in the form of written description of the riparian area, depth, littoral zone, lake nutrient concentrations, area, and macrophyte community.

Recommendations for each lake will be made based on conducted research and compared to compilation of past management activities of each lake. The two lakes of interest are both completely closed systems. Therefore, naturally reproducing populations are not likely to be recommended options. These lakes will basically be managed for angling opportunities. Because these lakes are going to be managed to maximize angler opportunity, public opinion on management objectives will be considered when making recommendations.

Objective 5

It is important to note that this study, as proposed, has not been designed as a statistical study; a specific hypothesis has not been developed, nor is one being tested. This study is designed to understand baseline conditions of fish migration in BCR and determine the *potential* for entrainment below Box Canyon Dam. The stated objectives of the study include:

- Estimate the extent of migration, gross fish movement, and migratory patterns of targeted fish species in BCR.
- Increased knowledge of the target species entrainment potential, if any, below Box Canyon Dam.

This proposed radio-tracking research will be conducted using coded radio transmitter as produced by LOTEK Engineering, Inc. Investigations into tag type compared pulsed radio transmitters, coded transmitters, and sonic tags. Coded radio transmitters were chosen because:

1. The 8.9 g coded tags would allow for a much quicker scan time of all transmitters, significantly reducing the chance that a fish would pass through the receiver's field without being detected.
2. Due to the repetition rate of the distinct coded signal burst in the coded tags, operation life is comparatively longer than its respective pulsed tag transmitter, allowing the research to continue for a period of at least a year.
3. Pulsed radio tags also have the ability to record water temperature in real time with a larger tag.

The tag recommended for use in this proposed research is the LOTEK MCFT-3EM, which weighs 8.9 grams (out of water weight). Because tag weight should not exceed 2% of the fishes body weight, each fish to be tagged must be a minimum of 445g. The recommended tag will have a typical operational life of 376 days @ a 4 second burst rate, while the operational life would be increased to 439 days if programmed with a five second burst rate. For this research tags have been programmed @ 5 second burst rate.

Additional tags that will be deployed include the LOTEK FRT-4 pulsed tag with temperature transmitter and the LOTEK FRT-2 pulsed tag with temperature transmitter. The life of these tags is temperature dependent. The FRT-4 will last approximately 250 days at 20^0 C and weighs 16 g. The FRT-2 will last approximately 1 year at 20^0 C and weighs 26 g. This additional tag weight requires minimum fish weights of 800 g and 1300 g respectively.

Species selected for the research include brown trout, mountain whitefish, westslope cutthroat (*Oncorhynchus clarki lewisi*), rainbow trout (*O. mykiss*), and largemouth bass. The target sample size is 30 tagged individuals for each of the five species. Sample sizes

as presented are not intended to represent statistically valid sample sizes, but rather are reflective of distribution, abundance, and economics. Nearly 82,000 fish were sampled by previous investigators in BCR (Ashe et al. 1990; Bennett and Liter 1991). With the exception of largemouth bass (7.7% of sampled fish) and mountain whitefish (5.4% of the sample), the target species comprise < 1% of all fish sampled and have rarely been represented in the catch. Additionally, mountain whitefish rarely, if ever, achieve the minimum weight of 445 g in the Reservoir system. As a result collection efforts may fail to capture the target number of individuals.

Several methods will be used to capture fish for tagging:

1. Collection from adfluvial trapping. Fish will be captured at the adfluvial trap sites on BCR tributaries. The traps, however, may only provide a limited number of fish meeting the size criteria for radio telemetry.
2. Electrofishing. Most likely, the majority of the fish to be tagged with transmitters will need to be captured via electrofishing. The Reservoir and tributaries to BCR will be electrofished to secure fish to be fitted with transmitters. The Reservoir is the most likely source of adequately sized fish to be fit with radio transmitters for the study. Electrofishing in the Reservoir below Albeni Falls Dam would occur only after temperatures had decreased to below 12^{o} C, with 10^{o} C being preferable. This most likely will occur by late October or early November. Electrofishing in the creeks may be initiated earlier in the year, depending upon water temperatures of the streams.
3. Hook and Line fishing. Collection of largemouth bass may be facilitated by the use of hook and line fishing in the sloughs. Hook and line fishing would only occur after temperatures had decreased to a maximum of 12^{o} C.

Transmitters will be surgically implanted in the body cavity of each species. This procedure involves anaesthetizing each individual using 2 g Tricaine methanesulfonate (MS-222) in five gallons of water until gill movement stops. The fish is then placed in a surgery cradle and a steady flow of anesthetic water is manually passed over the gills throughout the procedure. A small incision (approximately 2 cm) is made anterior of the pelvic fins (distance depends on tag size and fish size), slightly off center of the ventral surface, below the ribs. A smaller incision (approximately 2 mm) is made approximately 3 cm posterior of the initial incision and above the pelvic fins for the antenna to protrude from the body cavity (ensuring that fin activity will not be impacted by protruding antenna). The tag antenna is passed into the body cavity via the initial incision and out the smaller incision. The tag is then place longitudinally within the body cavity. Sutures are applied individually to the initial incision (usually 4) to close the wound. Individual sutures are preferred so in the event of an unlikely knot failure the wound will not completely open up. Next, the smaller antenna incision requires one suture to close. Immediately after the procedure is complete, the fish is placed back in freshwater and moved back and forth until it is completely revived, at which point it is released as near the capture site as possible.

One mobile receiver will be deployed at least once weekly. The mobile receiver will scan the reservoir for tagged fish either by car, boat, or when practical aircraft. A fixed receiver with a data logger will be located below the spillway of Box Canyon Dam to record any fish passing downstream of the dam and to monitor potential entrainment. Another antenna will be deployed downstream of the spillway antenna and will also be

wired directly into the data logger. This will allow tracking of those fish, which move downstream from the dam.

Due to depth limitations of the radio tags (approximately 40 feet), it is not possible to place another antenna upstream of the dam to monitor movements immediately upstream of the dam in the lower canyon; depths in this reach exceed 100 feet. With the antenna configuration presented in this report, however, we will be able to determine fish movement and the direction of their movement in relation to the spillway. Assuming correct transmitter operation, fish will either be detected traveling downstream from the spillway (i.e. picked up by the lower antenna) or they will ascend into the canyon and will travel upstream out of range of the spillway antenna and no longer be detected.

Objective 6

The stream habitat survey methodology contained four facets: transect surveys, reach overviews, interreach comparisons and fish surveys. Snorkel surveys and electrofishing are used to determine fish population densities and age class distribution for all salmonid populations within each stream and are combined with the interreach comparisons to draw conclusions on the effects of degraded habitat quality and non-native salmonids on native salmonid species. Conclusions were used to aid in more informed restoration recommendations. Stream and fish population survey methodology used is similar to that developed by Espinosa (1988) and further revised by Murphy and Huntington (1995).

Habitat surveys were broken into two components 1) transect surveys and 2) reach overview surveys. Transect surveys are the division of the stream into 30m segments. Primary pools, spawning habitat and acting woody debris counts were collected for the entire length of each 30m segment. The remainder of the habitat quality parameters such as habitat type, substrate, habitat function, bank stability, cover, and embeddedness were collected at the end of each 30m segment (the actual transect site). This method allows for a number value to be assigned to each habitat quality parameter. Reaches were defined by stretches of stream with common gradient, substrate and vegetation. Breaks between two homogeneous areas defined a new reach. Reach overview surveys are the visual observation and description of variables occurring within each reach. Each reach is permanently marked and flagged using aluminum tags and flagging as a reference point for long-term monitoring.

Fish density estimates are collected using standard snorkel survey techniques (Espinosa 1988). Sampling is conducted during the period from July 15 through September 15. Population density is addressed by number, size (age class) and species of fish per $100m^2$. The standard size/age classes for salmonid species were determined according to Espinosa (1988). Lengths of stations are 30 meters and selected so that beginning and ending points for stations never bisect pool habitat. Fish stations are permanently marked and flagged using aluminum tags and flagging.

g. Facilities and equipment

A large amount of the equipment that will be used implementing this project has been purchased (boats, nets, etc.) by project participants and interested stakeholders. A central database/analysis system is located in a central location for use by all project

participants. A vehicle is currently being leased through the project to be used for fieldwork or other project related activities. Facilities and equipment necessary to successfully implementing this project are, for the most part, adequate and available. In situations where needs are identified this project, other related projects, or a combination of both will address them.

h. Budget

The total budget requested is $421,000. In order to accomplish the stated objectives, personnel needs require two biologists, a data storage/analysis professional, and two scientific technicians. Given the stated objectives and tasks, the requested staff is very conservative.

Field supplies such as waders, raingear, paper, pencils and other expendable property are estimated at 3% of the total budget. Capital acquisitions account for 1% of the total budget. These funds will be used to purchase a laptop computer and GPS receiver. These estimates reflect cost savings from cooperative projects.

The travel line item reflects costs estimated from fieldwork and project administration. Vehicle costs are estimated by multiplying 15,000 miles at $0.31/mile, totaling $4,650. Maintenance and repair of electrofishing boats is conservatively estimated at $1,800. Airfare for project presentation, defense, and coordination is estimated to be $1,425. Auto rental is estimated at $750 for the year. Per Diem for fieldwork and administration is estimated at $3,505. Training and education for project personnel is estimated at $2,000. The travel line item accounts for 3% of the total budget.

Indirect costs are calculated at 20% of all costs except capital equipment and subcontracts. The indirect cost line item for the JSAP is $44,479 and accounts for 11% of the total budget.

Lease of office space, vehicle lease, and utilities necessary to implement the project total is $28,080 accounting for 7% of the total project budget.

Section 9. Key personnel

Jason R. Scott
Project manager/fish biologist
2080 hours

Duties: Design and implement research methods, data analysis, coordinate with other fish managers in the blocked area, ensure project is meeting objectives, report writing, proposal writing, supervise project staff, project administration.

1996–Present Kalispel Tribe of Indians Usk, WA

Fisheries Project Manager

- Manage a project charged with inventorying the fisheries stocks in the Upper Columbia River Basin-coordinating with two tribes and a state agency.

- Kalispel Tribe representative on the Resident Fish Managers Caucus of the Columbia Basin Fish and Wildlife Authority (CBFWA). Keep up on current issues, and prioritize projects for funding.
- Upper Columbia Subregional Team leader charged with organizing fisheries management agencies and Tribes in the Upper Columbia Subregion, author of subregional summaries in CBFWA annual work plans, Contributed to the authorship of the Resident Fish section of the Multi-Year implementation Plan, and session chair for the CBFWA/BPA annual review of projects.
- Contribute in discussions with state, county, federal, and tribal governments regarding fisheries management issues in the Pend Oreille River Basin.
- Perform boat and backpack electrofishing surveys.
- Database design.
- Writing scientific reports.

1995-1996 Kalispel Tribe of Indians Usk, WA

Fisheries Biologist

- Performed instream habitat assessments using 30 meter transect methodology.
- Performed instream snorkel surveys.
- Performed boat and backpack electrofishing surveys.
- Designed a bull trout presence methodology.
- Writing scientific reports.

Summer 1993, 1994 Colville National Forest, Supervisors office, Colville, WA

Fisheries technician-Crew leader

- Performed linear habitat assessments (Hankin and Reeves methodology).
- Performed backpack electrofishing surveys.
- Instream, riparian, and fish community assessment in fire affected areas.
- Data input in R-base.

EDUCATION:

1989–1995 Eastern Washington University Cheney, WA
B.S., Biology, Zoology option. March 1995
M.S Fisheries Biology,. Candidate, Eastern Washington University.

PUBLICATIONS/PRESENTATIONS:

Kalispel Natural Resource Department. 1997. Fish and wildlife management plan.

Kalispel Natural Resource Department, and Washington Department of Fish and Wildlife. 1996. Kalispel Resident Fish Project Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, contract number 95-BI-37227.

Scott, J.R. In Press. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams project. 1997 Annual Report. Report to U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife, Contract number 97-BI-35900.

Scott, J.R. 1997. Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams Project. Columbia Basin Fish and Wildlife Authority Annual Project Review.

Scott, J.R. 1996. Effects of migratory (fluvial, adfluvial) and resident life history strategies for bull trout (*Salvelinus confluentus*) on the intrinsic growth rate. Eastern Washington University Graduate seminar, March 1996.

Jim Lemieux
GIS/database manager
2080 hours

Duties: Assist managers in analyzing collected data, Construct database/computer system, maintain database/computer system, report writing,

October 1996 - May 1998
Information Specialist
Spokane Tribe of Indians
Wellpinit, Washington

- Midnite Uranium Mine Project

Responsible for GIS analysis and output relating to impacts on or from the Midnite Uranium Mine and Ford mill site.

- Spokane Tribal GIS Program

Responsible for developing and administering a Natural Resource based Tribal and BIA wide Geographic Information System. Responsible for developing GIS based products such as maps and databases for inventory and analysis by resource managers.

October 1991 - October 1996
GIS Analyst
Confederated Tribes of the Umatilla Indian Reservation
Pendleton, Oregon

- Parcel Conversion Project

Responsible for developing and implementing a digital parcel layer for the Umatilla Indian Reservation. Wrote AML to convert BLM GCDB coordinate file into ARC/INFO Point coverage for coordinate base. Developed conversion methodology for County parcel files and BIA property titles.

- Non-Point Source Pollution Project

Developed procedure to convert EPA STORE-IT coordinate database into ARC/INFO point coverage. Developed watershed hydrologic unit layer for the Umatilla basin.

- Land Acquisition Project

Built parcel packets utilizing County tax maps in ARC/INFO for individual target tracts.

June 1990 - September 1991
Natural Resources Technician
Confederated Tribes of the Umatilla Indian Reservation
Pendleton, Oregon

- Indian Lake water quality study
- Hydro well monitoring
- Water/Zoning permit processing

May 1989 - June 1990
Physical Science Technician
U.S. Bureau of Mines, Western Fields Operation Center

Spokane, Washington

- Mineral Survey of Toyabe Range, Toyabe National Forest, Nevada.

Mineral Survey of Trinity Mountains, Boise National Forest, Idaho.

Education

BA Geography - August, 1988
Eastern Washington University
Minors: Geology, Environmental Studies
High School Diploma
Shadle Park High School - June, 1984

Training

- Introduction to Geographic Information Systems (GDSC[1])
- Cartographic Production With ARC/INFO (GDSC[1])
- Global Positioning and Geographic Information Systems GPS/GIS (GDSC[1])
- GIS for Managers (GDSC[1])
- Introduction to ArcView (GDSC[1])
- Intermediate MS Access 97

Unhired
Fish biologist
2080 hours

Duties: Design research methods, schedule, etc., implement research projects, data analysis, report writing

Ray Pierre
Fisheries technician
2080

Duties: Install and maintain adfluvial traps, Check and maintain traps daily, record data, input collected trapping data.

Unhired
Fisheries technician
1500

Duties: Assist project biologists in data collection, assist in preparation of field projects.

Section 10. Information/technology transfer

Information will be in the form of annual reports, scientific reports, web pages, Streamnet, and public presentations.

Congratulations!