PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Salmon River Habitat Enhancement M&E

BPA project number: 9405000
Contract renewal date (mm/yyyy): 9/1999 ☒ **Multiple actions?**

Business name of agency, institution or organization requesting funding
Shoshone-Bannock Tribes

Business acronym (if appropriate) SBT

Proposal contact person or principal investigator:

Name	Jeffry L. Anderson
Mailing Address	P.O. Box 306
City, ST Zip	Fort Hall, ID 83203
Phone	(208) 238-3743
Fax	(208) 238-3742
Email address	salmon1@cyberhighway.net

NPPC Program Measure Number(s) which this project addresses
7.6A.1, 7.6A.2, 7.6B.1, 7.6B.3, 7.6B.4, 7.6C.5, 7.7, 7.8C.1, 7.8D.1

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

Other planning document references
Proposed Snake River Salmon Recovery Plan: Tasks 1.1.b., 4.5.a.; FY99 CBFWA Draft Annual Implementation Work Plan, Salmon River Subbasin Objectives 2, 3, & 4.

Short description
Maintain habitat improvements and evaluate benefits; monitor salmonid populations; coordinate evaluation of land and water stewardship activities; coordinate the planning, implementation, monitoring, and evaluation of new improvements and protections.

Target species
Snake River spring/summer chinook salmon, Snake River summer steelhead, bull trout.

Section 2. Sorting and evaluation

Subbasin
Salmon River

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

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
8909803	Salmon supplementation studies in Idaho Rivers - Shoshone-Bannock Tribes	Coordinate field work, share field personnel and equipment while monitoring salmonid population status in the Salmon River Basin.
9705700	Salmon River Production Program	Provide assistance in developing low-tech bioenhancment facilities on the Yankee Fork Salmon River.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1989	Reclamation of 2.5 km of floodplain in Bear Valley Creek eliminated a substantial source of fine sediment into the remaining 50 km of stream and the Middle Fork Salmon River.	YES: Improvements in surface substrate, pool cover, and non-anadromous fish densities have been documented.
1988	Successful interconnection of four series of remnant dredge ponds with the mainstem Yankee Fork Salmon River, creating over 1.5 ha of additional rearing habitat for anadromous salmonids.	YES: Use of the off-channel rearing ponds by juvenile anadromous salmonids has been greater than the adjacent mainstem Yankee Fork.
1991	Successful modification of a debris jam and removal of an abandoned dam has allowed access to an additional 3.2 km of spawning habitat and 7.7 km of rearing habitat for anadromous salmonids and bull trout.	YES: Passage barrier was removed thus allowing connectivity between Big Boulder Creek and the East Fork Salmon River for anadromous fish.
1992	Fencing constructed on Herd Creek to discourage livestock use of streambank and riparian areas,	NO: Increased anadromous fish production should result from lower levels of fine

	thus improving streambank stability and reducing sediment input into the stream.	sediments in the spawning gravels and increased embryo survival, but results have not been documented to date due to low numbers of adult returns to the system.
1994	Vertical banks in a cutoff channel in Big Boulder Creek were sloped, the stream was diverted away from high cutbanks, returned to a more natural meander pattern within 0.5 km of affected floodplain, eliminating the cutoff channel of BBC as a sediment sou.	NO: The stream is still in the process of reaching a dynamic equilibrium with the floodplain in the affected area, and revegetation efforts are ongoing.

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Improve communications and information sharing among entities working in the Salmon River Basin on fisheries related issues.	a	Participate in regional committees, work groups, etc., to ensure the exchange of Tribal information and perspective on the group's mission (e.g., natural production, supplementation, survival and mortality, habitat enhancement).
2	Monitor human activities in the Salmon River Basin which have the potential to affect anadromous fish and their habitat.	a	Monitor activities (e.g., mining, road construction, logging, grazing) on federal lands which have the potential to affect anadromous fish directly or indirectly through degradation of habitat or water quality or quantity.
2		b	Monitor activities (as in Task a) on state and private lands.
2		c	Work with appropriate government agencies, interest groups, and private individuals to ensure all human activity in the Salmon River Basin has no detrimental impact to anadromous fish and the affected parts comply with all laws.
3	Assist other entities in monitoring overall populations of anadromous fish in the Salmon River Basin.	a	Work with the Idaho Department of Fish and Game on monitoring parr densities and thus health of anadromous fish populations in the Salmon River Basin.
3		b	Monitor stocking success, where appropriate, of anadromous fish outplanted in the Salmon River Basin at the request of the Tribes.
4	Decrease both surface and subsurface streambed sediment in Bear Valley Creek (BVC) (MF Salmon River).	a	Restore the dredge-mined area to pre-mining conditions as much as possible.
4		b	Work with the USFS and others to eliminate all human activities which result in extraordinary amounts of sediment input into BVC.
4		c	Monitor sediment levels in BVC to document changes.
5	Increase streambank cover and stability	a	Revegetate the newly created floodplain and

	in BVC.		streambank in the site area.
6	Increase stream habitat diversity in BVC.	a	Allow natural hydrograph, including floodplain and riparian function, to allow BVC to reach a dynamic equilibrium in the affected area.
6		b	Monitor changes in pools and riffles in the site area and downstream.
6		c	Monitor changes in sinuosity in the site area.
6		d	Monitor changes in width-to-depth ratios in the project area and below.
7	Improve egg-to-parr survival of all fish but primarily anadromous fish in BVC.	a	Reduce sediment inputs into BVC.
7		b	Monitor chinook salmon redds in the fall and steelhead redds in the spring.
7		c	Monitor numbers of adult and juvenile salmonids, primarily chinook salmon and steelhead.
8	Increase rearing area for anadromous fish in the Yankee Fork Salmon River (YFSR).	a	Connect off-channel dredge ponds to the mainstem YFSR.
8		b	Monitor anadromous fish use of the off-channel rearing area.
8		c	Compare differences in numbers and growth between the off-channel rearing area and the adjacent mainstem YFSR.
9	Monitor use of the off-channel rearing area by anadromous fish to find ways to increase use.	a	Study the use of off-channel rearing area by chinook salmon and steelhead taking into account habitat use, flow, temperature, invertebrate densities, dissolved oxygen, and cover.
10	Incorporate the off-channel rearing area into a low-tech, bioenhancement facility for chinook salmon in the YFSR	a	In cooperation with the Tribes' Salmon River Production Program, continue to explore building a low-tech bioenhancement facility.
11	Decrease both surface and subsurface streambed sediment in Herd Creek (HC) and Big Boulder Creek (BBC) (EF Salmon River).	a	Eliminate the section of HC in the Bennetts Ranch area as an extraordinary source of sediment input into HC.
11		b	Eliminate the affected reach of BBC near the trailhead as an extraordinary source of sediment into the stream.
11		c	Work with the USFS, BLM, and others to eliminate all human activities which result in extraordinary amounts of sediment into the East Fork Salmon River.
11		d	Monitor sediment levels in HC and BBC.
12	Increase streambank cover and stability in HC and BBC.	a	Exclude livestock from streambanks in study sites in HC and continue revegetation as needed.
12		b	Revegetate the streambanks in the project site in BBC.
13	Increase stream habitat diversity in HC and BBC.	a	Allow natural hydrograph, including floodplain and riparian function, to allow

			HC and BBC to reach a dynamic equilibrium in the affected area.
13		b	Monitor changes in pools and riffles in HC and downstream.
13		c	Monitor changes in pools and riffles in BBC project site.
13		d	Monitor changes in width-to-depth ratios in HC and BBC.
14	Improve egg-to-parr survival of all fish but primarily anadromous fish in HC and BBC.	a	Reduce sediment inputs into HC and BBC.
14		b	Monitor chinook salmon redds in the fall and steelhead redds in the spring in HC and BBC.
14		c	Monitor numbers of adult and juvenile salmonids, primarily chinook salmon and steelhead in HC and BBC.
15	Increase spawning and rearing area for anadromous fish in BBC.	a	Monitor use by anadromous fish of newly accessible spawning and rearing habitat upstream of breached dam on BBC.
15		b	Outplant chinook salmon and steelhead into the newly accessible spawning habitat in BBC.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	9/1992	1/2020			10.00%
2	5/1984	1/2020			10.00%
3	9/1990	1/2020			5.00%
4	5/1984	8/2005	Significant decrease in surface and subsurface sediment in Bear Valley Creek.	X	5.00%
5	5/1987	8/2005	Increased streambank cover and stability in Bear Valley Creek.		2.00%
6	5/1989	8/2020	Increased stream habitat diversity in Bear Valley Creek.		5.00%
7	5/1984	8/2020	Significant improvements in egg-to-parr survival of all fish but primarily anadromous fish in Bear Valley Creek.	X	10.00%
8	5/1987	8/2020			10.00%
9	5/1987	8/2020			5.00%
10	5/1987	8/2005			3.00%
11	5/1987	8/2020	Significant decreases in surface and subsurface sediment in East Fork project areas.	X	10.00%
12	5/1992	8/2005	Increased streambank cover		5.00%

			and stability in East Fork project areas.		
13	5/1992	8/2020	Increased stream habitat diversity in East Fork project areas.		5.00%
14	5/1984	8/2020	Significant improvements in egg-to-parr survival of all fish but primarily anadromous fish in East Fork project areas.	X	10.00%
15	3/1992	8/2020			5.00%
				Total	100.00%

Schedule constraints
Some target changes for this project are dependent upon uncontrollable factors such as snow pack and run-off, which can substantially affect stream characteristics. Out-of-basin survival currently limits recovery efforts, the ultimate goal of the project.

Completion date
2020, or until successful recovery of chinook salmon and steelhead.

Section 5. Budget

FY99 project budget (BPA obligated): $257,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel	3 FTE's, 2 seasonal	%46	113,000
Fringe benefits	34% of FTE salary	%13	33,000
Supplies, materials, non-expendable property	Field Equipment and office supplies	%2	4,200
Operations & maintenance	MOA with USFS, Salmon Corps field work, structural maintenance	%6	15,000
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	0
NEPA costs		%0	0
Construction-related support		%0	0
PIT tags	# of tags:	%0	0
Travel	Field per diem, vehicle leases, travel	%14	34,500
Indirect costs	30% of Personnel and fringe	%18	43,800
Subcontractor		%0	0
Other	Training/workshops	%1	1,500
		TOTAL BPA FY2000 BUDGET REQUEST	$245,000

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
		%0	
		%0	
		%0	
		%0	
		Total project cost (including BPA portion)	$245,000

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	$240,000	$240,000	$225,000	$210,000

Section 6. References

Watershed?	Reference
☐	Bevenger, G. S., and R. M. King. 1995. A pebble count procedure for assessing watershed cumulative effects. USDA Forest Service, Research Paper RM-RP-319, Rocky Mountain Forest and Range Experimental Station, Fort Collins, Colorado.
☒	BNI (Bechtel National, Incorporated). 1987. Feasibility plan for the enhancement of the Yankee Fork of the Salmon River, Idaho. Report to the Shoshone-Bannock Tribes, Fort Hall, Idaho.
☒	EA (EA Engineering, Science, and Technology, Incorporated). 1988. Feasibility study: fisheries habitat enhancement project, East Fork Salmon River, Idaho. Draft Final Report to the Shoshone-Bannock Tribes, Fort Hall, Idaho.
☐	Hankin, D. G., and G. H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences 41:1575-1591.
☒	J. M. Montgomery. 1985. Bear Valley Creek, Idaho, fish habitat enhancement project feasibility study. Report to Shoshone-Bannock Tribes, Fort Hall, Idaho.
☒	Kiefer, S. A., P. K. Cowley, and M. Rowe. 1990. Salmon River subbasin plan. Final Report to the Northwest Power Planning Council, NPPC, Portland, Oregon.
☐	Konopacky, R. C., E. C. Bowles, and P. J. Cernera. 1985. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1984 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	Konopacky, R. C., P. J. Cernera, E. C. Bowles, and J. M. Montgomery, Consulting Engineers. 1986. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1985 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	McNeil, W. J., and W. H. Ahnell. 1964. Success of pink salmon spawning relative to size of spawning bed materials. U.S. Fish and Wildlife Service, Specific Science Report 469, Washington, D.C.
☐	NMFS (National Marine Fisheries Service). 1995. Proposed recovery plan for Snake River salmon. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Washington, D.C.
☐	NPPC (Northwest Power Planning Council). 1994. 1994 Columbia River Basin fish and wildlife program. NPPC, Portland, Oregon.
☐	Platts, W. S., and twelve other authors. 1987. Methods for evaluating riparian habitats with application to management. U.S. Forest Service, General Technical Report INT-221, Intermountain Research Station, Ogden, Utah.
☐	Richards, C., and P. J. Cernera. 1987. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1986 Annual Report to the Bonneville Power Administration (BPA), BPA,

	Portland, Oregon.
☐	Richards, C., and P. J. Cernera. 1988. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1987 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	Richards, C., P. J. Cernera, and J. M. Gunderman. 1989. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1988 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	Richards, C., P. J. Cernera, M. P. Ramey, and D. W. Reiser. 1992. Development of off-channel habitat for use by juvenile chinook salmon. North American Journal of Fisheries Management 12:721-727.
☐	Richards, C., and K. L. Bacon. 1994. Influence of fine sediment on macroinvertebrate colonization of surface and hyporheic stream substrates. Great Basin Naturalist 54(2):106-113.
☐	Rowe, M., S. Spaulding, J. M. Gunderman, and K. Bacon. 1990. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1989 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	Rowe, M., S. Spaulding, J. M. Gunderman, and K. Bacon. 1991. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1990 Annual Report to the Bonneville Power Administration (BPA), BPA, Portland, Oregon.
☐	Rowe, M., and five other authors. 1994. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1991 Annual Report to the Bonneville Power Administration (BPA), Fort Hall, Idaho.
☐	Saffel, P., H. Hayball, K. Bacon, and M. Rowe. 1994. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1993 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.
☐	Saffel, P., H. Hayball, K. Bacon, and M. Rowe. 1995. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1994 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.
☐	Saffel, P., H. Hayball, K. Bacon, and M. Rowe. 1996. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1995 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.
☐	Schwartzberg, M., and P. B. Roger. 1986. An annotated compendium of spawning ground surveys in the Columbia River. Columbia River Inter-Tribal Fish Commission, Technical Report 86-1, Portland, Oregon.
☐	Stonecypher, R. W., M. Rowe, H. Hayball, and K. Bacon. 1994. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1992 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.
☐	Thurow, R. F. 1994. Underwater methods for study of salmonids in the Intermountain West. USDA Forest Service, General Technical Report INT-GTR-307, Intermountain Research Station, Ogden, Utah.
☐	Anderson, J. L., H. Hayball, and K. Bacon. 1998. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1996 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.

PART II - NARRATIVE

Section 7. Abstract

The Salmon River Habitat Enhancement (SRHE) project was initiated by the Shoshone-Bannock Tribes in 1984 to improve chinook salmon and steelhead runs in traditional Tribal fishing areas. The overall goal of the SRHE project is to increase adult escapement back to the Salmon River by improving egg-to-parr survival of chinook salmon and steelhead, primarily through habitat improvements. The project has sponsored major habitat enhancements in three systems: 1) Bear Valley Creek (Middle Fork Salmon

River), 2) Yankee Fork Salmon River, and 3) East Fork Salmon River. While improving anadromous salmonid spawning and rearing habitat, the project enhancements also benefit resident fish and wildlife species by decreasing fine sediment inputs and enhancing riparian habitat. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best alternative was chosen for each system. Expected outcomes of this project are increased survival during freshwater life-stages of anadromous salmonids due to improvements in spawning, incubation, rearing, and riparian habitats; increased juvenile numbers should result in an increase in adult returns if out-of-basin survival can be improved. A timeline as to when benefits will be observed or the monitoring and evaluation has been successfully completed is elusive. Benefits from this project are masked by low smolt-to-adult survival rates mainly due to low survival in the Snake River corridor. Ultimately, only the recovery of chinook salmon and steelhead will determine if all efforts have achieved their goals. Our monitoring and evaluation includes both physical and biological parameters: 1) Redd counts to estimate adult escapement, 2) Snorkel surveys to estimate juvenile production, and 3) Habitat parameter measures to determine changes in habitat quality and quantity.

Section 8. Project description

a. Technical and/or scientific background

Historic hunting and fishing areas of the Shoshone-Bannock Tribes included central and southern Idaho. Rights to continue traditional activities were reserved by the Tribes in the Fort Bridger Treaty of 1868. The downward trends in returns of anadromous fish are a concern of the Tribes. For many years the Tribes have been working to improve anadromous fish runs back to traditional fishing areas. The efforts of this project have taken various forms, including: 1) sponsorship of habitat enhancement projects; 2) continued operations, maintenance, monitoring, and evaluation of habitat enhancement projects, 3) coordination and oversight of human activities in the Salmon River Basin, especially activities on state and federal lands; and 4) cooperation and information sharing with other fisheries and land management agencies, groups, and other tribes on fisheries-related issues.

The project has sponsored major habitat enhancements in three systems: 1) Bear Valley Creek (Middle Fork Salmon River), 2) Yankee Fork Salmon River, and 3) East Fork Salmon River. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best alternative was chosen for each system (J.M. Montgomery 1985; BNI 1987; EA 1988).

Bear Valley Creek, a major tributary to the Middle Fork Salmon River, supports wild stocks of chinook salmon and steelhead, and is an important traditional fishing area for the Shoshone-Bannock Tribes. Counts of chinook salmon redds in the drainage that exceeded one thousand per year in the middle 1950's (Schwartzberg and Roger 1986) have decreased to less than 50 redds in the 1990's (Saffel et al. 1996). Numerous factors have contributed to this decline including dredge mining in the 1950's. Dredge mining caused lateral scouring and downcutting through 2-3 km of unconsolidated mine spoils. As a result of this floodplain disturbance, an estimated 380,000 cubic meters of fine materials were gradually deposited into the stream over a twenty-five year period (J.M. Montgomery 1985). The increased sediment loading into Bear Valley Creek has severely degraded aquatic habitat throughout its entire length, causing lower egg-to-parr survival rates than other Salmon River subbasins less impacted by sediment (Rowe et al. 1990).

The Bear Valley Creek Habitat enhancement project (construction phase 1985 to 1989) has resulted in a substantial decrease in sediment input due to past mining activities. The high cut banks were regraded to create a new floodplain along 2.5 km of stream, eliminating these streambanks as a source of sediment input into Bear Valley Creek. The new floodplain was revegetated and the resulting vegetative cover should effectively eliminate the floodplain as a major source of sediment. The stream itself was not modified, and natural processes affecting stream morphology will allow the stream to reach its own dynamic equilibrium within the new floodplain.

The Yankee Fork Salmon River, a major tributary to the upper Salmon River, is an important spawning and rearing system for chinook salmon and steelhead, and an important traditional fishing area for the Shoshone-Bannock Tribes. Chinook salmon redd counts in the drainage once numbered over 400 as late as the early 1970's (Schwartzberg and Roger 1986) but have declined to less than 30 in the 1990's (Saffel et al. 1996). Many factors have been implicated for the decline in returning adult fish in the Columbia River Basin including impaired mainstem passage, harvest, predation, blocked habitat, and degraded habitat in spawning and rearing streams (NPPC 1994). The Yankee Fork Salmon River has a long history of adverse land use practices that have contributed to the decline of anadromous fish runs. Approximately six miles of stream habitat on private land in the lower Yankee Fork have been severely altered by dredge mining for gold from 1939 to 1942. Because of this activity, much of the natural meander pattern of the stream and associated instream habitat and riparian vegetation have been lost. Extensive unconsolidated and unvegetated dredge tailings have increased sedimentation of spawning gravels and rearing pools, and reduced riparian vegetation (Richards et al. 1989). Potential smolt production is high in the Yankee Fork drainage, with an estimated carrying capacity of 425,000 chinook salmon smolts and 59,000 steelhead smolts (Kiefer et al. 1990). Bechtel National, Incorporated (BNI) determined that with abundant numbers of spawning adults, rearing habitat would limit fish production in the Yankee Fork drainage (BNI 1987).

The Shoshone-Bannock Tribes' Yankee Fork Habitat Enhancement project (construction phase 1987-1988) was implemented to increase off-channel rearing habitat. Four series of remnant dredge ponds were interconnected to each other as well as to the mainstem Yankee Fork, thus creating 1.58 ha of additional rearing habitat (Rowe et al. 1990). This increased rearing area is expected to produce an additional 22,000 chinook salmon smolts (BNI 1987). Since construction, juvenile chinook salmon have been found to utilize this new habitat at higher densities than in the adjacent mainstem Yankee Fork (Rowe and others 1994).

The East Fork Salmon River is an important spawning and rearing area for chinook salmon and steelhead, and an important traditional fishing area for the Shoshone-Bannock Tribes. Agricultural, grazing, and mining practices have degraded available habitat. The Shoshone-Bannock Tribes East Fork Salmon River Habitat Enhancement project was implemented to improve degraded anadromous fish habitat in two major East Fork tributaries - Herd Creek and Big Boulder Creek.

The Herd Creek fencing project is located on private land that is used as an irrigated pasture for livestock grazing. Historic use of this area has resulted in poor bank stability, and annual erosion of vertical cutbanks which is a major source of fine sediment into the system. Fencing was built on Herd Creek in 1992 to discourage livestock use of streambank and riparian areas, thus improving streambank stability and reducing sediment input into the stream. In conjunction with the fencing project, willow plantings were utilized to improve stream/riparian habitat. Increased anadromous fish production should result from lower levels of fine sediments in the spawning gravels and increased embryo survival (EA 1988).

On Big Boulder Creek in 1991, a debris jam was modified and an abandoned dam breached to provide anadromous fish access to upstream spawning and rearing habitat. An additional 3.2 km of spawning habitat and 7.7 km of rearing habitat is now available to anadromous fish (EA 1988). Steelhead adults from the Idaho Department of Fish and Game's Pahsimeroi Hatchery have been outplanted into the newly accessible habitat from 1992 to 1997 in order to try to recover this run. Chinook salmon and steelhead eggs were also placed in sidestream incubators in 1998. In the early 1970's, a portion of Big Boulder Creek was diverted from its original channel, which led to erosion of an adjacent hillside causing excessive fine sediment to enter the stream and leaving bare, vertical banks exposed for further erosion. The channel also shifted, resulting in a wide and shallow streambed. In 1994, the vertical banks were sloped, and the stream was diverted away from the high cut-banks and returned to a more natural meander pattern within the floodplain. Revegetation efforts also began in 1994, and are ongoing. Enhancement efforts have eliminated the cutoff channel of Big Boulder Creek as a major source of fine sediment to the system.

In addition to enhancement efforts, through this project the Tribes have participated in many areas that involve the various sections of the 1994 Fish and Wildlife Program. Personnel have been involved with changes to allotment management plans, oversight on mining operations, efforts to improve fish passage including screening of irrigation diversions and diversion consolidations, participation in regional committees which share information on habitat enhancement and supplementation, and participation with technical and basin advisory groups working in the Salmon River Basin. This is an extremely important aspect of this project in terms of providing Tribal representation in these areas. Over 90% of the Salmon River is under federal ownership (Kiefer et al. 1990), on which the Tribes have treaty rights reserved by the Fort Bridger Treaty of 1868. Major human activities in the subbasin include logging, grazing, agriculture, and mining. These activities, improperly implemented, can have tremendous negative impacts on the survival of anadromous fish through, for example, sediment recruitment into a stream, destruction of riparian habitat, and toxic effluent drainage. In order to assure treaty right activities will be available for future generations, Tribal participation in the oversight of activities in the Salmon River Basin is essential.

The goal of the Tribes and this project is the recovery of chinook salmon and steelhead in the Columbia River Basin, focusing primarily on the Salmon River Basin. In accordance with the Columbia River Basin Fish and Wildlife Program goals, this project continues to protect and improve habitat conditions in the Salmon River Basin, thus benefitting the biological needs of salmon, steelhead, bull trout, and other fish and wildlife species. Implementation of State, Federal, and Tribal habitat improvements is called for, and this project, in addition to the enhancements listed above, has direct involvement with state, federal, and private enhancement efforts in the basin. This project also involves cooperative habitat protection and improvement with private landowners, as two of the project sites (Yankee Fork Salmon River rearing ponds, Herd Creek fencing project) are located on private land, and agreements and easements with the private landowners have been obtained for both projects. This project addresses the Proposed Snake River Salmon Recovery Plan (NMFS 1995) as it has protected and restored important habitat on federal lands (Task 1.1.b.); Bear Valley Creek and Big Boulder Creek enhancement sites are on USFS land. Also, this project protects watersheds that contain high quality habitat and habitat that can readily be restored (Task 1.1.b.3) through its involvement in the oversight of activities on federal lands. As listed earlier and in more detail in Section 8.B of this proposal, this project addresses numerous measures in Chapter 7 of the Fish and Wildlife Program (NPPC 1994).

b. Rationale and significance to Regional Programs

The Columbia River Basin Fish and Wildlife Program recognizes that improvements in habitat quality are needed to increase the productivity of many stocks of chinook salmon (NPPC 1994). Salmon River chinook salmon stocks are in jeopardy of going extinct in the near future unless survival through the migration corridor on the Snake and Columbia Rivers can be improved, as well as improvements in habitat quality and quantity in the Salmon River Basin itself. The Salmon River Habitat Enhancement Project has been working since 1984 to improve habitat in critical areas for the recovery of chinook salmon and steelhead and to monitor the results of those improvements. The enhancements initiated by this project strive to provide healthy stream and riparian communities. A healthy, functioning stream and riparian community will provide numerous benefits to fish and wildlife and water quality, as well as to other users of the resource. By improving habitat conditions to ensure compatibility with the biological needs of salmon, steelhead, and other fish and wildlife species, this project directly addresses the habitat goal of the Fish and Wildlife Program (NPPC 1994).

This project also directly addresses several measures of the Fish and Wildlife Program (NPPC 1994). Measure 7.6A.1 calls for coordination of human activities on a comprehensive watershed management basis, and through the project's involvement with the various technical and basin advisory groups for the Salmon River Basin, the Tribes are working to ensure that this happens. Measure 7.6A.2 calls for improved productivity of salmon and steelhead habitat critical to the recovery of weak stocks, and through our work in all systems, reducing fine sediment inputs into the system should improve egg-to-parr production. Also, by providing additional rearing habitat and access to previously blocked habitat, potential smolt production is increased in the Yankee Fork Salmon River and in Big Boulder Creek. All streams in our affected project areas have been designated critical habitat for the recovery of endangered

chinook salmon (57 FR 14653), and the project is working to improve habitat productivity in these areas by providing healthy, functioning stream and riparian communities.

Measure 7.6B.1 states the need to improve and maintain coordination of land and water activities to protect and improve the productivity of salmon and steelhead stocks. Through the project's involvement with changes to allotment management plans, oversight on mining operations, efforts to improve fish passage including screening of irrigation diversions and diversion consolidations, participation in regional committees which share information on habitat enhancement and supplementation, and participation with technical and basin advisory groups working in the Salmon River Basin, this project is directly addressing this measure. Measure 7.6B.3 gives priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowners. The projects on Herd Creek and the Yankee Fork Salmon River are both on private land, and cooperative agreements and/or easements have been obtained for both projects. Measure 7.6B.4 calls for giving priority to actions that maximize the desired result per dollar spent, and to actions that have a high probability of succeeding at a reasonable cost. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best biological and cost-effective alternative was chosen for each system (J.M. Montgomery 1985; BNI 1987; EA 1988). Measure 7.6B.6 encourages involvement with volunteers and educational institutions in cooperative habitat enhancement projects. The Tribes' Salmon Corps, a volunteer service-oriented organization, has been actively involved with past enhancement efforts with this project, and will be utilized further as opportunities arise.

Measure 7.6C.5 calls for federal land and water management agencies, states, tribes, and private landowners to take all steps necessary to comply with the habitat objectives. By providing healthy, functioning stream and riparian communities at our project sites, this project has improved and will continue to improve sediment regimes, bank stability, water quality, large woody debris, large pool frequency, riparian vegetation, stream morphology, and riparian communities.

Section 7.7 calls for cooperative habitat protection and improvement with private landowners, and by working with the model watershed technical and advisory groups, this project has been actively seeking and implementing improvements on private lands in the Salmon River Basin.

Measure 7.8C.1 states to ensure that all mining activities comply with state water quality standards. This measure is addressed by the project's oversight on mining activities in the Salmon River Basin. Measure 7.8D.1 charges parties to identify and protect riparian and underwater lands associated with perennial and intermittent streams and to initiate actions to increase shade, vegetation, standing and down large and small woody debris when water quality objectives are not being met. By implementing major enhancement projects in the three systems (Bear Valley Creek, Yankee Fork Salmon River, East Fork Salmon River), the project has taken, and will continue to take action to ensure water quality and habitat objectives are met in the Salmon River Basin.

c. Relationships to other projects

The Shoshone-Bannock Tribes currently sponsor four projects in the Salmon River Basin: This project, 9405000, Salmon River Habitat Enhancement; 8909803, Salmon Supplementation Studies in Idaho Rivers (ISS); 9107100, Snake River Salmon Sockeye Habitat; and 9705700, Salmon River Production Program (SRPP). All four projects share personnel and equipment when necessary during the field season and work closely together to plan activities to minimize expenses to all projects. In addition, this project shares data and avoids duplication of efforts with the ISS project, as some of our sampling areas overlap. This project will also work closely with the SRPP project after it completes the procurement process to develop low-tech bioenhancement facilities on the Yankee Fork Salmon River. This project works closely with the Idaho Model Watershed Habitat Projects (9401700) by serving on technical work groups. Finally, this project provides technical assistance, as necessary, to the Salmon River Diversion Consolidation Project (9600700).

This project also works cooperatively with the USDA Forest Service, the USDA Bureau of Land Management, the USDA Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Idaho Department of Fish and Game, the Idaho Department of Environmental Quality, the Idaho Department of Water Resources, the Lemhi and Custer Soil and Water Conservation Districts, and the Custer County Watershed Group. The Tribes must work closely with these agencies and groups in order to protect the natural resources to assure treaty right activities will be available for future generations.

The project requires a National Marine Fisheries Service Section 10 permit for scientific purposes under the Endangered Species Act of 1973. It has been determined that our sampling methods; snorkel surveys to estimate juvenile abundance, electrofishing and seining to collect fish weights and lengths, and redd counts to estimate adult escapement, represent a taking of a listed species (chinook salmon and steelhead). The permit requires an annual report be submitted, and a final report following the expiration of the permit. Other permits necessary are Idaho Department of Water Resources and Army Corps of Engineers permits to alter stream channels. In the course of the maintenance of the enhancement site in Big Boulder Creek, permitting may be necessary to accomplish the work within the normal high water mark of the stream, and will be obtained as needed.

d. Project history (for ongoing projects)

This project is a continuation of BPA Project #83035900: Bear Valley, Yankee Fork, & East Fork Habitat Work. This project has been underway for 5 years as Project No. 9405000 with a total expenditure to date of $1,338,299.72. Project reports to date include the following: Konopacky et al. (1985, 1986); Richards and Cernera (1987, 1988); Richards et al. (1989); Rowe et al. (1990, 1991, 1994); Stonecypher et al. (1994); Saffel et al. (1994, 1995, 1996); Anderson et al. (1998). The 1997 and 1998 Annual Reports are in preparation. Technical papers published in peer-reviewed scientific journals to date include Richards et al. (1992) and Richards and Bacon (1994). Major results achieved to date include the following:

1) The Bear Valley Creek habitat enhancement project (construction phase 1985 to 1989) has resulted in a substantial decrease in sediment input due to past mining activities. Reclamation of 2.5 km of floodplain eliminated a substantial source of fine sediment into the remaining 50 km of stream and the Middle Fork Salmon River. Improvements in surface substrate, pool cover, and non-anadromous fish densities have been documented.

2) The Yankee Fork Salmon River habitat enhancement project (construction phase 1987-1988) successfully interconnected four series of remnant dredge ponds with the mainstem Yankee Fork, creating over 1.5 ha of additional rearing habitat for anadromous salmonids. Use of the off-channel ponds by juvenile anadromous salmonids has been greater than the adjacent mainstem Yankee Fork.

3) The East Fork Salmon River habitat enhancement project has resulted in benefits to two major tributaries to the East Fork: Herd Creek and Big Boulder Creek. Fencing was built on Herd Creek in 1992 to discourage livestock use of streambank and riparian areas, thus improving streambank stability and reducing sediment input into the stream. In conjunction with the fencing project, willow plantings were utilized to improve stream/riparian habitat. Increased anadromous fish production should result from lower levels of fine sediments in the spawning gravels and increased embryo survival (EA 1988).

4) On Big Boulder Creek in 1991, a debris jam was modified and an abandoned dam breached to provide anadromous fish access to upstream spawning and rearing habitat. An additional 3.2 km of spawning habitat and 7.7 km of rearing habitat is now available to anadromous fish (EA 1988). In 1994, vertical banks in a cutoff channel in Big Boulder Creek were sloped, and the stream was diverted away from high cut-banks and returned to a more natural meander pattern within 0.5 km of affected floodplain. Revegetation efforts also began in 1994, and are ongoing. Enhancement efforts have eliminated the cutoff channel of Big Boulder Creek as a major source of fine sediment to the system.

There are several adaptive management implications for this project. The fencing effort on Herd Creek is experimental. As more knowledge is gained from the current configuration, the project will be

adapted to better exclude livestock and improve stream and riparian conditions. The Big Boulder Creek enhancement area is still in the process of reaching a dynamic equilibrium through natural processes and must be adaptively managed due to annual fluctuations in snowmelt run-off. During the construction phase, the project was adaptively managed on-the-ground with the contractors to achieve the design objectives of the project. Several different revegetation techniques have been implemented, and the knowledge gained from their successes or failures will be utilized in the planning of future projects in the region. Improvement of habitat has been performed in drainages where much potential benefit (i.e., increased quality and/or quantity of rearing and/or spawning habitat = more adult returns) was determined through assessments prior to implementation of enhancements. Therefore, habitat improvement would increase the number of adults returning to the systems and aid in the restoration of chinook salmon and steelhead populations. Monitoring of chinook salmon and steelhead populations is necessary to inform managers about the status of specific populations. This information is critical for determining management options for the preservation, protection, and recovery of chinook salmon and steelhead populations.

e. Proposal objectives

1. Improve communications and information sharing among entities working in the Salmon River Basin on fisheries related issues.
2. Monitor human activities in the Salmon River Basin which have the potential to affect anadromous fish and their habitat.
3. Assist other entities in monitoring overall populations of anadromous fish in the Salmon River Basin.
4. Decrease both surface and subsurface streambed sediment in Bear Valley Creek (BVC) (MF Salmon River).
5. Increase streambank cover and stability in BVC.
6. Increase stream habitat diversity in BVC.
7. Improve egg-to-parr survival of all fish but primarily anadromous fish in BVC.
8. Increase rearing area for anadromous fish in the Yankee Fork Salmon River (YFSR).
9. Monitor use of the off-channel rearing area by anadromous fish to find ways to increase use.
10. Incorporate the off-channel rearing area into a low-tech, bioenhancement facility for chinook salmon in the YFSR.
11. Decrease both surface and subsurface streambed sediment in Herd Creek (HC) and Big Boulder Creek (BBC) (EF Salmon River).
12. Increase streambank cover and stability in HC and BBC.
13. Increase stream habitat diversity in HC and BBC.
14. Improve egg-to-parr survival of all fish but primarily anadromous fish in HC and BBC.
15. Increase spawning and rearing area for anadromous fish in BBC.

Products from this project include annual reports to the BPA from 1984 to present (various authors and years) and publications in scientific journals (Richards et al. 1992, Richards and Bacon 1994). Physical products include: 1) Reclamation of over 2.5 km of floodplain in Bear Valley Creek, eliminating a substantial source of fine sediment into the remaining 50 km of stream and the Middle Fork Salmon River; 2) Documented improvements in surface substrate, pool cover, and non-anadromous fish densities in Bear Valley Creek; 3) 1.5 ha of additional rearing habitat were made available for juvenile salmonids by connecting off-channel pond systems to the mainstem Yankee Fork Salmon River; 4) Removal of a small hydroelectric dam and modification of a debris jam in the lower section of the stream made available 3.2 km and 7.7 km of previously unavailable spawning and rearing habitat, respectively, for anadromous salmonids in Big Boulder Creek; 5) Stabilization of 0.5 km of stream channel in the upper reaches of Big Boulder Creek removed an extraordinary source of fine sediment from the system and should improve

channel morphology; 6) Total riparian exclosure fencing on Herd Creek will improve streambank stability and reduce sediment inputs.

f. Methods

Initial project enhancement measures required considerable construction, which has been completed in all systems except for constructing additional fencing on Herd Creek and any maintenance required on Big Boulder Creek or the Yankee Fork Salmon River rearing ponds, which would be minimal. The project currently focuses on monitoring and evaluating the success of the previous enhancement work, and working with Salmon River Basin monitoring and coordinating activities.

Fulfilling Task 1.a. will provide the means to achieve Objective 1. Tasks 2.a., 2.b., and 2.c. will enable the achievement of Objective 2, and will involve on-the-ground presence by project personnel to monitor activities while in the field, and also periodically by visiting known locations where violations of environmental standards have occurred in the past. Project personnel also review and provide technical comments on all stream alteration permit applications in the region in order to ensure these activities will in fact benefit anadromous fish and their habitat. Task 3.a. and 3.b. will allow the project to fulfill Objective 3. These tasks include snorkel surveys to estimate juvenile abundance and redd counts to estimate adult escapement in various systems throughout the Salmon River Basin.

To meet Objective 4, Task 4.a. involved construction and revegetation of the floodplain. Task 4.b. involves monitoring and providing comments on grazing management, logging, recreational activities, and road influences in the watershed. Task 4.c. involves monitoring both surface and subsurface sediment in Bear Valley Creek including McNeil core samples to sample subsurface sediment (McNeil and Ahnell 1964), and the pebble count procedure of Bevenger and King (1995) to sample surface substrate. Task 5.a. involved revegetating the floodplain, and the methods for monitoring follow those of Platts and others (1987) to determine changes in cover and bank angles. Task 6.a. allows natural processes to shape stream morphology in the enhancement site. Tasks 6.b., 6.c, and 6.d. follow the methods of Hankin and Reeves (1988) to assess pool/riffle distributions, sinuosity, and width-to-depth ratios. Task 7.a. is fulfilled by achieving Objectives 4, 5, and 6. Task 7.b. involves redd counts to estimate adult escapement, and Task 7.c. uses the methods of Thurow (1994) for snorkel sampling to estimate juvenile abundance.

Task 8.a. was completed in 1988. Task 8.b. uses the methods of Thurow (1994) for snorkel sampling to estimate juvenile abundance, and electrofishing and seining are used to capture fish to weigh and measure juvenile fish to determine condition factors for Task 8.c. Task 9.a. involves more intensive snorkeling following Thurow (1994) by determining habitat use of juvenile salmonids, determining flow regimes through the ponds, monitoring temperature, dissolved oxygen, and cover, and monitoring invertebrate densities. Task 10.a. involves working with the Salmon River Production Program (9705700) when it completes the procurement process to develop low-tech bioenhancement facilities for chinook salmon and steelhead that were originally incorporated into the feasibility study for the Yankee Fork project in 1987 (BNI 1987).

Task 11.a. involves fencing efforts to completely exclude cattle grazing and expand the riparian area on the privately-owned section on Herd Creek. Task 11.b. involved the construction phase in 1994 on Big Boulder Creek and also involves our continuing revegetation and monitoring of the floodplain.. Task 11.c. involves monitoring and providing comments on grazing management, agriculture, logging, stream alterations, recreational activities, and road influences in the watershed. Task 11.d. involves McNeil core samples to sample subsurface sediment (McNeil and Ahnell 1964), and the pebble count procedure of Bevenger and King (1995) to sample surface substrate. Task 12.a. involves revegetation efforts within the fenced-off portion of Herd Creek as needed. Task 12.b. involves our revegetation and stabilization efforts on the streambanks at the Big Boulder Creek enhancement site. Task 13.a. allows natural processes to shape stream morphology in the enhanced areas of Herd Creek and Big Boulder Creek. Tasks 13.b., 13.c., and 13.d. follow the methods of Hankin and Reeves (1988) to assess pool/riffle distributions and width-to-depth ratios. Task 14.a. is fulfilled by achieving Objectives 11, 12, and 13. Task 14.b. involves redd counts to determine adult escapement in Herd Creek and Big Boulder Creek, and spawning success of outplanted fish in Big Boulder Creek. Task 14.c. uses the methods of Thurow (1994) for snorkel sampling

to estimate juvenile abundance. Task 15.a. involves redd counts and snorkel methods (Thurow 1994) to monitor use by anadromous fish in Big Boulder Creek, which was previously blocked by a hydroelectric dam and debris jam. Task 15.b. involves working with IDFG and NMFS to procure adult steelhead and chinook salmon to outplant into Big Boulder Creek, or steelhead and chinook salmon eggs to incubate in Big Boulder Creek.

Population estimates, salmonid production estimates, habitat parameters, and other variables will be statistically compared to previous years' data to evaluate trends and significant changes over time. Also, data will be compared to other basins/regions to assess the overall health of the target stocks and streams. Results expected for this project are that habitat will become more favorable for the production of anadromous salmonids and resident fish, and that survival to life stages associated with freshwater rearing of anadromous salmonids should increase to higher levels than before habitat improvements. By reducing sediment inputs and improving spawning, incubation, and rearing habitats, the project will allow for better or more habitat for anadromous salmonids, whether naturally returning, enhanced, or reintroduced with artificial production. Present utilization of available habitat is at the lowest level recorded due to low numbers of returning adults. Potential utilization of the habitat is extremely high if improvements in out-of-basin survival can be made.

The critical assumption for this project is that out-of-basin survival at eight hydroelectric facilities along the migration corridor will improve to the extent that recovery of chinook salmon and steelhead will be possible. Even with increased habitat quality and quantity, which this project has helped to provide, anadromous fish runs continue to decline due to low survival in the Snake and Columbia River migration corridor. Implementation of programs to improve out-of-basin survival such as immediate removal of the earthen-fill sections of the four lower Snake River dams and the restoration of the river to its natural condition are necessary to eliminate the critical uncertainties affecting this project. This project, and many others in the Salmon River Basin, were implemented to improve habitat for anadromous salmonids. Successful projects have been completed and habitat in general is being seeded at well below carrying capacity in most systems, and close to extinction levels in many others. The Snake River must be returned to a natural river condition in the immediate future for the successful recovery of endangered Snake River spring/summer chinook salmon and threatened Snake River summer steelhead.

g. Facilities and equipment

The project currently has adequate laboratory and office space and equipment, computers, facsimile, photocopier, administrative support, etc... to operate efficiently. We currently lease three pickup trucks for field work and travel which is adequate to successfully complete a field season. Other major field equipment includes a camp trailer, two snowmobiles, an ATV, camping/hiking gear, wetsuits and wetgear, substrate sampling equipment, stream discharge measurement equipment, water quality equipment, surveying equipment, electrofishing gear, and other miscellaneous tools and supplies necessary to complete all contract requirements. No special purchases of high-cost equipment are planned in the near future.

h. Budget

The budget for personnel includes monies for the SRHE share of the Fish & Wildlife Coordinator salary, the Project Manager, a Senior Technician, two seasonal technicians, and an administrative clerk ($113,000), fringe benefits at 34% of FTE salary ($33,000), and indirect costs at 30% of salary and fringe ($43,800) for a total of $189,800 personnel costs. Indirect cost and fringe calculations are based on previous years' Tribal budgets. $4,200 has been budgeted for miscellaneous field equipment and office supplies. For O&M, $10,000 has been budgeted as per the Tribes' MOA with the USFS to provide funding for any necessary work on Big Boulder Creek, and $5,000 has been budgeted for Salmon Corps assistance in fence maintenance and other field work. The Travel line item includes monies for 3 4X4 vehicle leases for field work and travel, field per diem for 4 persons for 90 days, and travel for Tribal representation at various basin advisory/workgroups for a total of $34,500. $1,500 has been budgeted for travel/registration fees to professional meetings and workshops. Attendance at peer sponsored meetings is critical for the exchange and dissemination of ideas about the status of resources in the basin and efficacy of restoration

techniques. Total budget request for FY00 is $245,000 which is $12,000 less than was allocated to this project for FY99.

Section 9. Key personnel

This project has four FTE's, 3 of which work full-time on this project. One technician will be replaced with two seasonal workers as winter downtime does not justify a permanent position. Personnel include a Project Manager, a Senior Fisheries Technician, a Fisheries Technician (will be replaced with 2 seasonal technicians), and an administrative clerk. Resume for the Project Manager follows.

Project Manager: Jeffry L. Anderson

Degrees Earned: M.S. in Zoology and Physiology, with an emphasis in fisheries management, University of Wyoming, Laramie, WY, December 1995.
B.S. in Biology, Clarion University of Pennsylvania, Clarion, PA, May 1993.

Current Employer: Shoshone-Bannock Tribes

Current Responsibilities:

Project Manager, Salmon River Habitat Enhancement Project. Administer and direct work on and off the reservation in anadromous fish habitat protection and restoration projects. Prepare and manage annual budgets and work plans. Prepare annual project proposal for funding by the BPA. Supervise a field crew of 2-3 people. Supervise monitoring program and field evaluations. Conduct fish and aquatic habitat surveys. Provide statistical interpretation of survey data and write annual and monthly progress reports to the BPA. Work with other tribal and agency biologists and personnel on methods of protecting and enhancing anadromous fishery resources including development of tribal comments and positions relative to regional projects and plans which affect salmon and steelhead stocks within the historical fishing area of the tribes. Assist in coordinating, communicating, and transferring information concerning projects to general tribal membership, Business Council, Fish and Wildlife Agencies, other Indian Tribes, private landowners, and the general public.

Recent Employment:
Fisheries Technician, Idaho Department of Fish and Game, Mar. 1996 - Oct. 1996.
Research Associate, Univ. of Wyoming, Jan. 1996 - Mar. 1996.
Research Assistant, Univ. of Wyoming, July 1993 - Dec. 1996.

Expertise:

Performing the above listed current responsibilities for the Salmon River Habitat Enhancement project since October 1996 have provided the expertise to adequately perform the job. Background and education are in fisheries and fish habitat management and restoration.

Recent Publications:

Anderson, J.L., H. Hayball, and K. Bacon. 1998. Salmon River habitat enhancement. Shoshone-Bannock Tribes 1996 Annual Report to the Bonneville Power Administration, Fort Hall, Idaho.

Rhine, T. D., J. L. Anderson, R. S. Osborne, and P. F. Hassemer. 1997. Length of hatchery steelhead smolts released in Idaho with implications to residualism. Issue Paper, Idaho Department of Fish and Game, Boise, ID.

Rahel, F. J., C. J. Keleher, and J. L. Anderson. 1996. Potential habitat loss and population fragmentation for cold water fish in the North Platte River drainage of the Rocky Mountains: Response to climate warming. Limnology and Oceanography 41(5):1116-1123.

Anderson, J. L. 1995. Incorporating fisheries databases into a GIS and investigating salmonid biomass, elevation, and gradient relations in Wyoming streams. Master's Thesis, University of Wyoming, Laramie, WY.

Section 10. Information/technology transfer

Information and technology generated from this project will be made available through the timely publication of annual reports as well as data and information sharing with other agencies throughout the course of the year. Also, at all enhancement sites, interpretive signs are in place which describe the projects and the sponsors.

Congratulations!