Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

Section 1. General administrative information

Ahtanum Creek Watershed Assessment

Bonneville project number, if an ongoing project 9102

Business name of agency, institution or organization requesting funding
Yakama Indian Nation

Business acronym (if appropriate) YIN

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name

NPPC Program Measure Number(s) which this project addresses.
7.6A Habitat Goal, 7.6B Habitat Policies, 7.6C Coordinated Habitat Planning, 7.8B Best Management Proactices

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

Other planning document references.
See Strategies 2-9 for spring chinook and 2-7 for steelhead, Yakima Subbasin Plan, 1990. Also see Wy Kan Ush Me Wa Kush Wit, Yakima River Subbasin Plan, basinwide recommendations 3-5, pp. 58-59

Subbasin.

Yakima

Short description.
Conduct watershed assessment in the agricultural portion of the Ahtanum Creek watershed, to complete assessment of entire watershed and facilitate restoration of salmon and steelhead.

Section 2. Key words

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

Other keywords.
Watershed analysis, instream flow, irrigation, surface/groundwater interactions

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Map irrigation systems utilizing creek water	a	incorporate GIS coverages, orthophotos, district maps into overall GIS map
		b	add delivery and drainage system features

		c	add cropping patterns from crop reports
		d	ground-truth map data
2	Model irrigation water use	a	measure water withdrawals from and returns to Ahtanum Creek
		b	assess consumptive use and irrigation efficiency
3	Describe stream flow and water temperature regime	a	measure creek flow and temperature over time and distance
		b	develop descriptive model of flow by location and season
4	Survey creek channel and floodplain	a	conduct qualitative assessment of riparian functional status
		b	use current and historical aerial photographs to map channel width and sinuosity , riparian vegetation and trends in these features over time
5	Describe fish population responses to habitat changes	a	assess potential salmon and steelhead production (pre-development conditions)
		b	describe response to changes in water withdrawal, return flows and riparian management
6	Recommend changes in irrigation facilities and management of land and water resources	a	integrate information and recommendations from upper watershed analysis
		b	use above data to recommend changes in irrigation and floodplain management
7	Implement recommendations	a	system modifications, substitution, land purchase or lease

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	10/1998	9/1999	20.00%
2	10/1998	9/1999	25.00%
3	10/1998	9/1999	20.00%
4	3/1999	9/1999	15.00%
5	3/1999	9/1999	10.00%
6	6/1999	9/1999	10.00%

7	10/1999	9/2003	0.00%
			TOTAL 100.00%

Schedule constraints.
Field data gathering may be constrained by weather or by private property access problems off the Yakama Reservation. The project will be able to rely partly on data already acquired as part of the current Yakima subbasin adjudication process.

Completion date.
1999 (analysis). Implementation will follow, beginning in FY2000

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	fish bio (lead) 0.5 FTE, wildl. bio 0.5, hydrol. 0.25, GIS bio 1.0, field tech 2.0, ofc 0.5	$145,938
Fringe benefits	25.3%	$36,922
Supplies, materials, non-expendable property	office and field supplies, GIS computer and and field laptop plus software, survey equipment	$21,000
Operations & maintenance	vehicles, office space, maintenance, utilities, insurance	$23,950
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		
PIT tags	# of tags:	
Travel	(and training)	$2,000
Indirect costs	23.5% calculated on all items on this budget	$55,180
Subcontracts	irrigation consultants	$5,000
Other		
TOTAL		$289,990

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	$500,000	$750,000	$400,000	$80,000
O&M as % of total	10.00%	10.00%	20.00%	100.00%

Section 6. Abstract

Ahtanum Creek was historically important for production of salmon and steelhead. The creek and its southernmost tributaries form part of the north boundary of the Yakama Indian Reservation. Spring chinook and coho are found in small numbers today; there is no current information on steelhead presence. Bull trout have been found as far downstream as the lowermost major irrigation diversion.

A watershed analysis for the upper, forested portion of the watershed is nearing completion. The lower, largely agricultural portion of the watershed is adversely affected by water withdrawal, by diking and channelization, by grazing practices and by residential development on the floodplain. Restoration of significant salmon and steelhead production in the watershed can be accomplished, but science-based strategies are needed for protecting stream flow, stream channels and floodplains.

We propose to map irrigated lands and water delivery systems, measure water discharge and temperature, compare water diversion and loss with on-farm water needs, and estimate the efficiency of irrigation water conveyance and use. At the same time we will gather historical and current data on stream channel condition, riparian function and salmonid populations.

We will use this information to determine how water use and riparian management in lower Ahtanum Creek may be limiting production of anadromous salmonids in the watershed as a whole, and to determine the most effective measures for salmon and steelhead restoration. We will recommend restoration measures that could include improved irrigation facilities, land and water management changes, and purchase or lease of land and water rights.

Section 7. Project description

a. Technical and/or scientific background.

Physical Setting Ahtanum Creek drains a 171-square mile watershed (Foxworthy, 1962), discharging into the Yakima River just south of the city of Yakima. The creek and its southernmost tributaries form part of the north boundary of the Yakama Indian Reservation. The North and Middle Forks of Ahtanum Creek originate on 7,000-foot Darland Mountain 30 miles west of Yakima, and join the smaller South Fork at Tampico 15 miles west of Yakima to form Ahtanum Creek proper. The Ahtanum Creek watershed is about ¼ the size of the neighboring Toppenish Creek and Satus Creek watersheds. However, gage records show that its annual runoff is over half that of the other two watersheds, and its late-summer base flow upstream from irrigation diversions may exceed those of either Toppenish Creek or Satus Creek over comparable periods of record. Higher watershed elevation and possibly geologic factors may account for Ahtanum Creek's greater base flow, which in turn suggests significant potential for rearing salmon and steelhead.

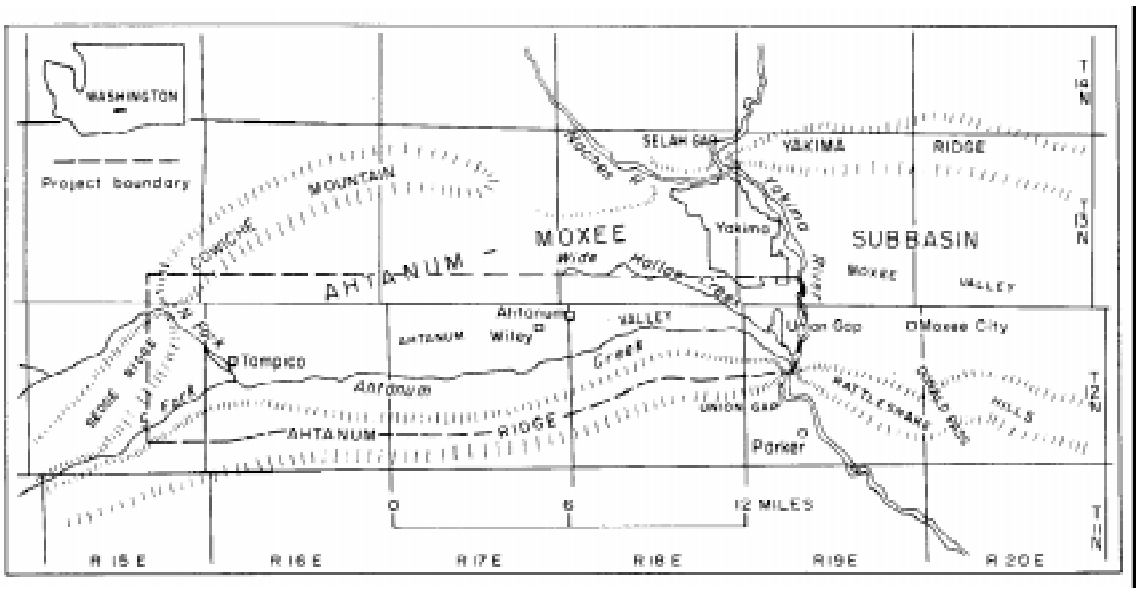

Fig. 1. Ahtanum Creek project area and vicinity map (reproduced from Foxworthy, 1962).

Fisheries Resources Salmon and steelhead once migrated in large numbers to Ahtanum Creek. Large fisheries on what must have been chinook salmon and steelhead were described by Catholic missionaries in the 1850s, and the Yakima Indian agent in 1867 mapped five traditional fishing sites on Ahtanum Creek and its North Fork (Tuck 1993). Anadromous runs declined with the advent of large-scale irrigation. At present, reintroduced coho are spawning in the lower mile of Ahtanum Creek, and juvenile chinook have been observed near the mouth of the creek. There is no recent information on steelhead in Ahtanum Creek.

Rainbow, cutthroat and bull trout are found in all three forks of Ahtanum Creek (Dominguez 1997; J. Matthews, YIN, pers. comm.). In the summer of 1992 a 12-inch bull trout was captured by a WDFW biologist in a pool below the Bachelor-Hatton diversion dam, which is a short distance downstream from the Ahtanum Main diversion. This suggests that Ahtanum bull trout may have fluvial traits, venturing at least four miles down the mainstem and past three major diversion dams during the irrigation season.

Irrigation Development The earliest records of irrigation in Washington come from the mission settlement along Ahtanum Creek in the 1850s. By the 1870s riparian lands were extensively irrigated, especially on the north (off-reservation) side of the creek. An Indian agent reported in 1891 that irrigation by whites had depleted Ahtanum Creek of water for supporting fisheries (Tuck 1993). Over-appropriation of Ahtanum Creek thus goes back more than a century.

In 1908 an out-of-court settlement allocated ¾ of the flow of Ahtanum Creek to north-side users, but in 1964 a federal circuit court decision in *United States of America v. Ahtanum Irrigation District* reduced the maximum flow that could be diverted north and allocated all flows that could be beneficially used to the south- (Reservation-) side

users after July 10 each year. The postwar development of groundwater resources observed by Foxworthy (1962) accelerated after the 1964 decision as north-side users sought to replace water diverted from their lands.

Today three districts encompass about 8,000 acres of land irrigated from Ahtanum Creek. The creek is dried up from June through October for several miles below the two largest diversions. During the off-season, creek water is turned into north-side canals (actually distributaries of Ahtanum Creek) to recharge the alluvial aquifer. The flow of Ahtanum Creek is therefore depleted by both surface diversions and well pumping.

Storage projects have been proposed for flood control and increasing irrigation deliveries, and to provide instream flows for fish. A bill is currently before the Washington legislature to authorize studies of an off-channel reservoir with instream flow augmentation for fish as one of its ostensible purposes.

The Ahtanum Main Canal, which serves most of the Reservation lands irrigated from Ahtanum Creek, was screened in 1930, but this screen fell into disrepair. In the last few years, fish screens have been constructed by the Bureau of Reclamation with Bonneville funds at the four largest irrigation diversions in the Ahtanum Creek drainage. This project (9107500) eliminates the most significant cause of smolt mortality at these four locations.

The Ahtanum Creek watershed is part of the current Yakima River Basin adjudication process, *Department of Ecology v. Acquavella et al.*, which began in 1977. The presiding judge, in his March 1, 1995 final order regarding treaty reserved water rights decreed that the Yakama Indian Nation has a time-immemorial yet diminished right for instream flow "necessary to maintain fish life" in Ahtanum Creek, as determined by the Bureau of Indian Affairs. The BIA has delegated its trust responsibility regarding fisheries management to the Yakama Indian Nation, and would look to the YIN for advice on instream flows. The U.S. Fish and Wildlife Service and the Yakama Nation have modeled habitat-discharge relationships using IFIM for three locations along Ahtanum Creek, but instream flow requirements have not been established as of this writing.

Other Issues The broad irrigated floodplain surrounding the lower 30 miles of Ahtanum Creek is heavily grazed by livestock. Exurbia is encroaching on the Ahtanum valley as well, bringing its own problems of groundwater use, pesticides and septic effluents. Since the 1996 flood in the Ahtanum Valley, citizen pressure to channelize and dike Ahtanum Creek has increased. Such unconfined stream reaches are critically important, however, in detaining floodwaters while providing habitat for juvenile salmonids and a variety of wildlife species.

A Washington Department of Natural Resources-sponsored watershed analysis is nearing completion for the North and Middle forks of Ahtanum Creek upstream from the irrigated area. This analysis, developed by landowners, resource agencies and the Yakama Nation, prescribes measures to reduce mass wasting and erosion/deposition, and to increase shading and wood recruitment to creek channels. A complementary assessment tailored to downstream problems is needed to begin to restore fish and wildlife populations in the whole Ahtanum watershed.

b. Proposal objectives.

1. Map irrigation systems.
2. Model irrigation water use.
3. Describe stream flow and water temperature regime.
4. Survey channel and floodplain.
5. Describe fish population responses to habitat changes.
6. Recommend changes in irrigation facilities and management of land and water resources.
7. Implement recommendations.

c. Rationale and significance to Regional Programs.

The long term goal of the Yakama Indian Nation is to restore salmon and steelhead to harvestable levels, while maintaining the genetic integrity and adaptability of populations. The Yakima Subbasin Plan outlined in Volume II, *Wy-Kan-Ush-Mi-Wa-Kish-Wit*, establishes an adult spring chinook return goal of 26,300 compared to an average of 4270 for 1986-1990 in the entire Yakima subbasin. The summer steelhead adult return goal is 29,700 compared to 2150 for 1985-90 in the subbasin. This will involve restoring terrestrial and aquatic habitat to conditions capable of supporting all freshwater life history stages of summer steelhead.

FWP 7.6A Habitat Goal: Protect and improve habitat conditions to ensure compatibility with the biological needs of salmon, steelhead and other fish and wildlife species. Pursue the following aggressively.
7.6A.1 Ensure human activities affecting production of salmon and steelhead in each subbasin are coordinated on a comprehensive management basis.

This project is the first attempt at objective fact gathering with the intent of restoring anadromous fish populations in Ahtanum Creek. The fisheries habitat problems in the Ahtanum Creek watershed are complex, and we intend to use watershed analysis as a framework for ensuring that future actions are complementary and effective.
This project builds on efforts in adjacent watersheds. The Yakama Indian Nation, through its part in the Yakima River Basin Water Enhancement Project, and by implementing the Satus Creek Watershed Restoration Project (9603501) and the Toppenish-Simcoe Instream Flow Restoration Project (5512000) has acquired equipment and expertise in water and fisheries monitoring that will be useful to this project. An overriding goal of each of these projects is to decrease watershed fragmentation and provide for connected systems which more closely mimic natural watershed hydrologic function, species assemblages, vegetation, and cultural values.

7.6A.2 At a minimum, maintain the present quantity and productivity of salmon and steelhead habitat. Then, improve the productivity of salmon and steelhead habitat critical to recovery of weak stocks. Next, enhance the productivity of habitat for other stocks of salmon and steelhead. Last, provide access to inaccessible habitat that has been blocked by human development activities.

In the hierarchy of actions described above, this project addresses the second and fourth actions dealing with weak stocks and man-caused blockages to habitat.

Ahtanum Creek is part of the historical range of Yakima spring chinook. The creek could provide additional habitat as the population expands geographically under the supplementation program begun by the Yakima Fisheries Project (8812001 et al.) with broodstock collection in 1997. Good-quality spawning and rearing habitat is available upstream from the agricultural part of the Ahtanum Creek watershed, but it is necessary to reconnect upper and lower Ahtanum Creek so spring chinook can ascend the creek. Coho already use the lower mile of Ahtanum Creek where upwelling keeps flow perennial in spite of the upstream diversions.

The Yakima Fisheries Project may not rear steelhead in the foreseeable future; managers will have to rely on habitat improvement to boost juvenile survival rates. The Ahtanum Creek watershed is contiguous with the Satus Creek and Toppenish Creek watersheds which together produce about half of all Yakima Subbasin steelhead. Besides its proximity to Satus and Toppenish creeks, Ahtanum Creek, as discussed earlier, has natural flow characteristics more suitable for supporting stream-type juvenile life histories characteristic of steelhead, spring chinook and coho. The Phase II screening projects also discussed earlier are predicated on the restoration of anadromous salmonid populations in Ahtanum Creek.

d. Project history

Not applicable.

e. Methods.

1. *Map irrigation systems.* Develop map from existing Yakama Reservation and Yakima County GIS coverages, orthophotos and irrigation district maps. Add irrigation district delivery and drainage system features from other sources such as aerial photographs. Use district crop reports, data compiled for current surface water adjudication, and aerial photographs to add cropping patterns to map.
2. *Model irrigation water use.* Measure surface water withdrawals (irrigation water supply) from Ahtanum Creek and return flows (irrigation system spills and runoff) to Ahtanum Creek. Incorporate all available gaging records. Use withdrawal data and cropping information to assess consumptive use and irrigation efficiency.
3. *Describe stream flow and water temperature regime.* Measure creek flow and temperature over time and distance, with sufficient spatial resolution to detect significant seepage gains and losses. Incorporate all available gaging records. Develop a descriptive model of creek flow by location and season.
4. *Survey channel and floodplain.* Utilize the qualitative Proper [riparian] Functioning Condition assessment method developed by the Bureau of Land Management, adding channel measurements if practicable. Also use current and historical aerial photographs to map channel width and sinuosity, riparian vegetation and trends in

these features over time. The most intensive of these techniques will be applied to random segments of the creek rather than the entire mainstem.

5. *Describe fish population responses to habitat changes.* Assess potential (pre-development) salmon and steelhead production. Describe response to changes in water withdrawal, return flows and riparian management under different restoration scenarios. Utilize available modeling techniques such as IFIM (IFIM has been performed already at three locations on Ahtanum Creek) and the Ecosystem Diagnostic and Treatment Planning Model currently under development for the Yakima subbasin.
6. *Recommend changes in irrigation facilities and management of land and water resources.* Recommend changes in irrigation and floodplain management using data developed and refined in this project, working with the Yakama Tribal Council, Wapato Irrigation Project (Bureau of Indian Affairs), Washington Departments of Ecology and Fisheries and Wildlife, north-side irrigation districts and Bonneville Power Administration.
7. *Implement recommendations.* System modifications, substitution, land purchase or lease will take place beginning in FY2000.

Factors that could limit project success include inclement weather and off-Reservation property access problems. Of course the ultimate success of this project hinges on implementation of the management recommendations. The affected entities do not have a history of cooperation, and all parties to the current adjudication are making their best case for rights to irrigation water. This is, however, an advantageous time for change given the new level of cooperation for management of the upper watershed, the possibility of salmon and/or steelhead listing under ESA, and the large overall effort to increase natural production of salmon and steelhead in the Yakima subbasin.

f. Facilities and equipment.

Facilities and equipment include a computer and software for GIS analysis, a field notebook computer, streamflow-measuring equipment, rented vehicles and office space. Some of our needs will be met using equipment acquired under other projects.

g. References.

Dominguez, L. 1997. Ahtanum watershed analysis including Cowiche, Foundation Creek and Darland Mountain WAUs. Appendix F: fish habitat analysis. 59 pp.

Foxworthy, B. 1962. Geology and ground-water resources of the Ahtanum Valley, Yakima County, Washington. U.S. Geol. Surv. Water Supply Paper 1598. 100 pp + map.

Tuck, R. L. 1993. History and status of anadromous salmonids in Ahtanum Creek, Washington. Eco-Northwest, Granger WA. 62 pp.

Section 8. Relationships to other projects

8812001 et al. Yakima/Klickitat Fisheries Project will supplement spring chinook in the Yakima subbasin. Habitat restoration in Ahtanum Creek and other historic spring chinook production areas is important for supplementation to succeed.

8812005 Fish Passage Video Monitoring; 8812008 Fisheries Technician Field Activities are in place to monitor success of habitat restoration and supplementation.

9603302 Yakima River Coho Restoration-O&M Although this is not a supplementation project, coho released under this project are spawning in Ahtanum Creek and can be expected to utilize additional habitat when actions proposed under this project are put in place.

9105700 Yakima Phase II Screen Fabrication; 9200900 Yakima Phase II Screen O&M; 9503300 Yakima Fish Protection, Mitigation and Enhancement Facilities Substantial investments of Bonneville funds have been made in fish passage facilities in Ahtanum Creek and in the Yakima River downstream from Ahtanum Creek. It is important to address the flow and habitat obstacles to salmon and steelhead production that remain.

9603501 Satus Watershed Restoration; 5512000 Toppenish/Simcoe Instream Flow Restoration are training staff and refining techniques for watershed monitoring and restoration and irrigation management.

Section 9. Key personnel

The Yakama Indian Nation employs the largest professional natural resources staff of any tribal government. Fully-qualified scientific, technical and support staff are available or can be hired to carry out all tasks under this project.

RESUME: DAVID T. LIND (PRINCIPAL INVESTIGATOR)

EDUCATION

Master of Science, University of Minnesota, July 1975. Major in fishery biology, minor in statistics. GPA 4.00.

Bachelor of Science with honors, University of Minnesota, June 1972. Major in fishery biology.

Course work included 91 quarter credits in biological sciences, 33 credits in mathematics and statistics and 20 credits in chemistry.

WORK EXPERIENCE

Fishery Biologist, Yakama Indian Nation, 1987 to present. Began as field biologist, supervising survey crew. Subsequent assignments in chronological order were in river basin planning, timber harvest environmental review, irrigation project planning, and interim management of water resources program. For the past 5 years, have been On-Reservation Fisheries Manager, responsible for fisheries management, research and habitat restoration projects on a 1.3-million-acre reservation, and representing fisheries interests on interdisciplinary teams in several arenas including timber harvest, irrigated agriculture and grazing. Supervise three fishery biologists.

Fishery Biologist, Grant County Public Utility District, Ephrata WA, 1986-1987. Took two temporary appointments involving hydroacoustic monitoring of migrating fish populations in the Columbia River, migration and river flow data analysis, and development of training materials.

Private-Sector Employment, Yakima WA, 1980-86. Worked as manager of a retail store and service company (1980-81), registered representative for a securities firm (1982-85), and program director for a church camp (1985-86).

Pollution Control Specialist, Minnesota Pollution Control Agency, Roseville MN, 1978-80. Helped establish and disseminate hazardous waste regulations, and train industrial community in compliance.

Aquatic Toxicologist, Minnesota Pollution Control Agency, 1976-78. Designed and operated mobile laboratory for testing mine effluent toxicity to fish and aquatic invertebrates, developed predictive models for heavy metal toxicity in natural waters.

Scientist, University of Minnesota, Dept. of Entomology, Fisheries and Wildlife, St. Paul, 1975-76. Conducted research on toxicity of industrial effluents to fish, authored two journal articles on this research and previous work done as graduate student.

Section 10. Information/technology transfer

The purpose of this project is to provide a basis for and to develop a fish restoration plan for Ahtanum Creek which addresses water withdrawal, instream flow and channel and floodplain habitat quality. Information will be transferred first and foremost to the implementation effort. For outside consumption a completion (annual) report will be submitted to Bonneville at the close of the project year. Excerpted data will be appropriately formatted and submitted to the Northwest Aquatic Information Network (StreamNet) and made available to the public via the Internet.