

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

Section 1. General administrative information

Toppenish-Simcoe Instream Flow Restoration

Bonneville project number, if an ongoing project 9705300

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

Business acronym (if appropriate) YIN

Proposal contact person or principal investigator:

Name Lynn Hatcher
Mailing Address P.O. Box 151
City, ST Zip Toppenish WA 98948
Phone (509)865-6262
Fax (509)865-6293
Email address yinfish@yakama.com

Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name

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

2.1 (Healthy Columbia River Basin), 7.1B (Conserve Genetic Diversity), 7.6A-D (Hab Goal, Policies and Objectives), 7.7 (Cooperative Hab Protection and Improvement With Private Landowners), 7.8G (Instream Flows For Salmon and Steelhead), 7.8H (Water Cons)

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

Not Applicable

Other planning document references.

Wy Kan Ush Me Wa Kush Wit, Steelhead CRFMP, Yakima River Sub-Basin Plan, WA State Salmon and Steelhead Stock Inventory

Subbasin.

Yakima River, Toppenish Creek, Simcoe Creek

Short description.

Restore instream flows to Toppenish and Simcoe Creeks by purchase, substitution, and/or lease of water and lands; Modify irrigation diversions to mimic natural runoff regimes which will aid recharge of alluvial aquifers and augment late-summer streamflow.

Section 2. Key words

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

Other keywords.

Instream flow, irrigation, surface/groundwater dynamics, water conservation

Section 3. Relationships to other Bonneville projects

Project #		Nature of relationship

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Characterize water use in the Toppenish-Simcoe Unit (completed with FY98 funding)	a	Develop project management plan

1		b	Map public and private irrigation systems and lands, update maps and ground-truth.
1		c	Measure discharge and temperature in creeks, canals and drains associated with the Toppenish-Simcoe Unit.
1		d	Compare surface water diversions with on-farm water use.
1		e	Monitor dewatered alluvial aquifer
2	Monitor steelhead populations above and below diversions of interest	a	Spring spawner surveys and yearly population censuses of steelhead in Toppenish and Simcoe Creeks
2		b	Ongoing spawner surveys and population censuses of steelhead in Toppenish and Simcoe Creeks.
3	Purchase, lease or substitute water on irrigated lands currently affecting project streams	a	Restore instream flow in late spring and summer by substitution of Yakima River water or groundwater, increasing conveyance efficiency of existing structures, and lease or purchase (160 acres FY99) of land and water from willing priority participants.
4	Maintain and monitor lease compliance; monitor steelhead population response	a	Maintain leases
4		b	Monitor compliance with lease provisions that are meant to ensure instream flows during irrigation season.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	8/1997	9/1998	0.00%
2	9/1997	8/2001	10.00%
3	10/1998	9/2000	20.00%
4	10/1998	9/2008	70.00%
			TOTAL 100.00%

Schedule constraints.

Inability to secure leases or buy lands due to uncooperative or unwilling landowners.

Completion date.

2008 (however leases would have to be renewed beginning in 2008, unless the cost is capitalized with additional funds during the 1998-2008 period.)

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	.5 FTE Fish Bio, .25 FTE Wild Bio, .25 FTE GeoHyd, .25 FTE GIS, 1 FTE Tech II, .5 FTE Admin Support	\$84,869
Fringe benefits	25.3%	\$21,472
Supplies, materials, non-expendable property	Office, Field Supplies	\$5,000
Operations & maintenance	Training, vehicle insurance, Utilities, repairs, building depreciation, rental vehicle, land rental	\$67,980
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Land purchase (160 acres at \$700/acre)	\$112,000
PIT tags	# of tags: 0	\$0
Travel	travel per diem	\$1,000
Indirect costs	23.5%	\$53,081
Subcontracts	Consultant fees and construction fees (design and construct of alternative water supply)	\$154,600
Other		
TOTAL		\$500,002

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	\$300,000	\$49,000	\$49,000	\$49,000
O&M as % of total	16.00%	100.00%	100.00%	100.00%

Section 6. Abstract

Toppenish and Satus Creeks, which rise and terminate wholly within the boundaries of the Yakama Indian Reservation, comprise about 20 percent of the Yakima River basin's areal extent and produce greater than half of the basin's wild summer

steelhead. These populations have suffered serious declines since reservation monitoring began in 1988, with the Toppenish stock descending more precipitously. Natural factors account for little or none of the difference between the two watersheds. However, while there are no longer any active diversions in the Satus Creek watershed, Toppenish Creek and its tributaries are diverted in several locations to irrigate up to 2,000 acres of lands within and upstream of the Toppenish-Simcoe Unit of the Wapato Irrigation Project. Irrigation diversions dry up sections of these streams in summer to provide an unreliable supply of water through poorly maintained delivery systems.

We propose to streamline the system and end summertime diversions without increasing hardship on local landowners. To accomplish this, we are identifying and mapping land ownership and water availability, as well as defining the nature of surface/groundwater dynamics in localized areas. As this knowledge is obtained, we will restore instream flows to affected reaches by purchase, lease or substitution of water and lands. With control of the major headworks, we can tailor diversions to mimic a natural runoff regime, allow recharge of shallow aquifers, and promote increased baseflows. Restoration of stream connectivity should promote the survival of aquatic species assemblages and riparian ecosystems. Our ultimate project goal is to increase the population of Toppenish and Simcoe Creek summer steelhead to 1,000 adults, the progress of which can be directly monitored by spring spawner surveys.

Section 7. Project description

a. Technical and/or scientific background.

Project Setting and Background

Toppenish Creek and its tributaries, wholly contained within the boundaries of the Yakama Indian Reservation, comprise a 625 square-mile catchment that contributes about 96,000 acre feet/year to the Yakima River system (see Figure 1). Watershed ecotones respond to a 5,000 foot elevational gradient and vary from Cascade Range forests to Columbia Plateau shrubgrass steppe. Within the lower watershed, intensive irrigated agriculture produces a variety of economically prominent crops.

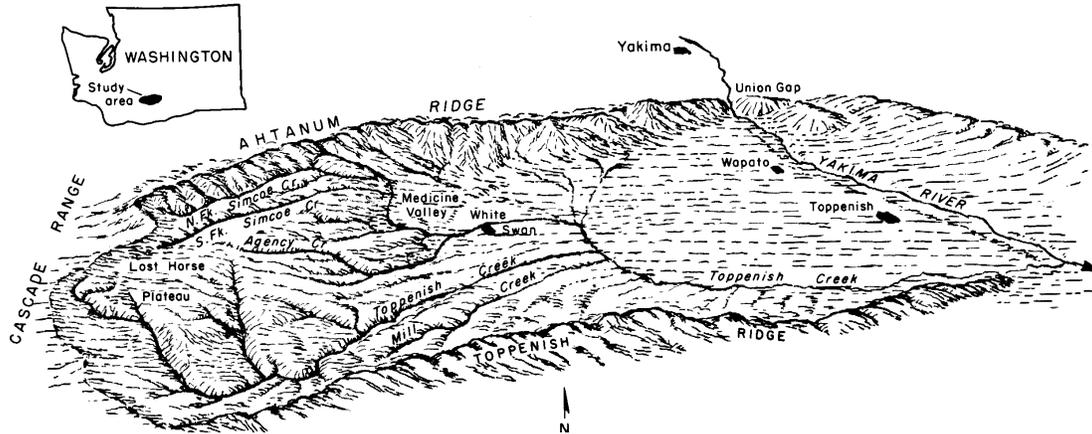


Figure 1. Toppenish/Simcoe Project area and vicinity map (reproduced from Gregg and Laird, 1975).

The nature and extent of irrigated agriculture has had a profound effect on the fishery resources of the basin. The Toppenish-Simcoe Unit of the Wapato Irrigation Project is capable of delivery to approximately 2,000 acres by outdated diversion structures, some of which lack any form of screening. When water is diverted in late spring and throughout the summer, reaches of Toppenish and Simcoe Creeks become dry, especially in a water-short year. Conversely, stream reaches below irrigation returns receive hot, turbid discharge out of phase with the natural hydrograph which further serves to degrade rearing habitat and promote adverse water quality conditions for both anadromous and resident aquatic species. In addition to the detrimental habitat effects of fluctuating discharge, the network of irrigation ditches and drains (along with stream entrenchment) has altered the natural runoff regime by helping to eliminate shallow aquifer recharge by spring overbank flooding. This loss of recharge to the groundwater component of the ecosystem has eliminated a mechanism which served to attenuate annual stream temperatures, providing a source of cool water to baseflows in the late summer and warm refugia during the winter. Aquatic species assemblages have suffered accordingly.

Fishery Resources

These conditions are obviously detrimental to fish production in streams which produce about one quarter of all wild summer steelhead in the entire Yakima River basin. Despite extremely degraded rearing habitat, Toppenish and Simcoe summer steelhead continue to persist. Recent analyses indicate that Toppenish/Simcoe steelhead are genetically dissimilar from other Yakima basin stocks as well as neighboring Satus Creek fish.

Toppenish Creek and Satus Creek steelhead have suffered serious declines in numbers since reservation population monitoring began in 1988. Nearly all of the remaining reservation production is in Satus Creek, but natural factors account for little or none of the difference between the two watersheds. Arguably, irrigation has contributed greatly to the precipitous decline of Toppenish/Simcoe steelhead. In fact, Toppenish Creek was estimated to have produced more steelhead than Satus Creek as recently as the

1950's. Local problems mirror the coast-wide decline in steelhead populations which has occurred in recent years. The Middle Columbia River ESU, including Yakima River summer steelhead, is a candidate species for listing under the Endangered Species Act. Yakama Reservation steelhead are important drought-adapted stocks whose interaction with hatchery fish has been kept to a minimum. These populations should therefore be protected with maximum effort.

Proposed Solution

It is our hypothesis that restoration of a "natural" discharge regime will recharge the entire stream ecosystem and support those food-webs basic to the survival of all life stages of steelhead (Ward and Stanford, 1992; Stanford and Ward, 1993). This hypothesis is inherent to reaches dewatered annually by diversions, but is also applicable to those reaches which experience extreme discharge fluctuations as a function of irrigation practices (withdrawals and additions to and from the natural channel). In addition to providing conditions conducive to the regrowth of native vegetation, this project would provide in place mitigation for steelhead. This project would protect prime spawning and rearing habitat, and could restore juvenile steelhead to previously underutilized reaches of project streams affected by unsatisfactory water quantity and quality.

An important underpinning of this project is the concept that instream flows, although important to sustain instantaneous survival of aquatic species, are vital to the maintenance of riparian ecosystems. Our plans to monitor the aquifer associated with a 5-mile dewatered reach of Toppenish Creek will provide valuable insight into the flux of surface water and its associated shallow groundwater. This information could be vital to understanding placement and timing of groundwater substitution for irrigation supply, given a properly functioning annual cycle of recharge.

Of those 2,000 acres under the Toppenish-Simcoe Unit, approximately 70% are held in tribal trust status while fee patent owners control the remainder. The majority of lands in the affected area are under the control of the Yakama Nation, so there exists an excellent opportunity for substitution or purchase of idle lands. If the acreage involved was higher and the percent of affected land in tribal trust lower, this project would be much more difficult to accomplish. In addition, acreage under this demand system has declined during the 1985-1995 drought season.

This project is part of an effort throughout the watershed to define the socioeconomic, cultural and natural uses of lands and water. Valuable work has been completed which will provide the decision base for future project tasks.

b. Proposal objectives.

1. Characterization of water use in the Toppenish-Simcoe Unit of the Wapato Irrigation Project [facilitated by FY97 and FY98 funding] to provide a priority list of available lands and water for lease or purchase and subsequent transferal to instream flow use. Stream

gaging stations, groundwater sensors, updated GIS layers and a Project Management plan are direct products of this objective, and will continue to provide valuable information throughout the life of the project.

2. Monitoring of steelhead populations above and below diversions of interest to provide both a baseline of adult returns for comparison value, as well as means to evaluate project success. Observation of lessees will be required to ensure that diversions do not occur out of season; population censuses will continue to discern if steelhead juveniles are using previously dewatered reaches for rearing habitat.

3. Purchase, lease or substitution of water on irrigated lands currently affecting project streams as a function of information gained from Objective 1. Acquisition of lands and continuing lease of properties will provide a means to assure active conservation of natural ecosystems, as well as management steeped in proper natural resource goals.

4. Maintenance of lease stipulation compliance and monitoring of steelhead population response of not only adult returns, but also the magnitude and extent of juveniles in previously underutilized reaches of project streams.

c. Rationale and significance to Regional Programs.

Toppenish and Simcoe basin steelhead are genetically valuable, drought-adapted populations which have experienced limited interaction with hatchery stock. This fact, coupled with the stock's genetic dissimilarity from other Yakima basin steelhead, suggests that priority should be given to habitat protection in each basin. Active irrigation diversion continues to take place in the Toppenish basin, and although the majority of water is supplied by the Wapato Irrigation Project's diversion of the Yakima River, some Toppenish and Simcoe Creek water is used in agricultural production. If we can eliminate the usage of this surface water by any one or combination of the methods previously specified, prime steelhead spawning and rearing habitats can be protected. In accordance with CBFWA Habitat Work Group guidelines, this project is intended to "protect the best" spawning and rearing habitat in Toppenish and Simcoe Creeks, and attempts to restore habitat previously viable for steelhead rearing by returning discharge regimes to a more natural state.

The connected nature of the Toppenish/Simcoe project area with respect to land management goals and current use provides an excellent opportunity to restore habitat solely by the addition of water. This will increase the overall health of the basin not only with respect to fishery values, but on the watershed level as well.

d. Project history

The anticipated completion of Objective 1 by the end of FY98 will supply us with the information needed to begin restoring previously diverted surface water back into the

stream. Spawner surveys and juvenile population censuses will help to develop a ranking system of reaches where efforts should concentrate first. Management of the project will begin to adapt to the changing nature of land and water ownership in the project area, and our knowledge base will enable us to prioritize future acquisitions and leases. If surface water cannot meet the needs of a landowner in the affected area, we will also have the knowledge and resources to substitute or provide another source of water.

Once the system is in place and all affected lands and water have been acquired by all means available to us, we will then monitor compliance with any special lease requirements intended to maintain instream flows. GIS layers portraying land and water ownership will continue to be updated as the control mosaic changes, and will be useful to other Tribal programs for management information. In addition, continued monitoring of steelhead populations will serve as an index of project success.

e. Methods.

The first step of this project, slated for completion by the end of FY 1998, involves a comprehensive accounting of the land and water use of the Toppenish-Simcoe Unit. All public and private irrigation systems will be mapped to gain an understanding of the extent and magnitude of affected areas. In addition to mapping, surface flow in Toppenish and Simcoe Creeks and all associated laterals and canals will continue to be measured to augment baseline water budget information and further evolve our decision database. Mapping and surface discharge gaging will allow comparison of diversions with on-farm water use. Piezometers will be installed in appropriate locations to aid definition of the surface/groundwater dynamics of dewatered reaches. We may discover that natural stream losses account for dewatered sections of Toppenish Creek in the absence of irrigation diversion.

Concurrent with defining the nature and extent of land ownership and water use will be the continued monitoring of steelhead populations above and below diversions of interest in Toppenish and Simcoe Creeks. These monitoring efforts will include spring spawner surveys and summer electrofishing and snorkeling censuses. Juvenile observations will help to gage the proximal progress of the project.

Using information gained, we will find and implement the most practical ways to restore instream flow in late spring, summer and fall, choosing from the following options: substitution of Yakima River water or groundwater, increasing conveyance efficiency of existing structures, and lease or purchase of land from willing participants.. Decisions made will rely upon data portraying water flux in the underlying aquifer, and the magnitude and timing of surface diversions for agricultural production. One certainty is that surface diversions will be limited to spring runoff periods only. Waters transferred back into the stream from the efforts of this project will be protected from downstream appropriation through enforcement of the Yakama Nation Tribal Water Code

A critical uncertainty underlying this entire project lies in the assumption that more and better summer habitat, and better late-spring passage conditions will increase steelhead numbers in the Toppenish Creek basin. The larger run to the neighboring Satus Creek basin, where there is similar upstream habitat quantity and quality but no diversions downstream, supports this assumption. Adult returns, as derived from spring spawner surveys in project streams and extrapolated from observations at the Prosser and Roza counting stations, will provide an excellent means to judge the success of the project over time.

f. Facilities and equipment.

This project will utilize the facilities of the Yakama Nation Fisheries Resource Management Program, with expenditures for utilities and office supplies. Two 4WD vehicles will be required to perform project tasks, with associated rental fees, insurance and upkeep. The largest portions of the FY 1999 budget are for land acquisition and lease maintenance, as well as consultant, contractor and construction costs for any substitution (groundwater wells, improved surface diversion structures) vectors defined from completed tasks of Objective 1.

g. References.

Gregg, D.O. and L.B. Laird. 1975. A general outline of the water resources of the Toppenish creek basin, Yakima Indian Reservation, Washington. Open-File report 75-19, U.S. Geological Survey, Tacoma, Washington.

Stanford, J.A., and J.V. Ward. 1993. An ecosystem perspective of alluvial rivers: connectivity and the hyporheic corridor. *Journal of the North American Benthological Society* 12:48-60.

Ward, J.V., and J.A. Stanford. 1996. Ecological connectivity in alluvial river ecosystems and its disruption by flow regulation. *Regulated Rivers* 11:105-119.

Section 8. Relationships to other projects

This project could benefit both directly and indirectly from a number of projects currently under way and proposed within the Yakima and Toppenish basins. The Teanaway Instream Flow Restoration (ongoing BPA project 9704900) will provide valuable information as to the nuances of private landowner negotiations for both purchase and lease. This is a YIN project, so in-house personnel are available for consultation.

On-reservation projects include the Yakima Nation Riparian/Wetlands Restoration Project (ongoing YIN-BPA project 9206200), which will provide a knowledge and experience base, as well as a possible source of funding for land and lease acquisition due to overlapping goals and project area. In addition, the Satus Creek Watershed Restoration

Project (ongoing YIN-BPA project 9603501) has acquired equipment and expertise in water and fisheries monitoring that will be useful to this project.

The Toppenish/Simcoe Instream Flow Restoration project would complement the Toppenish Creek Corridor Enhancement Project, a planning effort currently involving the Yakama Indian Nation under Public Law 96-182 (Yakima River Basin Water Enhancement Project or YRBWEP). The Toppenish Creek Corridor project focuses on activities downstream from this proposed project, but will provide valuable information as part of a watershed approach and will help to establish watershed and stream connectivity. 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.

Fish Passage Video Monitoring (ongoing BPA project 8812005) will provide population information from adult counts at the Prosser and Roza Dam fish counting stations. In addition, Fisheries Technician Field Activities (ongoing BPA project 8812008) will provide crews needed to assist with steelhead spawner surveys in Toppenish and Simcoe Creeks.

The Upper Toppenish Watershed Analysis has been submitted for Bonneville Power Administration funding and would be very beneficial to the scope and goals of this project. Its purpose is to enhance natural detention and storage processes in the upper watershed to stabilize the hydrograph and provide a more steady source of discharge to the lower watershed. This proposed project's area of study is within that of the Toppenish/Simcoe study area, and improved flow conditions will benefit the instream needs of aquatic species assemblages.

Section 9. Key personnel

Kale Gullett, Fishery Biologist I, ½ FTE

Education

M.S. Rangeland Ecology and Watershed Management/Water Resource Management, May 1996, University of Wyoming, College of Agriculture

B.S. Zoology and Physiology/Fisheries Biology, May 1994, University of Wyoming, College of Arts and Sciences

Current Employer

Yakama Nation Fisheries Resource Management Program

Current Responsibilities

Research, management and restoration of stream ecology and fisheries resources of the Toppenish Creek basin, Yakama Indian Reservation; in-house Instream Flow Incremental Methodology (IFIM) technical experience base for recommendation and evaluation of Reservation instream flows; member of Toppenish Creek Corridor Enhancement Plan

writing and technical team; evaluation of hydraulic effects of proposed riverine modifications; field, computer and technical assistance for other Program employees.

Previous Employment

Miller Ecological Consultants, Incorporated, Fort Collins, Colorado.

Research Technician, August 26, 1996 to December 1, 1996. Assisted in Colorado River Squawfish (endangered) radio telemetry project to determine late-summer microhabitat preferences for instream/passage flow determination.

USDA-US Forest Service Rocky Mountain Region Fish Habitat Relationships Unit, Laramie, Wyoming.

Research Associate I, May 11, 1996 to August 1, 1996. Field and lab application of IFIM for completion of instream fishery flow recommendation report to Regional Forester, Denver, CO.

University of Wyoming Department of Rangeland Ecology and Watershed Management and Wyoming Water Resources Center, Laramie, Wyoming.

Graduate Research Assistant, September, 1994 to May, 1996. Evaluation of the relationship of fish habitat hydraulics to a region-wide habitat capability criterion.

USDA-US Forest Service Rocky Mountain Forest and Range Experiment Station, Laramie, Wyoming.

Research Fisheries Technician, Summer 1992 and 1993. Collection of fisheries, habitat and hydrology data for Colorado River Cutthroat (sensitive) trout migration project.

Expertise

Education and applied experience mainly in the field of instream flow application and research, evaluation of riverine fishery hydraulics and habitat, hydraulic modeling, stream ecology and hydrology, watershed management and fisheries biology and management.

Publications

Gullett, K.A., T.A. Wesche, R.N. Schmal and W.A. Hubert. 1998. Comparison of salmonid habitat availability to streamflow characteristics in the central Rocky Mountains: Some insights for water resource decision makers. *Water Resources Bulletin*, in review.

Gullett, K.A., T.A. Wesche and R.N. Schmal. 1998. Evaluation of the USFS Rocky Mountain region 2 40% standard habitat capability criterion. USFS National Fish Habitat Relationships Unit Currents, GPO, Washington, D.C., in progress.

Wesche, T.A. and K. A. Gullett. 1996. Bypass (instream) fishery flow recommendations for Cow Creek below Overland Ditch Diversion, Colorado. Completion report to Rocky Mountain Regional Forester, Denver CO, to fulfill Interagency Agreement #1102-0001-94-041 between the USDA-US Forest Service and University of Wyoming Cooperative Extension Service.

Section 10. Information/technology transfer

The technical information resulting from this project (and its component tasks) will be distributed in the following ways:

- A completion (annual) report will be submitted to Bonneville at the close of the fiscal (calendar) year and Bonneville will distribute copies to all individuals and agencies on its mailing list.
- Progress and methodologies will be appropriately formatted and submitted to the Northwest Aquatic Information Network (StreamNet) and made available to the public via the Internet.
- The results of this project will also be presented and critiqued in a series of workshops hosted by project personnel to further educate the public as to the benefits of informed management and multi-disciplinary cooperation.
- Results will be used to continue implementation of the project, measure success, and serve as a feedback loop for future adaptive management.