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## PART I - ADMINISTRATIVE

### Section 1. General administrative information

Title of project

Klickitat River Sub-Basin Assessment

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BPA project number: 20118

Contract renewal date (mm/yyyy):

Multiple actions?

Business name of agency, institution or organization requesting funding

Yakama Indian Nation

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Business acronym (if appropriate)

YIN

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Proposal contact person or principal investigator:

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

NPPC Program Measure Number(s) which this project addresses

7.6A.1, 7.6A.2, 7.6B.3, 7.6B.4, 7.6C

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

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Other planning document references

Wy-Kan-Ush-Me-Wa-Kish-Wit, Klickitat River Subbasin Plan, basinwide recommendations

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Short description

Compile and evaluate existing fisheries and watershed information and perform field verification to prioritize protection, restoration and analysis needs throughout the Klickitat River subbasin, based on potential benefit to the fisheries resources.

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Target species

Klickitat River spring and fall chinook, coho, winter steelhead, summer steelhead, resident rainbow trout, cutthroat trout, bull trout

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### Section 2. Sorting and evaluation

Subbasin

Klickitat

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**Evaluation Process Sort**

CBFWA caucus	Special evaluation process	ISRP project type
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Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input checked="" type="checkbox"/> Anadromous fish <input checked="" type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input type="checkbox"/> Multi-year (milestone-based evaluation) <input checked="" type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input checked="" type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> 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
20510	Yakima/Klickitat Fisheries Project Umbrella	Dependence of supplementation on habitat carrying capacity
9705600	Lower Klickitat Riparian and In-Channel Habitat Enhancement Project	Assessment can guide future enhancement efforts in the lower Klickitat subbasin

### Section 4. Objectives, tasks and schedules

#### ***Past accomplishments***

Year	Accomplishment	Met biological objectives?

#### ***Objectives and tasks***

Obj 1,2,3	Objective	Task a,b,c	Task
1	Compile, evaluate, and ground-truth existing information on historical and current watershed condition and anadromous fish use within the Klickitat River sub-basin (watershed).	a	Describe historical (i.e. normative) and current watershed condition and function,
		b	Describe historical and current anadromous fish usage within the watershed.
		c	Identify key habitat for protection or restoration, and key locations for reestablishing passage.

		d	Identify limiting factors where anadromous fish populations are depressed,
2	Compile and evaluate information on social and economic factors affecting anadromous fisheries restoration in the Klickitat River watershed.	a	Survey current and historical land ownership, land use, and water use within the watershed,
		b	Survey existing, ongoing, and planned watershed and fisheries studies within the watershed,
3	Perform ground-truthing of factors limiting fisheries resources, and riparian PFC assessment to identify condition, trend, and causes of degradation in key watershed sub-units,	a	Ground-truth findings on limiting factors identified above. Assess riparian/stream condition, trends and causes of degradation in key watershed sub-units. .
4	Integrate information, identifying and prioritizing: 1) subbasin units, based on potential for protection or restoration of high quality anadromous fish habitat, and 2) information gaps, where potential is indeterminate.		.
5	Prepare a concise report on the results of the assessment.		

**Objective schedules and costs**

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	5/2000	6/2000			35
2	4/2000	6/2000			20
3	7/2000	8/2000			20
4	8/2000	9/2000			15
5	9/2000	9/2000			10
				<b>Total</b>	10000.00 %

**Schedule constraints**

Weather conditions will affect the timing of field studies; the initiation of the assessment is timed accordingly.

**Completion date**

9/2000

**Section 5. Budget**

**FY99 project budget (BPA obligated):**

**FY2000 budget by line item**

Item	Note	% of total	FY2000
Personnel	Project Manager, 640 hours, Bookkeeper, 80 hours	%7	15,311

Fringe benefits	@ 25.3%	%2	3,874
Supplies, materials, non-expendable property	Miscellaneous supplies	%1	2,000
Operations & maintenance	vehicles, fuel, repairs, insurance	%4	8,900
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	
NEPA costs		%0	
Construction-related support		%0	
PIT tags	# of tags:	%0	
Travel		%0	
Indirect costs	@ 23.5%	%3	7,070
Subcontractor	Professional services (watershed and GIS specialists, fisheries biologist, geographer)	%84	197,904
Other		%0	
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$235,059</b>

### **Cost sharing**

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
		%0	
		%0	
		%0	
		%0	
<b>Total project cost (including BPA portion)</b>			<b>\$235,059</b>

### **Outyear costs**

	FY2001	FY02	FY03	FY04
<b>Total budget</b>				

## **Section 6. References**

Watershed?	Reference
<input type="checkbox"/>	Cline, D. R., 1976, Reconnaissance of the Water Resources of the Upper Klickitat River Basin, Yakima Indian Reservation, Washington: U.S. Geological Survey Open-File Report 75-518, 54 p.
<input type="checkbox"/>	Independent Scientific Group, 1996, Return to the River, Restoration of Salmonid Fishes in the Columbia River Ecosystem...584p.
<input type="checkbox"/>	Parker, G.L. and Storey, F.B., 1916, Water Powers of the Cascade Range, U.S. Geological Survey Water Supply Paper 369, 169 pp.
<input type="checkbox"/>	
<input type="checkbox"/>	

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## **PART II - NARRATIVE**

### **Section 7. Abstract**

The Klickitat River sub-basin, currently one of the most productive anadromous fisheries in the mid-Columbia River ESU now produces a small fraction of its former runs. Though efforts have been made to understand and address problems causing the decline of fish runs in the Klickitat subbasin no effort has been made which systematically address the entire subbasin as a watershed, and develop prioritized solutions for the whole subbasin.

In accordance with the NPPC's intention to coordinate fisheries restoration efforts within sub-basins, and consistent with their Fish and Wildlife Program, we propose to perform an assessment of the Klickitat River sub-basin, with the goal of providing a framework for future fisheries restoration activities. We will: compile existing information on past and present watershed functioning, fisheries resources, and land and water use; subdivide the watershed by groundwater subbasins; subdivide the subbasins by climate/vegetation factors into watershed units; identify watershed units with high existing or anadromous fishery potential; identify factors limiting fish production. Following field verification, we will synthesize the information to prioritize protection and restoration of habitat, reestablishment of passage, and further analysis needs. A report summarizing the assessment results will be completed in September, 2000.

### **Section 8. Project description**

#### **a. Technical and/or scientific background**

The Klickitat River is located on the east slope of the Cascade Range in southcentral Washington, and drains 1,350 sq. miles in Klickitat and Yakima counties. The Klickitat enters the Columbia River at River mile (RM) 180.4. The Klickitat River is one of the longest undammed rivers in the northwest, flowing about 70 miles south from its source in the Cascades to the Columbia River. The entire basin is underlain by volcanic rocks of four distinct age groups. The Cascade crest, which forms the western boundary of the basin is dominated by Mount Adams (Pahto), a 12,000 foot dormant stratovolcano with an extensive glacier system that drains into the Klickitat River. At the northwest corner of the basin lie the Goat Rocks, the deeply eroded remnants of an extinct stratovolcano that reach about 8,000 feet. The northern boundary is the Klickiton divide, a ridge of Columbia River Basalt reaching about 7,000 feet that separates the Klickitat from the watershed of the Tieton River, a tributary to the Yakima. The Lost Horse and Lincoln Plateaus, 5-6,000 foot plateaus underlain by Columbia River basalts separate the Klickitat from the Ahtanum and Toppenish basins, which drain east to the Yakima River. In the southeast part of the basin, younger volcanic rocks, including many cinder cones cover the older basalts on the divide separating the Klickitat from the Satus basin.

Precipitation decreases dramatically from west to east across the basin. The summit of Mt. Adams and the Goat Rocks receive over 100 inches of precipitation annually. The eastern watershed divide, although it ranges between four and six thousand feet receives between about 30 and 50 inches. Mt. Adams accumulates a large snowpack, which feeds high summer base flows and contributes to a large glacier system. By contrast, east of the Klickitat River, less snowpack accumulates and melt is earlier. Consequently per square mile 7-day low flows are on the order of a hundred times greater in streams draining Mt. Adams than the eastern Klickitat basin.

Mt. Adams has a distinct influence on both water quantity and water quality in the Klickitat River. The Rusk Glacier on the east flank of Mt. Adams is prone to occasional glacial outburst floods that feed torrents of water and volcanic debris into Big Muddy Creek. Typical of Cascade volcanoes, the combination of volcanic rock weathering to clay and glacial action deliver a large volume of fine sediment to the river system through Big Muddy Creek and the West Fork Klickitat. The effects of this on fish habitat have not been fully assessed.

Most of the Klickitat River basin is underlain by permeable rocks. Cline, (1976) estimates that about 60% of the average annual streamflow leaving the Yakama Reservation in the Klickitat River is groundwater discharge. The volcanic rocks on the Mt Adams side of the Klickitat River are highly permeable containing both permeable volcanic debris and lava tubes. Individual springs discharge up to 40 cfs, and a gain in flow of about 400 cfs attributable to groundwater discharge has been observed in the Klickitat River through this reach.

Due to the smaller water budget and earlier runoff, the east side tributaries are more dependent on meadow complexes and other spatially disproportionate influences for storing water and releasing flow from springs to sustain base flow. The underlying Columbia River basalts and Simcoe volcanics have permeable zones, but it is important to preserve the features that retard runoff to allow time for infiltration to occur. These features are sensitive to a variety of practices, and their condition needs to be assessed as part of this proposal.

The Klickitat River and its tributaries flow mostly through canyons, and extensive floodplain reaches are not common. Those that do occur likely provide important habitat and food web benefits, and their condition should be assessed.

Development in the basin is limited mostly to timber harvest and agriculture. Effects of forest practices and road building on stream flow and habitat need to be assessed, particularly in sensitive sub-watersheds. Irrigated agriculture is practiced in the Camas Parry, west of the Klickitat River. This area is on a plateau inaccessible to anadromous fish, so the principal impacts are to water quality. In the Little Klickitat and Swale Creek drainages, dewatering and riparian habitat degradation are problems currently under assessment.

## **b. Rationale and significance to Regional Programs**

An increasing body of information currently exists on the fisheries and water resources of the Klickitat River Sub-basin. Nevertheless, a host of competing and cooperating interests, from federal, tribal, state, county, and municipal governments to irrigation districts, businesses, environmental organizations and individuals, are involved in the use, management and restoration of those resources. The need for a coordinated effort to restore healthy anadromous fish runs to the Klickitat River watershed becomes ever more pressing. The Independent Scientific Review Panel (ISRP) has repeatedly stressed the importance of assessments which will identify and prioritize analysis and restoration needs within the sub-basins of the Columbia River Basin. The purpose of this proposal is to address that need within the Klickitat River Sub-basin .

The approach outlined in this proposal is based on the idea that a relatively rapid, qualitative assessment of the Klickitat River watershed, relying largely on existing information, can legitimately perform geographical 'triage', identifying: 1) areas of highest priority for protection, restoration, or reestablishment of passage, 2) areas with indeterminate potential for production of anadromous fish, or with an indeterminate contribution to the functioning of the aquatic ecosystem, where more detailed, smaller-scale watershed analysis is appropriate, and 3) areas where, for physical/biological or social/economic reasons, the potential for anadromous fish production is low, or the influence on the aquatic ecosystem is small. These determinations will be made in accordance with the Columbia River Fish and Wildlife Program measures 7.6B.3 and 7.6B.4, which state: '*... Give priority to habitat projects that have been integrated into broader watershed improvement efforts and that promote cooperative agreements with private landowner.*', and '*For actions that increase habitat productivity or quantity, give priority to actions that*

*maximize the desired result per dollar spent. Also, give higher priority to actions that have a high probability of succeeding at a reasonable cost over those that have great cost and highly uncertain success.'*

This assessment will provide guidance for immediate to mid-term restoration efforts in the Klickitat River subbasin, as well as identifying information gaps which should be filled.

**c. Relationships to other projects**

This project will build on the information base generated by several other projects (e.g. Yakima-Klickitat Fisheries Project, Klickitat River Subbasin Salmon and Steelhead Production Plan, 1990). The results of this project will guide future fish restoration proposals submitted for the Klickitat Watershed by the YIN.

**d. Project history** (for ongoing projects)

(Replace this text with your response in paragraph form)

**e. Proposal objectives**

The objectives of this proposal are to:

1. Compile and evaluate existing information on historical and current watershed condition and anadromous fish use within the Klickitat River subbasin,
2. compile and evaluate information on current and historical land use, land ownership, water use, and planned future development with the Klickitat River subbasin,
3. perform ground-truthing of factors limiting fisheries resources, and riparian PFC assessment to identify condition, trend, and causes of degradation in key watershed sub-units,
4. integrate information, identifying and prioritizing: a) subbasin units, based on potential for protection or restoration of high quality anadromous fish habitat, and b) information gaps, where potential is indeterminate, and
5. prepare a concise report detailing the results of the assessment.

**f. Methods**

The various tasks will be divided into three inter-related subsets: watershed, fisheries, and social/economic. A team of three to five individuals, collectively having expertise in geology, geomorphology, hydrology, plant ecology, and soil science, will be assembled to assess watershed condition and functioning. A fisheries biologist will develop the fisheries component of the assessment. The individual responsible for the social/economic component need not have a specific expertise, but should be thoroughly familiar with water and fisheries resources issues in the Klickitat River Subbasin. Additionally, a Geographic Information Systems (GIS) specialist will assist in the analysis and synthesis of the information collected by the members of the assessment team. To the greatest degree possible, everyone involved should have experience in the Klickitat River Subbasin which supports their understanding of the physical, biological, social, and economic processes within the subbasin.

The scale of investigation will be based on division of the subbasin ten hydrologic zones. Preliminary assessment resources will include: existing studies, existing GIS information, topographic, geologic, soils and vegetation maps, aerial photographs, flow records, climate records, historical land use records, local resource professionals, land managers, and land users. GIS coverages will be developed as needed to support the characterization of the watershed and the fisheries resources. Interaction, communication, and the sharing of information among the assessors will be critical to the development of this assessment

The watershed assessment team will further subdivide the hydrologic zones into subbasin units based on the factors (i.e., climate, vegetation, and geomorphology) which drive the hydrologic functioning of these areas.

A fisheries biologist will identify areas throughout the subbasin with high existing or potential value to the fisheries resource, and summarize existing knowledge of factors limiting habitat or passage for each area with impaired fisheries value. We will incorporate the Ecosystem Diagnosis and Treatment (EDT) species-specific computer modeling effort in progress under the Yakima/Klickitat Fisheries Project (YKFP) to determine factors limiting production of salmon stocks in the Klickitat Subbasin. The EDT modeling project incorporates data gathered by a number of agencies on the physical and biological parameters affecting these stocks at specific locations and time periods.

The social/economic specialist will: compile existing watershed analyses, studies on fisheries and water resources, and identify ongoing or planned analyses and studies; summarize existing legislation pertaining to fisheries restoration; inventory ongoing and planned restoration projects; locate or develop maps of land ownership, land use, and water use within the watershed.

With the onset of the field season, the watershed team will conduct Proper Functioning Condition (PFC) assessment on the areas with depressed anadromous fish production. PFC assessment is a rapid, qualitative technique developed and adopted by the USDA Forest Service and the USDI Bureau of Land Management for evaluating the functional condition and trend of stream/riparian systems. Condition, trend, causes of degradation (i.e., site-specific, and/or cumulative effects), and potential for restoration will be assessed. Concurrently, the fisheries biologist will perform field studies to ground-truth his investigations into factors limiting fisheries productivity. Collectively, these efforts will confirm the locations of: 1) sites having a high priority for protection restoration, or passage improvement and the nature of both the problems and solutions, and 2) sites having a high priority for further assessment, and the nature of the information needs. In addition to ground-truthing existing knowledge and prioritizing restoration and analysis efforts, these assessments will establish a record of the current condition of an array of locations critical for fisheries habitat.

Finally, the watershed assessment team, the fisheries biologist, and the social/economic factors investigator will combine and synthesize their findings to group the subbasin units according to actual or potential fisheries significance. The subbasin units will be assigned to one of three groups, based on having: 1) high existing or potential fisheries value, with high priority for protection, habitat restoration, or reestablishment of passage; 2) an indeterminate level of potential fisheries value i.e., a more detailed analysis is appropriate, or 3) low potential fisheries value. The assessment team will summarize their findings and recommendations in a report.

**g. Facilities and equipment**

**h. Budget**

Yakama Indian Nation staff will be responsible for project oversight and administration. These functions will require 640 hours of professional staff time and 80 hours of a bookkeeper's time. Personnel costs, including fringe benefits will amount to \$19, 185. Miscellaneous supplies, vehicle costs and indirect costs will add another 17,970.

The majority of the budget (i.e., \$197,904) will be allocated to contracting the professional services of the watershed specialist, fisheries biologist, and GIS specialist for the period of the assessment. This amount includes lodging expenses which will be incurred during field investigations.

## Section 9. Key personnel

### **DAVID E. FAST, YKFP Research Biologist**

Fisheries Resource Management  
P.O. Box 151  
Toppenish, Washington 98948  
Work: 509-966-5291

#### ***Education***

University of Washington, Seattle, Washington  
Doctor of Philosophy in Fisheries Science, 1987.

University of Puerto Rico, Mayaguez, Puerto Rico  
Master of Science in Marine Sciences, 1974.

St. John's University, Collegeville, Minnesota  
Bachelor of Science in Zoology, 1969.

#### **Research Experience**

**1988-Present: Research Manager. Fisheries Resource Management Program, Yakama Indian Nation.** Responsible for the design, development, and implementation of a major supplementation and research facility to test the concept of using artificial production to rebuild natural spawning populations of spring chinook salmon in the Yakima Basin. Write detailed project plans, develop short and long-term project goals and objectives, and supervise professional and technical staff.

**1985-1988: Project Leader. Spring Chinook Enhancement Study.**

Responsible for research project designed to determine the best methods of enhancing the spring chinook salmon population in the Yakima Basin. Evaluate survival through various life stages and total production of naturally producing salmon. Determine methods of supplementation with hatchery reared fish while minimizing adverse genetic impacts.

Fast, D.E. 1987. The Behavior of salmonid alevins in response to light, velocity and dissolved oxygen during incubation. Pages 84-92 in Salmonid Migration and Distribution Symposium (E.L. Brannon, ed.), School of Fisheries, University of Washington, and Directorate for Nature Management, Norway, Trondheim, Norway.

Fast, D.E., J.D. Hubble, T.B. Scribner, M.V. Johnston, W.R. Sharp.  
1989. Yakima/Klickitat Natural Production and Enhancement Program. 1989 Annual Report to Bonneville Power Administration. Project 88-120. 107 pp.

Fast, D.E. 1989. Supplementation Strategies For The Yakima/Klickitat Production Facility. Pages 143-147 in Northwest Fish Culture Conference Proceedings (R.Z. Smith, ed.).

Fast, D.E., J.D. Hubble, M.S.Kohn, and B.D.Watson. 1991. Yakima River Spring Chinook Enhancement Study. Project Completion Report to Bonneville Power Administration. Project 82-16. Volume 1 - 345 pp. and Volume 2 (Appendices) 133 pp.

### **William Sharp, YIN Fisheries Biologist**

Bachelor of Science in Natural Resource Management with minor in Watershed Science.  
Colorado State University 1987.

Instream Flow Incremental Methodology (IFIM) certification Colorado State University 1988.

#### Current Employer:

Yakama Indian Nation Fisheries Resource Management Program  
PO Box 151, Toppenish, WA. 98901  
5/1989 to present

#### Current Responsibilities:

Project Manger for BPA project 9506800 11/12 FTE. This includes research design and development, daily field operation, data analysis and synthesis, report writing, budgeting, and subcontract development.

#### Recent Previous Employment:

U.S. Fish and Wildlife Service, Vancouver, WA.  
August 1988 – May 1989  
Conducted IFIM study on rivers throughout Oregon and Washington

Idaho Fish and Game, Region 3, Boise, ID.

March 1987 – October 1987

Constructed and operated adult and juvenile fish trapping facilities, snorkel and adult spawner surveys.

US Army Corps of Engineers, Walla Walla and Portland Districts

1982 – 1985

Conducted radio telemetry studies at five mainstem Columbia River Hydroelectric dams.

I have over eleven years of Pacific Northwest fisheries work experience. I have designed and implemented fisheries and habitat studies, analyzed and presented data. I have managed field crews from 2-20 individuals. I have worked on habitat construction projects in the Yakima basin where we've constructed off-channel rearing structures, alcoves and velocity refugia to benefit depressed spring chinook stocks. As the lead biologist on the Klickitat Project 9506800 I have conducted all aspects of project design, budgeting, salmonid population monitoring at all life stages and stream habitat inventory.

## **Section 10. Information/technology transfer**

Although beyond the scope of this proposal, we believe that the information compiled and generated by this assessment should be archived in way that it is accessible to all interested parties.

**Congratulations!**