Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

ASSESS FISH HABITAT AND SALMONIDS IN THE WALLA WALLA WATERSHED IN WASHINGTON

Bonneville project number, if an ongoing project 9010

Business name of agency, institution or organization requesting funding

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE

Business acronym (if appropriate) WDFW

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Subcontractors.

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

7.0C.1, 7.1C.3, 7.2, 7.3, 7.3B.1, 7.4A, 7.4B, 7.4L, 7.6, 7.6C, 7.8G, 10.5A

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

NOT AVAILABLE FOR THE WALLA WALLA WATERSHED

Other planning document references.

A) Pages in WY KAN USH ME WA KUSH WIT, related particularly to page 54, items 1b, 1c, 2, 3, 5, 8

B) Associated with NE OREGON HATCHERY PROJECT - UMATILLA H. SUPPLEMENTAL MASTER PLAN, and the WALLA WALLA INVESTIGATIVE REPORT NO. 1- DEC. 1993.

C) This proposal would update the Watershed Assessment portion in the WALLA WALLA SUBBASIN PLAN, 1989

D) Pages 16 & 17 of the COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM, FY 1998 - ANNUAL IMPLEMENTATION WORK PLAN (OCT 1997). Also on Page 63 of the WALLA WALLA SUBBASIN SECTION of this same Work Plan,

E) Section III.B.11 recommendation for watershed assessment to precede implementation of restoration projects - in REPORT OF THE INDEPENDENT SCIENTIFIC REVIEW PANEL (ISRP REPORT 97-1, JULY 1997)

Subbasin.

WALLA WALLA (INCLUDES MILL CREEK AND TOUCHET RIVER AND TRIBUTARIES)

Short description.

TO DETERMINE FISH PASSAGE, REARING, AND SPAWNING CONDITIONS FOR STEELHEAD AND POTENTIAL REINTRODUCTION OF SALMON, AND TO ASSESS STEELHEAD AND BULL TROUT DISTRIBUTION, DENSITIES, AND GENETIC COMPOSITION IN THE WALLA WALLA WATERSHED.

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	*	Resource mgmt		Fish disease
		x	Planning/admin.	*	Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

HABITAT ASSESSMENT, WATER FLOWS OR DISCHARGE, WATER QUALITY, SALMONID POPULATION ASSESSMENT & DISTRIBUTION

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9606400	Walla Walla Watershed Enhancement	WDFW proposed project updates the habitat assessment with new field data and could help guide what habitat enhancement is needed and where.
9601200	Adult Anadromous Fish Passage Improvement at Irrigation Diversion Dams on the Walla Walla	WDFW proposed project updates the habitat assessment and would help identify low flow locations and potential passage problems for adult salmon (if reintroduced) existing passage problems for steelhead. This information may help guide passage improvement actions.
8805302	Walla Walla Master Plan (draft) 1993, as part of the NE Oregon Hatchery Program (NEOH)	The WDFW proposed project would provide current data that are needed concerning 1) low flows, desired flows, and summer temperature passage problems, as well as other water quality problems, 2) potential rearing and spawning habitat available for reintroduction of spring chinook and other salmon and for supplementation of steelhead, 3) identification of the steelhead and bull trout stocks present, and 4) the distribution and abundance of steelhead and bull trout. These data are necessary for adequate planning and implementation of this Master Plan.
9604600	Riparian and Fish habitat Analysis, Protection, and Enhancement to increase natural production of spring chinook and steelhead.	The WDFW proposal has been coordinated with the CTUIR and supplements their project. It increases the fish habitat evaluation portion and could guide habitat

		protection and enhancement efforts.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Assess habitat conditions for anadromous and resident salmonids in the Washington portion of the Walla Walla Watershed	a	Establish 4-5 constant recording stream discharge monitors in the lower Walla Walla River, Touchet River and possibly lower Mill Creek to identify available water for salmonid passage and rearing during April or May through October.
		b	Conduct periodic stream discharge measurements to calibrate constant recording discharge monitors and at other sites to provide information on water discharge available for salmonid passage and rearing.
		c	Conduct periodic flights of the lower Walla Walla and Touchet rivers to determine continuity of stream flows for adequate fish passage and rearing.
		d	Deploy constant recording water temperature monitors at various sites in the Walla Walla, Touchet, Mill Creek, and tributaries to determine temperature limitations for salmonid passage, rearing or spawning (April-October).
		e	Establish fixed water quality monitors and periodically collect water quality data (eg. dissolved oxygen, turbidity, pH, total phosphorus, etc.) to determine suitability and limitations for salmonids (April-October).
		f	Conduct general habitat surveys in portions of the stream with

			potential for salmonid use to quantify habitat conditions and limiting factors (use a combination of modified Habitat Suitability Index models for rainbow or steelhead and spring chinook and a Hankin and Reeves survey).
		g	Conduct an Instream Flow Incremental Methodology (IFIM) Study of the lower mainstem Walla Walla River to determine recommended flows needed for fish passage and rearing. Begin planning for an IFIM study for the Touchet River in 2000.
2	Determine salmonid distribution, habitat use and relative abundance in the Washington portion of the Walla Walla watershed.	a	Conduct steelhead and bull trout spawning surveys. Conduct extensive surveys and then establish index areas throughout the basin.
		b	Conduct electrofishing or snorkel surveys during summer to determine salmonid rearing distribution. In index areas determine fish density, abundance, and habitat use.
3	Identify, and genetically characterize stocks of naturally produced steelhead and bull trout in the Walla Walla Watershed.	a	At existing adult steelhead trap sites in Oregon (Nursery Dam) and Washington (Yellowhawk Creek and Touchet River) collect up to 100 fin clips each from adult natural steelhead and bull trout for DNA analysis. If possible, supplement with tissue samples from steelhead carcasses for electrophoretic analysis to compare with existing genetic data for nearby steelhead populations.
		b	Collect fin clips or other tissue samples from juvenile steelhead/rainbow trout and bull trout during electrofishing for salmonid distribution, density and

			abundance surveys for genetic (DNA or electrophoretic) analyses to supplement adult collections, if necessary.
		c	Conduct DNA or electrophoretic analyses at the WDFW genetics laboratory and compare with other genetic analyses for nearby populations to identify steelhead and bull trout stocks.
		d	Use the genetic stock identification information to plan for development of local steelhead broodstocks for hatchery production in the Walla Walla Watershed.
4	Compile and disseminate results and conclusions for watershed restoration planning.	a	Annually distribute written data summaries and complete a final written report for distribution
		b	Report results orally to various organizations

Objective schedules and costs.

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	04/1999	12/2001	55
2	04/1999	12/2001	20
3	04/1999	12/2001	15
4	04/1999	08/2002	10

Schedule constraints.

ESA listings of bull trout and/or steelhead may delay scheduled activities until ESA permits are obtained, or listings may require modifications to proposed actions to reduce potential impacts to listed species. High flows in area streams may require delay of monitoring devices until flows subside in May or June.

Completion date. Final report completion in 2002, unless project is initiated in 1998.

Section 5. Budget

FY99 budget by line item

Item	Note	FY99

Personnel		71,166
Fringe benefits		20,282
Supplies, materials, non-expendable property	nets, boots, rain gear, flights, fuel, DNA analyses, water analyses, computer, printer, sofware, 5 flow dataloggers, 2 dry suits, 12 temp. Monitors and software, electronic balance	54,325
Operations & maintenance		0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		0
PIT tags	# of tags:	0
Travel		7,640
Indirect costs	at 19.5% (excluding equipment)	26,859
Subcontracts	WA DOE for flow monitor set-up & operation	3,520
Other		0
TOTAL		183,792

Outyear costs.

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	179,234	159,000	25,000	0
O&M as % of total	1.0	1.0	0	0

Section 6. Abstract

Fish habitat in streams within the Walla Walla watershed of southeast Washington and northeast Oregon has been severely degraded by urban and domestic development, farming, grazing, irrigation, logging, recreational activities, floods and flood control efforts.

Historically, the Walla Walla basin produced substantial runs of both spring chinook and summer steelhead. Chum and coho also were likely present. Salmon have been absent from the basin since approximately the 1920's due to irrigation dams, extensive water withdrawals and habitat degradation (CTUIR 1989). Native steelhead runs have also declined. Steelhead and bull trout in the Walla Walla watershed are candidate species, or proposed for listing, respectively, under the Endangered Species Act (ESA).

The Northwest Power Planning Council Fish and Wildlife Program (NPPC 1995) calls for regular updating of subbasin plans (7.0C) and collection of population status, life history and other data on wild and naturally spawning populations (7.1C and 7.1C.3), which includes bull trout (10.5A). It also calls for improved hatchery production, or

developing new hatchery supplementation programs, while proceeding with extreme caution to avoid damaging remaining wild and naturally spawning populations (7.2). The Fish and Wildlife Program (FWP) recommends developing, implementing and evaluating supplementation plans and risk assessments (7.3, 7.3B.1, 7.4A). It also requires writing a hatchery production Master Plan (7.4B, 7.4L) that includes identification of factors limiting production and setting project goals and objectives. A watershed assessment and coordination of habitat planning efforts is recommended (7.6C). The FWP also states that instream flow needs should be established and protected (7.8G). The Independent Scientific Review Panel (ISRP 1997) and the NPPC (1997) recommended that watershed assessments precede implementation of restoration projects (III.B.11).

The NPPC has funded several projects in the Walla Walla basin (9601100, 9601200, 9604600, 8805302) with the Confederated Tribes of the Umatilla Reservation (CTUIR), and the Walla Walla Conservation District (9606400). Additional aquatic resource efforts are underway in the basin by Corps of Engineers (COE) for resource planning and environmental restoration (COE 1997, COE 1992) and by a citizen watershed council in Oregon (BOR 1997). The Columbia and Walla Walla County Conservation Districts supmitted a proposal to the Washington Department of Ecology (WDOE) for funding a watershed planning effort in 1998. A Subbasin Plan (CTUIR 1989) and a draft hatchery production Master Plan (CTUIR 1993) have also been compiled for the watershed. All these efforts in the Walla Walla watershed are for planning or implementing watershed and fish stock restoration programs.

The WDFW is proposing to conduct a watershed habitat and salmonid fish stock assessment in the portion of the Walla Walla Basin within Washington State (>70% of the basin). The project would assess the habitat conditions (particularly stream flows, water temperatures, and water quality) that affect steelhead and bull trout use and passage in the lower portion of the basin, as well as the potential for adult and juvenile passage should spring chinook or other salmon species be reintroduced. Habitat and fish stock assessment in the middle and upper watershed within Washington would evaluate the amount of potential rearing and spawning habitat available, habitat limiting factors for steelhead, bull trout and salmon (if they are reintroduced in the future), and habitat conditions, habitat use, distribution, abundance and genetic stock identification for existing natural populations of steelhead and bull trout. The specific objectives are as follows:

1. Assess habitat conditions for anadromous and resident salmonids in the Washington portion of the Walla Walla watershed.
2. Determine salmonid distribution and relative abundance in the Washington portion of the Walla Walla watershed.
3. Identify, and genetically characterize stocks of naturally produced steelhead and bull trout in the Walla Walla watershed (including part of Oregon).
4. Compile and disseminate results and conclusions for watershed restoration planning.

Methods proposed for this study include habitat and fish components. A series of fixed monitoring sites for measurement of stream discharge and spring and summer water

temperatures and water quality would be established and operated. Additional measurements will be taken periodically at other locations. Habitat surveys such as Hankin and Reeves (1988) or use of habitat suitability models for spring chinook (Raleigh et al. 1986) and rainbow/steelhead trout (Raleigh et al. 1984) will be conducted at selected sites throughout the basin to determine the number and quality of pools and cover as well as quantify other habitat measures and habitat limiting factors. Data collection for the distribution and abundance of salmonids will include steelhead and bull trout spawning surveys and electrofishing or snorkeling for juvenile fish during the summer. Genetic stock identification for natural steelhead and bull trout will consist of taking samples of tissue or fin clips at existing adult trap sites, from recovered carcasses, or from juveniles during electrofishing surveys. A DNA sequencer, or gel electrophoresis will be used to analyze allelle frequencies and compare with other steelhead and bull trout populations.

The information proposed for collection is critical for planning and implementing watershed restoration, resource management for sensitive and depressed salmonid populations, as well as for planning hatchery supplementation or continuing hatchery mitigation for steelhead, or for reintroduction of spring chinook or other salmon in the Walla Walla basin. Some results would be available within one year, and the final project report would be available in 2002. Annual summaries and coordination with CTUIR, ODFW, COE, WDOE and the Walla Walla and Columbia Conservation Districts, as well as others, would receive high priority.

Section 7. Project description

a. Technical and/or scientific background.

The Walla Walla watershed is located in southeast Washington and northeast Oregon. The total area of the watershed is 1,758 square miles, of which 1,275 square miles (73%) are in Washington (COE 1992, 1997). The primary physiographic features of the basin are the steep, lightly timbered Blue Mountains in the southeast, the rolling foothills and Palouse Prairie throughout much of the landscape, and the Walla Walla and Touchet river valleys. The main streams in the Basin include Mill Creek, the Touchet and Walla rivers, plus several smaller tributaries. Approximately 15% of the basin is forest lands and 82% is used for cropland and grazing. Over 90% of the basin in Washington is privately owned.

Fish habitat in area streams has been severely degraded by urban and domestic development and related water withdrawals, farming, irrigation, grazing, logging, recreational activities, floods and flood control efforts, as well as road construction and maintenance activities. Sixty percent of current water usage in the basin is for irrigating crops (COE 1997) and irrigation has severely impacted stream flows in the Walla Walla River since the 1880's (Nielson 1950). Historically, the basin produced substantial runs of both spring chinook and summer steelhead. Chum and coho also were likely present.

Salmon have been absent from the basin since approximately the 1920's due to irrigation dams, extensive water withdrawals and habitat degradation (CTUIR 1989). Native steelhead runs have also declined. Steelhead and bull trout in the Walla Walla watershed are candidate species, or proposed for listing, respectively, under the Endangered Species Act (ESA). Further decisions concerning ESA listings of these two species in the Wal1a Walla Basin are expected in 1998.

Fish management efforts in the Washington portion of the Walla Walla watershed are focused on protection and restoration of dwindling naturally produced steelhead and bull trout, implementation of a large mitigation program for steelhead and resident trout under the Lower Snake River Compensation Plan (LSRCP), and providing recreational fishing opportunities. Primary threats to fish resources include hydroelectric dams and associated reservoirs in the Columbia River, out-of-basin harvest, loss of riparian habitat, loss of instream water, and detrimental changes in hydrology, sediment transport, stream channel stability and summer water temperatures caused by local land use activities.

The Walla Walla Subbasin Plan, written nearly ten years ago (CTUIR 1989), and the draft Walla Walla Master Plan (CTUIR 1993) which was based on the Subbasin Plan, recommend using hatcheries for supplementing steelhead and reintroducing spring chinook salmon in the Walla Walla watershed. The Northwest Power Planning Council Fish and Wildlife Program (NPPC 1995) calls for regular updating of subbasin plans (7.0C) and collection of population status, life history and other data on naturally spawning (wild) populations (7.1C and 7.1C.3), which includes bull trout (10.5A). It also calls for improved hatchery production, or developing new hatchery supplementation programs, while proceeding with extreme caution to avoid damaging remaining naturally spawning populations (7.2). The Fish and Wildlife Program (FWP) recommends developing, implementing and evaluating supplementation plans and risk assessments (7.3, 7.3B.1, 7.4A). It also requires writing a hatchery production Master Plan (7.4B, 7.4L) that includes identification of factors limiting production and setting project goals and objectives. A watershed assessment, and coordination of habitat planning efforts is recommended (7.6C). The FWP also states that instream flow needs should be established and protected (7.8G). The Independent Scientific Review Panel (ISRP 1997) recently recommended that watershed assessments precede implementation of restoration projects (III.B.11). The NPPC in its Annual Implementation Work Plan for Fiscal Year 1998 (NPPC 1997) concurred with the ISRP=s recommendation that watershed assessments that describe habitat conditions, as well as needs and opportunities for habitat restoration for fish stocks inventoried in that watershed, precede implementation of restoration activities.

The NPPC has approved and funded several projects in the Walla Walla basin (9601100, 9601200, 9604600, 8805302) with the Confederated Tribes of the Umatilla Reservation (CTUIR), and the Walla Walla Conservation District (9606400). Additional aquatic resource efforts are underway in the basin by Corps of Engineers (COE) for resource planning and environmental restoration (COE 1992, COE 1997) and by a citizen watershed council in Oregon (BOR 1997). The Walla Walla and Columbia County

Conservation Districts have submitted proposals to the Washington DOE for watershed planning efforts in the basin in 1998. A Subbasin Plan (CTUIR 1989) and a draft hatchery production Master Plan (CTUIR 1993) have also been compiled for the watershed. The U.S. Forest Service (USFS) and the Oregon Department of Fish and Wildlife (ODFW) are conducting bull trout spawning surveys and a radio telemetry study in the basin. All these efforts in the Walla Walla watershed are for planning or implementing watershed and fish stock restoration programs, or for protecting wild salmonids.

The existing resource planning efforts for the Walla Walla basin each provide new information and complement one another, but they all tend to use much of the same limited data for fish habitat conditions and salmonid distribution and abundance. For example, it is common knowledge that portions of the Walla Walla and Touchet rivers are dry or very warm in spring and summer because of irrigation withdrawals. These low flows and high stream temperatures likely affect salmonid passage, use, or survival in the lower rivers, but the extent and duration of these problems have not been quantified. Also, current information on salmonid distribution, habitat use, abundance and stock identification are generally lacking. Additional field data are necessary to adequately plan for habitat and salmonid stock restoration. These data should include detailed field measurements of water availability and other water quality for fish passage, rearing and spawning, as well as other measures of habitat condition and determination of habitat limiting factors. They should also include field verification concerning salmonid distribution, abundance, and genetic stock identification. These data needs are key elements necessary for watershed and fish stock restoration planning and implementation in the basin.

The Washington Department of Fish and Wildlife (WDFW) has been actively involved for many years with fish habitat and salmonid stock assessment activities in the nearby Tucannon River and Asotin Creek as part of model watershed programs (Asotin Conservation District 1994, Columbia Conservation District 1997), LSRCP hatchery monitoring and evaluation, and stream flow studies of the Tucannon River. The WDFW has coordinated with the CTUIR, COE, Washington Department of Ecology (WDOE), the ODFW, and the Columbia and Walla Walla County Conservation Districts regarding this proposal. All entities have indicated general support and are intending to cooperate with this proposed project. The proposed WDFW project would supplement efforts by all other organizations by providing detailed, quantifiable salmonid habitat and population data for much of the basin that are necessary for adequate resource planning and restoration efforts within the Walla Walla Basin. The WDFW has the expertise for the proposed data collection and summarization for fish habitat and fish stocks in the basin. Genetic stock identification and characterization will be obtained from portions of the Walla Walla Basin in Oregon and Washington to supplement current WDFW efforts (Busack and Shaklee 1995) to identify salmonid stocks for local and State management, as well as for more regional ESA considerations (Spruell and Allendorf 1997). Genetics samples, data and analyses (Dr. Shaklee as lead) would be available to ODFW, CTUIR, the National Marine Fisheries Service (NMFS), the U. S. Fish and Wildlife Service (FWS) and other interested parties. Stream discharge, temperature and water quality data

proposed to be collected for the lower portions of the Walla Walla and Touchet rivers would be of substantial importance to several other resource planning efforts and organizations (eg. DOE, COE, CTUIR, ODFW, Walla Walla Watershed Council in Oregon, etc.). John Covert (WDOE) has much experience with stream flow monitoring as does Dr. Hal Beecher (WDWF) with use of the Instream Flow Incremental Methodology to determine fish habitat needs and recommend flows for salmonids. Similar flow studies were conducted by these individuals in the Tucannon River in the past three years (eg. Covert et al. 1994). Dr. Bill Ehinger and Dave Hallock (WDOE) have many years of experience collecting and analyzing water quality data. The proposed temperature monitoring and habitat and fish stock assessment are similar to activities conducted by WDFW in the Tucannon River (Mendel et al. 1993). Glen Mendel (WDFW) has been actively involved in salmonid and habitat assessment and monitoring projects in southeast Washington as part of the LSRCP for many years, and is currently also involved in fish management and fishery coordination for this area.

b. Proposal objectives.

The WDFW is proposing to conduct a watershed habitat and salmonid fish stock assessment in that portion of the Walla Walla Basin within Washington State. The project would assess the habitat conditions (particularly stream flows, water temperatures and water quality) that affect steelhead and bull trout use and passage in the lower portion of the basin, as well as the potential for adult and juvenile passage if spring chinook or other salmon species are reintroduced. Habitat and fish stock assessment in the middle and upper watershed within Washington would evaluate the amount of potential rearing and spawning habitat available for salmon, and habitat conditions and habitat limiting factors, habitat use, distribution, densities, abundance and genetic stock characterization of existing natural populations of steelhead and bull trout. The specific objectives are as follows:

1. Assess habitat conditions for anadromous and resident salmonids in the Washington portion of the Walla Walla watershed.
2. Determine salmonid distribution and relative abundance in the Washington portion of the Walla Walla watershed.
3. Identify, and genetically charaterize stocks for naturally produced steelhead and bull trout in the Walla Walla watershed (including part of Oregon).
4. Compile and disseminate results and conclusions for watershed restoration planning.

c. Rationale and significance to Regional Programs.

The work proposed by the WDFW would provide detailed habitat and fish stock information in the Walla Walla basin that should help guide all FWP approved projects for improving fish passage or habitat (9606400, 9601100, 9601200, 9604600) and hatchery production planning (8805302) as well as resource planning efforts by the COE (COE 1992, 1997) other organizations (Walla Walla Watershed Council in Oregon 1997 and the Walla Walla and Columbia County Conservation Districts, etc). Although the

CTUIR project for riparian and fish habitat analysis, protection and enhancement...(#9604600) appears from its title to conflict or duplicate actions proposed by the WDFW project, there is no duplication or conflict. Their fish habitat analysis is specific to sites that receive riparian and fish habitat enhancement activities as part of their project, while our proposed fish habitat assessment is to evaluate habitat conditions throughout the basin for overall watershed planning. The WDFW has discussed coordination and cooperation with the CTUIR and we both see opportunities for mutual assistance and benefits to resource planning in the basin (Jed Volkman, CTUIR, personal communication).

The proposed project would address the goals of the FWP and other efforts as indicated below for each numbered objective.

Objective 1: Assess habitat conditions ...

Limited stream flow (discharge), water quality, and temperature data have been compiled in recent reports for the Walla Walla River (Zimmerman 1993, COE 1992, COE 1997). Zimmerman (1993) collected some new stream temperature data from one site near the mouth of the river. He concentrated on the likely effects of temperatures and flows on potential reintroduction of spring chinook salmon but he did not evaluate their effects on existing natural steelhead and bull trout populations in the watershed that may become listed under ESA in the near future. These documents do not assess the amount or condition of salmonid fish habitat in the watershed for rearing and spawning, or the factors limiting salmonid use and production. The draft Walla Walla Master Plan (CTUIR 1993) listed estimates of suitable salmonid habitat in the basin as documented in the Walla Walla Subbasin Plan (CTUIR 1989). These estimates were best guesses in 1988 by Mark Schuck and Glen Mendel of WDFW, and Gary James (CTUIR), and were based on general familiarity with the area streams. They have not been verified by field habitat measurements. The proposed WDFW project would obtain the necessary field data to evaluate those estimates and develop the final Master Plan for hatchery production (7.4B, 7.4L). This is consistent with the FWP (NPPC 1995) which calls for regularly updating the Subbasin Plan (7.0C). The Independent Scientific Review Panel (ISRP 1997) recently recommended that watershed assessments precede implementation of restoration projects (III.B.11). The NPPC (NPPC 1997) later concurred with the ISRP=s recommendation that watershed assessments precede implementation of restoration activities. A watershed assessment and coordination of habitat planning efforts is recommended in the FWP (7.6C). The FWP also states that instream flow needs should be established and protected (7.8G). The proposed project would determine instream flow needs with an IFIM study in the lower Walla Walla River.

Objective 2: Determine salmonid distribution and relative abundance...

Little is known about salmonid distribution and abundance for many areas of the watershed. Steelhead spawning ground surveys and juvenile salmonid sampling are currently conducted in the upper Touchet River basin, but much of the remaining watershed has not been sampled in recent years, if at all. The proposed activities would greatly increase our knowledge for planning and management and they are specially

called for in the FWP for regularly updating the Subbasin Plans (7.0C), development of the hatchery production Master Plan (7.4B, 7.4L), and collection of population status, life history and other data on naturally spawning populations (7.1C and 7.1C.3, 10.5A). It enables the fishery managers to adequately plan for hatchery enhancement while protecting naturally produced salmonids (7.2, 7.3, 7.3B, 7.4A) and remain consistent with potential ESA requirements and the WDFW Wild Salmonid Policy. Bull trout spawning surveys are conducted within the basin, but additional areas should be sampled to determine spawning use. A radio telemetry study of adult bull trout is underway by the USFS and ODFW that may provide useful information on adult habitat use and movements. Very little is known about juvenile bull trout distribution and habitat use for rearing.

Objective 3. Identify, and genetically characterize stocks for naturally produced steelhead and bull trout ... Currently, the LSRCP hatchery program is using Lyons Ferry stock steelhead for mitigation in the Walla Walla River basin. This stock may be inconsistent with the WDFW Wild Salmonid Policy, and potential ESA requirements if listings occur that include salmonids within this watershed. This stock is also inconsistent with the draft hatchery Master Plan (CTUIR 1993) and ODFW=s wild fish management plan for the Walla Walla River. The number of separate natural steelhead and bull trout stocks in the Walla Walla basin are currently unknown, so we can not effectively determine the best approach to develop one (or multiple) local hatchery broodstock(s) for steelhead mitigation or supplementation and for protection of natural stocks. Collection of genetics data as proposed by WDFW is consistent with the FWP for updating Subbasin Plans (7.0C), collecting information about population status of wild populations (7.1C, &.1C3, 10.5A), and developing hatchery Master Plans and hatchery programs (7.2, 7.3, 7.3B, 7.4A, 7.4B, 7.4L). It also assists with management decisions associated with wild fish policies and potential listing under ESA.

Objective 4: Compile and disseminate results and conclusions for watershed restoration planning. Summaries of results and conclusions will greatly benefit salmonid habitat and fish stock restoration planning and implementation and management decisions as indicated for the first three objectives.

The WDFW has arranged for assistance from WDOE for stream discharge and water quality monitoring. WDOE has indicated they will contribute the costs of establishing and compiling the water quality data. WDFW has also communicated the intent of our proposed activities with the CTUIR, ODFW, the COE and the Columbia and Walla Walla Conservation Districts for future cooperation and coordination. Ample opportunity exists for assisting each other in data collection, watershed planning and implementation of restoration activities. Coordination and cooperation will be a high priority.

d. Project history (for continuing projects).
Not Applicable

e. Methods.

Tasks 1a-c. WDOE will establish several stream discharge monitoring devices to continually record stream discharges from April or May through October. The monitors will be established at various sites in the Walla Walla and Touchet rivers to supplement the one active USGS gauge station in the lower Walla Walla River. Periodic stream flow measurements will be made at transects with a Swoffer portable velocity meter to determine discharge and calibrate the monitoring stations. Additional stream flow measurements will be periodically made at additional sites to supplement the fixed-site monitors. Approximately two flights per month will be made with a Cessna 182 fixed wing aircraft during May-October to determine continuity of water flow in the river channels in the lower Walla Walla and the Touchet rivers. A video or 35 mm camera may be used to document results of the flights.

Task 1d. WDFW will deploy up to 12 constant recording temperature monitors to record water temperatures each hour from May through October. These monitors will be distributed along several streams in the basin to aid in determination of available habitat and passage conditions for salmonids.

Task 1e. WDOE will establish several fixed-site monitoring devices to continually record water quality from April or May through October. The monitors will be established at various sites in the Walla Walla and Touchet rivers to supplement the one USGS gauge station in the lower Walla Walla River. Water quality sampling will include dissolved oxygen levels (DO) levels and percent oxygen saturation, total phosphates, turbidity and several other factors. Periodic water quality sampling may be conducted at various sites in the Touchet and Walla Walla rivers when discharge or temperature monitors are downloaded, and at other times and locations to supplement the fixed-site samples.

Task 1f. General and intensive habitat surveys will be conducted in selected reaches of the streams to determine fish habitat conditions. Number and area of pools, pool quality, thalweg velocities, and other habitat measures will be collected. The survey methods may include modified Hankin and Reeves (1988) methods for the general habitat surveys and use of the Habitat Suitability Index Models for spring chinook and rainbow/steelhead trout (Raleigh et al. 1984 and 1986) to help identify habitat limiting factors for these salmonids. Other standard habitat variables may be included.

Task 1g. The IFIM study will require scheduling of personnel and determination of study reaches. We will have to secure access from private landowners and complete coordination with Dr. Hal Beecher (WDFW) and possible involvement by WDOE. Data collection in the lower Walla Walla would be initiated in 1999 if access and other logistics are worked out. Planning would begin for possibly conducting an IFIM in the lower Touchet River in 2000 if multiple sites are needed. Otherwise the Touchet study may be conducted in 1999 with the lower Walla Walla River.

Task 2a. We will attempt to conduct steelhead and additional bull trout spawning surveys, depending on stream flows and the availability of access to private lands.

Selected river segments (index areas) would be walked weekly, if possible. Marked redds would be used to determine redd life (visibility duration) for expansion of redd counts. Bull trout surveys would supplement those currently conducted by the USFS, ODFW and WDFW.

Task 2b. Randomly selected snorkel or electrofishing index sites will be established and surveyed for juvenile salmonid distribution and densities throughout the watershed within Washington. Snorkeling will usually involve two snorkelers conducting a total count of salmonids at each site. Salmonids captured during electrofishing will be identified and measured. Scale and DNA samples (small fin clips) may be collected from a portion of the sampled fish. Some juvenile salmonids may be killed for tissue samples for genetic analysis with electrophoresis. Block nets will be used to isolate the site during electrofishing and prevent ingress or egress of fish. Two or three pass electrofishing surveys and use of a depletion estimation formula will estimate the numbers of fish present and density at each selected site. Site length and width measurements will be used to calculate the area sampled. Other qualitative electrofishing or snorkeling may be conducted to determine general salmonid distribution. Juvenile sampling will generally occur between 5 July and 30 September to measure summer rearing conditions, distribution, densities and abundance.

Task 3a. WDFW will coordinate with ODFW for DNA sampling (small fin clip) of up to 100 wild steelhead and 100 bull trout crossing the Nursery Bridge trap in Milton-Freewater Oregon. Samples will be held in alcohol, and sampling will follow the WDFW genetics DNA sampling protocol. Similar sampling will occur at a cooperatively operated trap in Yellow Hawk Creek, and in the upper Touchet River. Each sample will receive a unique identification code.

Task 3b. Additional fin clips or tissue samples may be collected from juvenile salmonids during electrofishing surveys to supplement the fin clip samples or to possibly use electrophoresis instead of DNA genetic analyses. The same sampling protocol will apply as with the adults for DNA sampling.

Task 3c. Genetic analyses will be conducted at the WDFW Genetics Lab. in Olympia, WA with a DNA sequencer or gel electrophoresis. Allelle frequencies will be compared with other genetic samples and data sets in the Northwest to determine fish stock relationships.

Task 4a and b. Data will be compiled annually and disseminated orally and in written form. A final report will be completed that summarizes the entire project in 2002 (or 2001 if the project is funded and initiated in 1998).

f. Facilities and equipment.

The WDFW Snake River Lab. has two portable Swoffer velocity meters for stream discharge measuring and two or more backpack electrofishers available for use on this project. Suitable vehicles are available for use part-time. DNA and eletrophoresis

processing equipment (DNA sequencer, etc.) are available at the WDFW Genetics Lab.

The WDOE will contribute all personnel, travel and data compilation costs for the water quality sampling. Water quality analysis will be processed at about $300 per water sample.

Purchases of equipment in 1999 for the project will include a computer and accessories (~$3,500) for data analysis and reporting, 5 water discharge monitoring stations (~$1,300 each) and 12 water temperature monitoring units (~$150 each). An electronic balance will be purchased (~$600-800), as will two dry suits for snorkeling (~$500 each).

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Mendel, G., et al. 1993. Tucannon River Spring Chinook Salmon Hatchery Evaluation Program Report - 1992 Annual Report. AFF 1/LSR-93-06. Washington Department of Fisheries report to the U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office, Boise, Idaho.

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Raleigh, R., W. J. Miller, and P.C. Nelson. 1986. Habitat Suitability Models and instream flow suitability curves: Spring Chinook. U.S. Fish and Wildlife Service Biological Report 82(10.122). U.S. Department of Interior, Washington, D.C.

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Section 8. Relationships to other projects

The proposed project is closely related to projects 8805302, and 9604600 in the Walla Walla basin. It is also indirectly associated projects 9606400, 9601200, and 9601100. See section 7C for discussion or relationships. The proposed project is related to the watershed planning efforts of the Conservation Districts and the Walla Walla Watershed

Council in Oregon, as well as with the Corps of Engineers Walla Walla Watershed Reconnaissance Plan and any subsequent feasibility studies.

Section 9. Key personnel - the Project leader will be Glen Mendel

GLEN W. MENDEL, Washington Department of Fish and Wildlife, Snake River Lab. - 401 S. Cottonwood St., Dayton, WA 99328 - (509) 382-1005, FAX (509) 382-2427.

Education: - Supplemental Aquatic biology courses (1983), University of Idaho
- M.S. degree -- Wildlife Resources (1979), University of Idaho.
- B.S. degree -- Wildlife/fisheries (1975),
- B.S. degree -- Biology (1973) Univ. of Idaho.

Employment History:

Fish Biologist 3 (fish management) for the Washington Department of Fish and Wildlife (WDFW) in SE WA (part-time since April 1997). Assistant project leader for evaluation of Lyons Ferry Hatchery program for spring and fall chinook salmon and steelhead (Mar. 1994-present).
Fishery Biologist 3 for the Washington Department of Fisheries (5/1991 to 3/1994). Field supervisor for three projects: Monitoring and evaluation of Lyon's Ferry spring and fall chinook salmon hatchery programs (as part of the Lower Snake River Compensation Plan - LSRCP), and conducting adult fall chinook salmon radio telemetry research to evaluate upstream migration and spawning in the Snake River. Planned, directed and supervised these projects with 3 permanent staff, and up to 10 seasonal support staff.
Habitat Biologist 3 for the Washington Department of Wildlife (12/1988 to 5/1991). Main duties included reviewing and responding to environmental permits to protect fish and wildlife and their habitats in 3 SW Washington counties.
Fish Biologist 2 for the Washington Department of Wildlife (7/1984 to 12/1988) for evaluation of Lyons Ferry Hatchery steelhead and resident trout program .
Wildlife Biologist 2 for the Washington Department of Game (5/1983 to 7/1984). Biologist in charge of the Instream Habitat Improvement Study for streams in SE WA.
Biologist - Fisheries (GS/7) for the US Army Corps of Engineers (Jan-Sep. 1982, Apr. - Jun. 1981). Field supervisor for radio telemetry of chinook salmon at Snake R. dams.
Wildlife Biologist 2 for the Washington Department of Game (June - Dec. 1981, Jan. - Apr. 1981). Senior biologist on a study of anadromous fisheries enhancement potential in SE WA. Evaluated salmonid habitat and predicted salmonid biomass in streams by using the Wyoming HQI model. Estimated fish populations from electrofishing samples at 46 sites in 9 streams. Assisted with data collection for the Instream Flow Incremental Methodology.
Research Aid for the University of Idaho Cooperative Fisheries Research Unit (Sept. 1980 - Jan. 1981).
Wildlife Biologist (GS/7) for the USDA Soil Conservation Service (May - Dec. 1979).

Publications: several publications in journals and symposium proceedings, and many

agency reports regarding salmonid populations and their habitats .

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Current Position:

Hydrogeologist 3, Shorelands and Water Resources program, WA Department of Ecology. August 1990 - present.

Past Experience:

Computer information Consultant 2 for the WDOE Water Resources Program. May 1988-1990.

Senior Geologist, Conoco Inc. January 1983-May 1988.

Research Assistant, Department of Geology and Geophysics, Univ. of Utah. 1980-1982.

Academic Record:

M.S. Degree (1983) Univ. Of Utah, College of Mines.

B.S. Degree (1980) Unv. of Michigan, College of Engineering.

Teaching Fellowship (1981) Univ. of Utah, Geological Society of America Penrose Grant.

Publications:

Bowman, J.R., Covert, J.J., Clark, A.H., and Mathison, G.A. 1985. The CanTung E Zone Scheelite Skarn Orebody, Tungsten, N.W.T., Oxygen, Hydrogen and Carbon Isotope Studies: Econ. Geol. v. 80:1872-1985.

Olson, T.M., Covert, J.J.. 1994. Eastern Washington observation well network. Washington Department of Ecology open file technical report 94-04, 94p.

Covert, J.J., Lyerla, J.M. and Ader, M.D. 1994. Initial Watershed assessment Tucannon River watershed: Washington Department of Ecology open file technical report 95-04, 44p.

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PRESENT POSITION

Research Scientist (Washington Department of Fish and Wildlife)

EDUCATIONAL BACKGROUND

M.S. Fishery Biology (1974) Colorado State University
Ph.D. Biology (1972) Yale University
M.Phil. Biology (1970) Yale University
B.S. Zoology (1968) Colorado State University

PROFESSIONAL EXPERIENCE

1987-present Research Scientist; Washington Department of Fisheries
1985-1987 Fishery Biologist; Washington Department of Fisheries
1981-1985 Senior Research Scientist; CSIRO Division of Fisheries Research; Cleveland, AUSTRALIA
1975-1981 Assistant Professor; Department of Zoology, University of Hawaii and Hawaii Institute of Marine Biology
1974-1975 & 1972-1973 Postdoctoral Research Associate; University of Illinois

SELECTED PUBLICATIONS (since 1991)

Shaklee, J.B. and P. Bentzen. 1997. Genetic identification of stocks of marine fish and shellfish. [SUBMITTED].

Shaklee, J.B. and N.V. Varnavskaya. 1994. Electrophoretic characterization of odd-year pink salmon (*Oncorhynchus gorbuscha*) populations from the Pacific coast of Russia, and comparison with selected North American populations. Can. J. Fish. Aquat. Sci. 51(Suppl. 1):158-171.

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Shaklee, J.B. and S.R. Phelps. 1992. Chinook salmon $NADP^+$-dependent cytosolic isocitrate dehydrogenase: Electrophoretic and genetic dissection of a complex isozyme system and geographic patterns of variation. Biochem. Genet. 30:455-489.

Shaklee, J.B., D.C. Klaybor, S. Young, and B.A. White. 1991. Genetic stock structure of odd-year pink salmon, Oncorhynchus gorbuscha, Walbaum, from Washington and British Columbia and potential mixed-stock fisheries applications. J. Fish Biol. 39(Supplement A):21-34.

White, B. and **J.B. Shaklee**. 1991. Need for replicated electrophoretic analyses in multiagency genetic stock identification programs (GSI): examples from a pink salmon (Oncorhynchus gorbuscha) GSI fisheries study. Can. J. Fish. Aquat. Sci. 48:1396-1407.

Shaklee, J.B. 1991. Simulation and other analysis of the 1991 Columbia River spring chinook GSI baseline. Technical Report 115 (40pp.), Washington Department of Fisheries, Olympia, WA.

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Education:

A.B. - Middlebury College, Middlebury, Vermont; Biology, 1970

M.S. - University of West Florida, Pensacola, Florida; Biology and Marine Science, 1973; Dr. Thomas S. Hopkins, major professor

Ph.D. - Florida State University, Tallahassee, Florida; Biological Science (ichthyology), 1979; Dr. Ralph W. Yerger, major professor

Experience:

April, 1995 - present. Instream Flow Biologist, Major Projects Division, Habitat Management Program, Washington Department of Fish and Wildlife, Olympia (Resource Program Manager 2; Fisheries Research Scientist 2). Serve as instream flow specialist. Conduct research on relationships among flow, fish, and habitat and conduct studies to validate IFIM. Represent agency in consultation for licensing hydroelectric projects and other energy facilities, as well as Habitat Conservation Plans. Represent agency in water resource policy and planning.

March, 1994 - April, 1995. Hydropower Project Coordinator, Major Projects Division, Habitat Management Program, Washington Department of Fish and Wildlife, Olympia (Resource Program Manager 2). Coordinate agency response to hydroelectric project licensing. Coordinate agency mitigation of nuclear power plants and other energy facilities. Serve as instream flow specialist. Represent agency in water resource policy and planning. Conduct research on relationships among flow, fish, and habitat.

September, 1991 - March, 1994. Hydropower Project Coordinator, Major Mitigation Program, Habitat Management Division, Washington Department of Wildlife, Olympia. Coordinate agency response to hydroelectric project licensing. Coordinate agency mitigation of nuclear power plants and other energy facilities. Serve as instream flow specialist.

April, 1986 - September, 1991. Manager, Technical Services Section, Habitat Management Division, Washington Department of Wildlife, Olympia.

January, 1983 - March, 1986. Instream Flow Biologist, Habitat Management Division, Washington Department of Game, Olympia.

January, 1982 - January, 1983. Mitigation Biologist. Washington Department of Game, Seattle.

November, 1981 - January, 1982. Stream fish ecologist. BioSystems Analysis, Inc., Seattle. Research and develop stream habitat classification for Pacific Northwest.

Publications, technical:

Beecher, H.A. 1995. Comparison of preference curves and habitat utilization curves

based on simulated habitat use. Rivers 5 (2): 109-120. (published February 1996)

Beecher, H.A., T.H. Johnson, and J.P. Carleton. 1993. Steelhead parr and depth-velocity distribution: test of an assumption of the Instream Flow Incremental Methodology. Can. Journal of Fisheries and Aquatic Sciences 50 (11): 2380-2387.

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Beecher, H.A. 1975. Carotenoids in color change of Pomacentrus variabilis. Florida Scientist 38 (2): 106-113.

Beecher, H.A. 1973. Studies on the color phases of the cocoa damselfish, Pomacentrus variabilis (Pisces: Pomacentridae). M.S. thesis, University of West Florida, Pensacola. 57 pp.

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Educational Background

Ph.D. Ecology, University of North Carolina-Chapel Hill, 1992.

M.S. Environmental Science, Western Washington University, 1988

B.S. Forest Resources, University of Idaho, 1985

Registered Diagnostic Medical Sonographer, ARDMS, 1985

A.S. Radiologic Technology, Indiana University, 1977

Employment History

Currently working in the Ambient Monitoring Section of the Washington State Department of Ecology. My primary duties are the analysis and interpretation of long-term river and stream data. I also act as an in-house advisor on study design and statistical analysis of environmental data. I taught a 24 hour (8 weeks) linear regression class, have given several seminars on study design. Authored the Quality Assurance Project Plan for the River and Stream Ambient Monitoring Network, which included a power analysis to optimize sampling resources.

Biological Technician/self-employed (employed by the Klamath Tribe June-August 1990, on contract with the Klamath Tribe September-December, 1990 and on contract with U.S. Bureau of Reclamation January 1991 to December, 1992) Duties included: 1) collecting water samples from Upper Klamath Lake, Agency Lake, and several tributaries; 2) laboratory analyses for chlorophyll, nitrate, ammonia, total phosphorus and soluble reactive phosphorus concentrations; 3) Collect, compile, and analyze flow data from Agency Lake tributaries using Omnidata Datapod 115 continuous stream stage recorders; 4) collect temperature, pH, conductivity and dissolved oxygen data using Hydrolab submersible data sondes; 5) compile and analyze data from lake sampling and tributaries to develop a nutrient budget for the Agency Lake sub-basin for application in a lake eutrophication model; 6) design, execute and analyze several different experimental designs to assess nutrient limitation of phytoplankton and trophic interactions among nutrients, phytoplankton, zooplankton, and fish; 7) design, execute and analyze a monitoring program to estimate annual, areal phosphorus export from flood-irrigated pastures near Ft. Klamath, Oregon, for use in assessing the impacts of cattle ranching operations on lake nutrient loading. (Supervisor-Sharon Campbell, USBR-Denver, CO 303 236 6011)

Research/Teaching Assistant, University of North Carolina, Chapel Hill, NC. Worked with indoor mesocosm experiments to evaluate the effects of a gradient of total nitrogen:total phosphorus ratios and zooplankton herbivory on phytoplankton communities.

Volunteer, Klamath Indian Tribe, Chiloquin, OR. June-August, 1989. Worked with Tribal biologists (immediate supervisor-Larry Dunsmore) on *in situ* limnological experiments and water quality sampling of Upper Klamath Lake, Oregon.

Research/Teaching Assistant, Western Washington University Bellingham, WA. Sept. 1986 to August 1988. Duties included: 1) collecting water samples from Lake Whatcom and several of its tributaries, 2) determining discharge rates of the tributary streams, 3) laboratory analyses for chlorophyll, nitrate, ammonia, total phosphorus and soluble reactive phosphorus concentrations, 4) phytoplankton and zooplankton taxonomy and counts, 5) maintenance of boats and sampling equipment.

Environmental Consultant, self-employed. April 1987 to June 1988. Collected temperature, pH, dissolved oxygen and specific conductance measurements for the U.S. Army Corps of Engineers on Howard Hansen Reservoir, Green River, Wynoochee Reservoir, Wynoochee River and the Lake Washington Ship Canal (Washington state).

Hydrologic Technician, U.S. Forest Service. June 1985 to September 1985 and May 1986 to September 1986. Worked on a research crew studying water-induced forest road erosion in central Idaho and western Montana.

Publications/Presentations

Ehinger, W.J. and R.A. Matthews. 1988. Phytoplankton Population Dynamics in Lake Whatcom. Proceedings of the International Mountain Watershed Symposium, June 1988. Lake Tahoe, CA.

Ehinger W.J. and R.A. Matthews. 1988. Phytoplankton composition and temporal variation among three basins of a large, temperate, monomictic lake. Paper presented at the American Society of Limnology and Oceanography Annual Meeting, Boulder, CO.

R.A. Matthews, G.B. Matthews and W.J. Ehinger. 1991. Classification and ordination of limnological data: a comparison of analytical tools. Ecol. Model. 53: 167-187.

Ehinger, W.J. 1993. Seasonal variation in the relative importance of nutrient limitation and *Daphnia pulicaria* grazing on phytoplankton biomass and growth in a hypertrophic lake. Paper presented at the American Society of Limnology and Oceanography Annual Meeting, Edmonton, Alberta, Canada.

Ehinger, W.J., 1995 . Trend analysis in Puget Sound rivers. Proceedings of the Puget Sound Conference, January, 1995. Seattle, Washington.

Section 10. Information/technology transfer

Data will be summarized annually and distributed to BPA, CTUIR, ODFW, COE, the Conservation Districts and others for Walla Walla Watershed planning and restoration implementation. Annual progress will be presented orally at BPA progress review workshops and in other forums. The final report will be compiled by WDFW and printed and distributed by BPA in 2002 (2001 if implementation begins in 1998).