PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project	
Estimate natural steelhead production in two tributaries of the Walla Walla River, WA.	
BPA project number	**20021**
Contract renewal date (mm/yyyy)	
Multiple actions? (indicate Yes or No)	
Business name of agency, institution or organization requesting funding	
Washington Department of Fish and Wildlife	
Business acronym (if appropriate)	**WDFW**
Proposal contact person or principal investigator:	
Name	**Mark Schuck**
Mailing address	**401 South Cottonwood**
City, ST Zip	**Dayton, WA 99328**
Phone	**(509) 382-1004**
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Email address	**schucmls@dfw.wa.gov**
NPPC Program Measure Number(s) which this project addresses	
3.2 C, 4.1 A, 4.1 B, 4.2 A, 5.1 B, 7.0 A, 7.0 C, 7.1 C, 7.1 D.2, 7.2, 7.3, 7.4 B, 7.6 C	
FWS/NMFS Biological Opinion Number(s) which this project addresses	
Not available for the Walla Walla watershed	
Other planning document references	
Lower Snake River Compensation Plan, **Walla Walla Sub-basin Plan,** **Walla Walla River Master Plan,** **WDFW Wild Salmonid Policy,** **Tribal Recovery Plan (WY-KAN-USH-MI-WA-KISH-WIT)**	
Short description	
Estimate adult escapement and natural production of wild steelhead in Mill Creek and Touchet River (tributaries of the Walla Walla River) to determine whether steelhead populations above four Columbia River dams can be sustained without hatchery supplementation, and help direct watershed habitat recovery efforts toward limiting factors in the basins.	
Target species	
Summer Steelhead	

Section 2. Sorting and evaluation

Subbasin
Walla Walla

Evaluation Process Sort

CBFWA caucus		**CBFWA eval. process**		**ISRP project type**	
X one or more caucus		If your project fits either of these processes, X one or both		X one or more categories	
X	Anadromous fish	X	Multi-year (milestone-based evaluation)		Watershed councils/model watersheds
	Resident Fish	X	Watershed project eval.		Information dissemination
	Wildlife				Operation & maintenance
					New construction
				X	Research & monitoring
				X	Implementation & mgmt
					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**
9000501	Umatilla and Walla Walla river Basins Natural Production Monitoring and Evaluation.	Fulfills stated objectives sooner than planned.
9010	Assess Fish Habitat & Salmonids in Walla Walla Watershed in Washington	Proposal actions would build directly from data collected under 9010 and fully describe steelhead production from the major Washington steelhead areas.
8805302	Plan, site, design & Construct NEOH Hatchery - Umatilla/Walla Walla component. Walla Walla Master Plan	Supplementation of steelhead populations in the Walla Walla basin are part of the NEOH goal as define in

		the Master Plan. This proposal will provide escapement and stock data (in partnership with 9010) to guide the development of new supplementation broodstock(s) and where supplementation may or may not be needed.
9604601	Walla Walla Basin Fish Habitat Enhancement	Data collected under this proposal and 9010 can help direct habitat improvement efforts to areas identified as having severe problems, thus maximizing benefits to the resource.

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	Estimate escapement of hatchery and wild steelhead into the Touchet River and Mill Creek drainages of the Walla Walla River.	1a	Construct adult traps at the Corps of Engineers diversion dam on Mill Creek in Walla Walla, and at the Dayton Acclimation pond intake structure on the Touchet River
		1b	Operate adult traps throughout the steelhead migration. Enumerate, determine sex, origin, and length. Affix an external tag (floy type) or fin clip to allow documentation of fall back. Collect scales for age determination and scale pattern analysis.
		1c	Collect DNA fin clips from all wild origin steelhead, and tissue samples for allozyme characterization from all wild origin trap and prespawning mortalities. Archive samples for future analysis in coordination with BPA Project #9010.
		1d	Calculate an estimated escapement past each adult trap.

Obj 1,2,3	Objective	Task a,b,c	Task
		1e	Establish spawning index areas within both basins. Coordinate action with ongoing Project #9010.
		1f	Walk index areas weekly beginning in late February and continuing through the end of spawning. Locate and mark all steelhead redds. Determine duration of redd visibility.
		1g	Walk potential spawning areas within the basins at least twice during the spawning season to count redds.
		1h	Calculate total redds constructed.
		1i	Calculate number of redds per female and per spawner. Estimate total egg deposition within each basin based on estimated average fecundity from hatchery fish.
2	Document juvenile life history patterns and survival rates and estimate annual smolt production from each river.	2a	PIT tag representative groups of pre-smolts from each Touchet River tributary to assess contribution of each tributary's population as smolts.
		2b	Operate a rotary fish trap in each river near the site of adult traps. Capture, enumerate, PIT tag, and CWT steelhead smolts.
		2c	Collect length, weight and scale samples from juvenile steelhead to determine age structure of the population.
		2d	Remove a fin clip and tissue sample all trap mortalities to genetically (DNA or allozyme) characterize the population. Archive samples or coordinate with Project #9010 for analysis.
		2e	Mark and release known numbers of wild steelhead smolts upstream of the traps to recapture and calibrate trap efficiency.
		2f	Estimate the number of steelhead smolts annually leaving each river.
3	Evaluate smolt-to-adult return rates.	3a	Collect information on PIT tagged juveniles during downstream migration

Obj 1,2,3	Objective	Task a,b,c	Task
			and returning adult steelhead detected at Columbia and Snake River dams and sampled in commercial fisheries.
		3b	Collect and summarize PIT and CWT information from adults returning to adult traps operated on each river.
		3c	Estimate smolt to adult survival rates based on PIT and CWT recoveries of adult captured in in-river traps (see Obj. 1).
4	Coordinate, compile, analyze and report results	4a	compile and report results as quarterly (or monthly if necessary) reports from each task in a timely manner to interested managers within the basin.
		4b	Provide annual reports in hard and electronic format to all interested parties.
		4c	coordinate all actions with managers within the basin. Provide written and oral data summaries to interested parties as necessary to ensure timely inclusion of results in planning efforts.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	12/1999	5/2004	accurately enumerate adult escapement	X	35
2	7/2000	9/2006	estimate egg-to-smolt survival rates for multiple brood years of steelhead.	X	40
2	2/2000	6/2007	estimate smolt out-migration from rivers	X	10
3	4/2000	9/2007	estimate out-migrant survival from PIT tags		10
3	6/2001	6/2009	calculate mean SAR for wild steelhead from each river	X	0

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
4	10/1999	6/2009			5
				Total	100

Schedule constraints
Adult trap modifications must be complete before fall steelhead migration starts. ESA permits to allow for takes of listed bull trout (and steelhead if listed) could delay start of trapping.
Completion date
FY2009

Section 5. Budget

FY99 project budget (BPA obligated):	$ **N/A**

FY2000 budget by line item

Item	Note	% of total	FY2000 ($)
Personnel	Biologist (1.2 FTEs) Technicians (1- Tech 2 :12 months) (5- Tech 1's: 3 mo. each, total 15mm)	31.1	103,500
Fringe benefits	Approximately 28.5% of salaries	8.9	29,500
Supplies, materials, non-expendable property	Includes some durable support structures associated with adult and smolt traps (walkways, lighting, safety equipment)	2.4	8,000
Operations & maintenance	includes CWTs and rental of two CWT tagging machines for 3 months. ($2,200/mo/machine)	5.5	18,200
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	5' rotary fish traps (2 @ $15,000) Portable generators (2 @ $500) PIT tagging station ($15,000) Computers (2 @ $2,200)	21.2	70,400

	Adult traps (2 @ $10,000)		
NEPA costs	n/a		
Construction-related support	estimated	9.0	30,000
PIT tags	# of tags: 4,500	3.9	13,050
Travel	includes leasing two vehicles	3.6	12,000
Indirect costs	22.5% of $214,250 (capital acquisitions exempt)	14.5	48,200
Subcontractor			
Other			
TOTAL BPA REQUESTED BUDGET			$332,850

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
LSRCP	PIT tagging station	3.2	12,000
LSRCP	Office space	1.6	6,000
LSRCP	Misc. equipment (flow meter, GPS unit, office equipment, communication radios)	1.6	6,000
LSRCP	Adult and smolt trapping assistance	1.9	7,100
LSRCP	Juvenile population estimates and PIT tagging assistance	3.0	11,500
Total project cost (including BPA portion)			$375,450

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	237,200	248,400	260,200	272,550

Section 6. References

Watershed?	Reference
	Busby, P.J., T.C. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, F.W. Waknitz and I.V. Lagomarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon and California. NOAA Technical Memorandum NMFS-NWFSC-27. U.S. Department of Commerce. 261p.
	Confederated Tribes of the Umatilla Indian Reservation (CTUIR). 1989. Walla Walla Subbasin Salmon and Steelhead Plan. Prepared for the Northwest Power Planning Council. Portland, Oregon.
	CTUIR. 1993. Walla Walla Master Plan (draft). Prepared for the Northwest

	Power Planning Council. Portland, OR.
	CRITFC. 1995. Wy-Kan-Ush-Mi-Wa-Kish-Wit. Spirit of the Salmon - Tribal Recovery Plan. Volumes I and II.
	Germond, J. 1998. Oregon Department of Fish and Wildlife, Assistant District Fish Biologist, Pendleton, OR.
	Lower Snake River Compensation Plan Status Review Symposium. 1998. U.S. Fish and Wildlife Service, Boise, ID.
	Northwest Power Planning Council (NPPC). 1995. 1994 Columbia River Basin Fish and Wildlife Program (as amended in 1995). Portland, OR.
	Schuck, M.L. and G. Mendel. 1987. Assessment of Production from Lyons Ferry/Tucannon Hatchery Complex; and Field Studies Summaries: Annual Report (Part II) 1985-86. Washington Department of Wildlife Report to USFWS. Report # FR1/LSR-87-8.
	Schuck, M.L., A.E. Viola and M. Keller. 1995. Lyons Ferry Trout Evaluation Study: 1993-93 Annual Report. Washington Department of Fish and Wildlife Report #H95-06.
	Schuck, M.L., A.E. Viola and J. Dedloff. 1997. Lyons Ferry Trout Evaluation Study: 1995-1996 Annual Report. Washington Department of Fish and Wildlife Report #H97-08.
	Schuck, M., A. Viola, J. Bumgarner and J. Dedloff. 1998. Lyons Ferry Trout Evaluation Study: 1996-97 Annual Report. Washington Department of Fish and Wildlife Report #H98-10.
	Sneva, J. 1998. Washington Department of Fish and Wildlife Scale Lab. Personal communication.
	U.S. Army Corps of Engineers District, Walla Walla, Washington. 1975. Special Report: Lower Snake River Fish and Wildlife Compensation Plan. 95 pgs. plus appendices.
	Washington Department of Fish and Wildlife. 1997. Policy of Washington Department of Fish and Wildlife and Western Washington Treaty Tribes Concerning Wild Salmonids.
	Washington State Natural Resources Cabinet. 1998. Extinction is Not an Option - a Statewide Strategy to Recover Salmon. Working draft.

PART II - NARRATIVE

Section 7. Abstract

Efforts have begun throughout the Columbia Basin to recover salmon and steelhead populations which have become depressed to the point of being listed under the federal Endangered Species Act (ESA). Populations of steelhead in the Walla Walla basin have been identified for supplementation under the Tribal Recovery Plan and are recognized as an important Mid-Columbia River wild population. Recent declines in wild escapement into the Walla Walla generally followed coast wide declines in anadromous salmonid populations. However, prior to recent declines the populations appeared to be somewhat stable. Washington Department of Fish

and Wildlife proposes to monitor adult steelhead escapement and estimate smolt production from two major steelhead spawning tributaries in the Walla Walla basin, Touchet River and Mill Creek.

Adult steelhead will be trapped, tagged and released above existing passage structures to spawn. Estimates of the number of redds constructed will be made and redds/spawner calculated. The incidence of hatchery fish escaping into predominantly wild spawning areas will be documented. Two rotary migrant traps will be used to collect out-migrating juvenile steelhead throughout the migration season. Efficiencies for the trap will be calculated and total juvenile production of steelhead from each river calculated. Emigrants will be coded-wire tagged and/or PIT tagged to monitor their juvenile migration success and to measure smolt-to-adult survival.

Returning adult steelhead will be detected at Columbia River dams, sampled in non-selective fisheries or captured at adult traps in the Touchet River or Mill Creek. Estimated adult-to-adult and smolt-to-adult return rates will be calculated, and whether populations are currently sustaining themselves will be determined. Recommendations will be made to fishery managers concerning where and what type of actions should be taken in the basins to achieve the goals as stated in the NPPC Fish and Wildlife Plan and in Washington's Wild Salmonid Policy.

Section 8. Project description

a. Technical and/or scientific background

Populations of anadromous salmonids within the Columbia River have received increased attention in recent years as National Marine Fisheries Service (NMFS) has undertaken several coast wide status reviews. Results from their reviews (Busby 1996) supported actions to list salmon and steelhead populations in the Snake and upper Columbia River ESUs. Insufficient steelhead data were available for rivers within the Mid-Columbia ESU to warrant a similar action, causing NMFS to delay a final decision on listing until further data collection and analysis could occur.

The Walla Walla River enters the Columbia River at Rk 504, approximately 18 Km below the mouth of the Snake River, and is considered part of the Mid-Columbia River steelhead ESU. The Walla Walla River drains from the Blue Mountains; its North and South Forks are the major anadromous salmonid producing tributaries in Oregon, and the Touchet River and Mill Creek are the two largest steelhead producing tributaries in Washington. Knowledge of natural steelhead production in Washington is limited to parts of the Touchet River. WDFW has conducted some steelhead spawning surveys, juvenile density sampling and limited adult trapping on the Touchet River as part of the Lower Snake River Compensation Plan hatchery production monitoring and evaluation program (Schuck et al. 1996). Very little data, however, is available for Mill Creek. Oregon Fish and Wildlife (ODFW) has trapped steelhead entering the Oregon section of the Walla Walla River for the past several years (J. Germond, ODFW pers. comm.). The limited available data indicate that escaping populations of wild steelhead, and the resulting juvenile populations in these rivers have decreased. Declines may not have been as precipitous as for other wild steelhead populations of the upper Columbia and Snake rivers of recent years. In order that correct decisions are made by fisheries managers (State, Tribal and Federal) concerning whether to list the Mid-Columbia ESU, and that the most effective and appropriate actions are taken to stabilize and rebuild these populations, further data about the life history and reproductive

capacity of these steelhead are needed. We believe there are two alternatives to the actions proposed here. First, to continue on the present course of full implementation the Fish and Wildlife Plan (development of NEOH and plans to supplement wild steelhead populations with offspring of endemic broodstock, and watershed corrective actions to improve habitat and increase natural production) without being fully aware of the status of existing populations and where efforts should be directed to achieve maximum benefit for the fish. The second alternative is failure to implement recovery actions under the FWP because insufficient data is available to warrant actions under the plan, potentially resulting in the loss of all or significant portions of the steelhead population, and failure of attempts to reintroduce spring chinook as currently proposed in the Walla Walla Master Plan (CTUIR 1993). Both of these alternatives place the population and efforts toward recovery at risk of failure and/or an inability to document the beneficial effects of FWP actions.

Accurate enumeration of adult escapement in production areas and of the juvenile populations that result from their spawning is needed before further planning and implementation of a supplementation program. Because of the complex life history of steelhead, further data describing survival rates by age class and eventual smolt production estimates by brood year will be necessary to fully understand population dynamics. Estimates of smolt-to-adult and adult-to-adult survival for these wild steelhead populations will complete the data set needed to evaluate whether within-basin or out-of-basin factors are presently limiting production in these watersheds. Once this data is available, efforts to stabilize and rebuild the populations (whether through habitat improvement, hatchery intervention or both) can be most effectively directed to ensure maximum success.

b. Rationale and significance to Regional Programs

The Walla Walla basin may represent a unique opportunity to implement portions of the NPPC Fish and Wildlife Plan (FWP). Significant portions of the upper basin in both Oregon and Washington retain spawning populations of wild steelhead. These populations have shown a resiliency to habitat degradation and a persistence of viable numbers during recent years when other steelhead populations have been forced toward extinction. Because the basin lies above only the four lower Columbia River dams, these steelhead may be able to persist under moderate survival conditions and possibly rebuild themselves under good habitat conditions. The FWP identifies the need to "halt (the) decline and rebuild populations to sustainability" (Sect. 4.1), promotes the funding of projects directed at critical unknowns or uncertainties (3.2 C, 4.1 A, 4.2 A). Two critical uncertainties exist within the basin: 1) are populations of steelhead within Washington's portion of the Walla Walla above, or at, replacement, and if not; 2) how best can managers intervene to rebuild steelhead populations in the Walla Walla River Watershed that appear to be on the edge of successful productivity. A full understanding of Walla Walla River steelhead life history and their productive capacity is needed to ensure that actions which are proposed, whether Watershed type habitat improvements (4.1 A), hatchery supplementation (7.0 A, 7.3), or both, are correctly directed to achieve maximum benefit for the fish (4.1).

The existence of LSRCP mitigation within the basin raises further questions: should mitigation

releases of hatchery steelhead continue, should new broodstocks be developed for the program to reduce the potential for negative impacts of hatchery production and serve as a more appropriate source of supplementation fish, and can wild populations within the basin be used for broodstock development without serious damage. Answers to these questions must be obtained and integrated into existing management documents if managers are to make informed decisions that benefit natural populations. More data is needed to most effectively meet requirements outlined in the NPPC Fish and Wildlife Plan, by the ESA, Washington's Wild Salmonid Policy (1997), and in the Walla Walla River Basin Master Plan (1993). Funding of this proposal under the FWP seems a logical extension of work already begun within the basin. WDFW in currently not fiscally able to augment their presence in the basin and expanded monitoring and evaluation will be crucial in documenting recovery efforts. Partnerships between co-managers and the potential for future matching funds from Washington State as part of their salmon recovery effort will be forwarded if M&E work is begun as soon as possible.

The initial work within the Washington portion of the basin has been accomplished as part of the evaluation activities associated with the LSRCP mitigation program. Currently the LSRCP program releases about 300,000 hatchery smolts into the Walla Walla basin annually. The LSRCP program is committed to responding to the needs of ESA listed populations that may be currently, or have been, affected by hatchery smolt releases and to improve hatchery production practices for the benefit of wild populations (FWP 7.2). A greater understanding of basin wide population dynamics will guide actions which can be taken as part of the LSRCP, such as the need to develop locally adapted broodstock, alter hatchery smolt release strategies to minimize temporal and spatial overlap of wild and hatchery adult fish, or the direct supplementation of weak naturally spawning populations. The increased knowledge of the basin may also provide insight to factors which may limit the success of future attempts to re-introduce spring chinook salmon (Walla Walla River Sub-basin Plan).

c. Relationships to other projects

The Assessment of Fish Habitat and Salmonids in the Walla Walla Watershed project (9010), begun in 1998 represents the first concerted effort to systematically identify fish population status within the basin, and to identify where habitat limiting factors exist. This proposal will be coordinated and integrated with that data collection effort to more fully describe the productive nature of the Touchet River and of Mill Creek. We anticipate collaborative actions between the two projects to most effectively use project personnel, and maintain staff stability through the life of the projects. Data from the project may also help direct the use of funds available from Washington State's Salmon Recovery Plan (1998) in a manner complimentary to NPPC goals and objectives. The Umatilla and Walla Walla Basin Natural Production M&E Project (9000501) has generally described objectives similar to those proposed here, however to date work has been concentrated in the Umatilla Basin, and it is unclear when or where efforts to answer similar questions within the Walla Walla (and specifically the Touchet River and Mill Creek) will be addressed. By allowing WDFW to move forward on answering critical questions, a more comprehensive approach throughout the basin can be considered with better data upon which to base decisions. There will be further benefit from the data as Watershed recovery efforts funded by NPPC and Washington State's Salmon Recovery Program through the Conservation Districts can be most effectively directed to stream reaches which support critical steelhead populations.

Hatchery smolt production from the LSRCP program provides a large, successful mitigation fishery within the basin. An established monitoring and evaluation program is in place in Dayton, adjacent to the Touchet River and near one proposed site of adult and smolt trapping. Current LSRCP funding does not allow for the necessary monitoring to occur that will provide direction for this ongoing mitigation effort to respond to concerns raised by the NMFS status review. By linking the two programs through the M&E effort, maximum efficiency of scale is achieved. A significant cost saving with the LSRCP program will occur through sharing of personnel and equipment, and project startup time will be greatly reduced. Further, we anticipate that recommendations resulting from the project may be implemented through the LSRCP program.

Ongoing planning and construction of the NE Oregon Hatchery (NEOH) complex (8805302) has identified production goals outlined in Walla Walla Sub-basin plan, and Walla Walla River Master Plan. This planning and construction effort, as well as previous FWP actions to improve the basin for anadromous salmonids (9601200 - Adult passage improvements; 9601100 - installation of juvenile screens and provision for trap and haul; and, 9604601 - habitat improvements within the basin) are, or have been, funded through the NPPC Fish and Wildlife Program. Data collected from the proposed project would provide valuable habitat and population data with which to make critical future decisions on issues such as supplementation, and how further to proceed to rebuild anadromous fish populations in the Walla Walla basin.

d. Project history

N/A

e. Proposal objectives

Four objectives are identified for the proposal: 1) Estimate escapement of hatchery and wild steelhead into the Touchet River and Mill Creek drainages of the Walla Walla River, 2) Document juvenile life history patterns and survival rates and estimate annual smolt production from each river, 3) Evaluate smolt out-migrant and adult return success rates, and 4) Analyze and disseminate project data and results to managers to aid in decision making and adaptive management.

Objective 1 - Estimate escapement of hatchery and wild steelhead into the Touchet River and Mill Creek drainages of the Walla Walla River.

The Touchet River and Mill Creek represent a significant portion of available steelhead spawning and rearing area in Washington. Monitoring and evaluation actions conducted under LSRCP funding have attempted to estimate escapement of hatchery and wild steelhead into the Touchet River through spawning surveys, with marginal success. Adult trapping will be required to obtain an accurate enumeration of returning adult steelhead. Trapping will occur throughout the migration period and the project will provide a summary description of the population escaping into each basin (including male:female ratio, mean length at age, and proportion of hatchery fish escaping to spawn). Expanded (more extensive and intensive than can now be accomplished by

LSRCP and 9010) spawning surveys will be conducted to estimate the number of redds constructed. These data will be used to calculate redds/female and may have broad applicability throughout the upper Snake and Columbia river basins by allowing estimates of escapement to be made in other rivers solely from spawning ground surveys. These data will also form the basis for analyzing egg-to-fry, egg-to-smolt and egg-to-adult survival rates in these two rivers, a key elements in understanding whether the population is capable of replacement under current in-river habitat conditions. *Assumptions:* WDFW assumes that adult traps constructed within both basins will effectively capture migrating adult steelhead without unnecessarily retarding their upstream movement, displacing spawning to below the trapping sites and impacting production in prime rearing areas, or imposing unacceptable direct mortality, and that accurate estimation of escapement can be achieved. Further, WDFW is aware that under certain flow conditions in Mill Creek, downstream migration of post-spawn steelhead may be impeded by the proposed adult trap. These situations would be monitored closely and steps would be taken in trap design to allow for unimpeded adult emigration from the system. Also, WDFW is aware of the presence of bull trout within both of the drainages proposed for study, and many of the same concerns listed above apply to bull trout and will be addressed in facility design and operation.

Objective 2 - Document juvenile life history patterns and survival rates and estimate annual smolt production from each river.

Steelhead exhibit a complex life history. Smolts are known to migrate from rivers in Southeast Washington at age 1+, 2+ and 3+ (John Sneva, WDFW pers. Comm.), and return as adults to spawn after one to three years in the ocean (Schuck et al. 1995). Describing the relative contribution of these variants is essential to understanding the productivity of the basins. Estimates of juvenile steelhead populations by age class are currently being made in the Touchet River during late summer from electrofishing and snorkel surveys conducted by LSRCP evaluation personnel, and as part of Project 9010. Pre-smolt juvenile steelhead will receive PIT tags (1,500) as part of the juvenile population sampling in the Touchet River, which will allow an assessment of contribution by tributary within the Touchet. Sequential year sampling will allow year class survival rates to be calculated. Juvenile populations will be periodically sampled in Mill Creek by Project 9010 personnel. Trapping within each basin during the spring out-migration will allow estimates of smolt production to be completed and sampling smolts and estimating total annual out-migration over a series of years builds on data collected in Objective 1. This action will fully describe juvenile life history and survival rates and provide the basis for development of a spawner/recruit relationship for both systems. *Assumptions:* WDFW can operate a smolt trap for continuous periods to accurately estimate smolt out-migration.

Objective 3 - Evaluate smolt-to-adult return rates.

Little is known of the survival rates of wild steelhead smolts from the Mid-Columbia River. Coded-wire tagging and PIT tagging of wild out-migrants will allow them to be monitored through the Columbia River corridor and for adult returns to be identified in non-selective fisheries and traps upon return. Adult returns to in-river traps will be essential to calculating spawner/recruit relationships. *Assumptions:* 1) enough smolts can be captured and tagged to provide adequate CWT and PIT tag groups, and return as adults to measure survival with precision, 2) enough smolts will be detected at Columbia River dams to evaluate downstream

migration, and 3) adults can be effectively trapped upon return.

Objective 4 - Coordinate, compile, analyze and report results.

Multiple actions by numerous management and oversight agencies are occurring simultaneously on the Walla Walla River. Actions to document the distribution, health and productivity of the salmonids toward which all the actions are directed will be critical in allowing these actions to be adaptively responsive to the most current data. Monthly, quarterly and annual reports will ensure a steady flow of raw data and that preliminary assessments of the data are readily available to managers. As appropriate, presentation of data will occur in written, electronic and oral forms.

f. Methods

Adult steelhead will be trapped at existing passage structures with minor modifications at minimal cost. A concrete diversion dam owned and operated by the Army Corps of Engineers is located in Mill Creek within the City of Walla Walla. An existing fish ladder provides passage and will be modified to accept a trap to capture and enable sampling of adult migrant steelhead. Trapping will occur throughout much of the fall-spring adult migration. The trap will be checked at least daily to minimize passage delays for the fish. Each fish will receive an identifiable external tag or mark, be measured for length, sex and origin determined, scale sample removed, tissue for DNA and/or electrophoretic sampled, then released upstream to continue its migration. WDFW evaluation personnel sample adult salmon, steelhead and bull trout without the use of anesthetic. Fish are placed in a deep "V" measuring trough filled with water, with 20-25 cm of the head and anterior body covered. Fish lie quietly during sampling and do not require recovery after release. This method will be followed for all adult sampling. Although tagging each fish adds additional stress, it is essential to determining what proportion of fish may be falling back and re-entering the trap. An over estimate of escapement is likely to occur without this action.

Limited trapping data from the Touchet River 1991-1995 (Schuck et al. 1997) indicated that predominately wild origin steelhead escaped into the primary steelhead production areas. Although WDFW conducted systematic spawning surveys of the Touchet River above Dayton 1987-1997, they were unable to estimate escapement in three of those years because of high turbid spring flows. More extensive adult trapping is needed to accurately enumerate escapement. An existing LSRCP water diversion structure on the Touchet River within the City of Dayton had been modified to serve as an adult trap, but the trap was destroyed in the 1996 flood and no funds were available with which to rebuild the trap. Reconstruction of the trap must occur before trapping can continue. Trapping and data collection would occur throughout the migration season as described above for Mill Creek.

Nearly 80 Km of streams (Touchet R. and Mill Cr.) may be used by steelhead for spawning. Because of unpredictable spring flows in the basin, walking all spawning areas weekly would be extremely difficult. Furthermore, redd life (period of time when the redd can be seen and identified) can be limited by river flow patterns requiring redds to be enumerated regularly. WDFW utilizes index area monitoring in association with full river surveys to estimate the number of redds constructed in rivers. Established index areas within the Touchet River will be used for spawning surveys Index areas will also be established in Mill Creek. Expanded weekly surveys

during the spawning season will be made to enumerate completed redds in both river systems. Final surveys of each basin will be completed at the end of steelhead spawning. Index area counts and final basin surveys will be used to calculate total redds constructed. Tissue samples from pre and post spawning mortalities will be collected when possible and archived or analyzed in association with Project 9010 to genetically characterize the populations.

Juvenile population sampling and PIT tagging within the Touchet River will be conducted by LSRCP evaluation personnel. Five hundred PIT tags will be inserted into pre-smolt juvenile steelhead (age 1+ and 2+). We will operate a juvenile migrant trap in each river near the adult trapping sites to capture and enumerate steelhead migrants. Fish will be captured using five-foot rotary screw traps. Smolt trapping conducted by LSRCP M&E personnel on the Tucannon River showed that most steelhead emigrated during March-May (Schuck et al. 1998). Trapping conducted in the mid 1980's showed similar results, with additional sub-smolts emigrating from the river in early winter (Schuck et al. 1987). We expect similar out-migrant behavior in the Walla Walla basin, therefore trapping will occur intensively during the spring emigration months of March-May and will be conducted during other months as environmental conditions and personnel allow. During the intensive sample period, the migrant trap will be operated 24 hrs/day, seven days a week. We expect to capture up to 4,000 Touchet River and 2,000 Mill Creek migrants and will CWT tag all to assess smolt to adult survival (Objective 3). A portion of the fish will be fin clipped for DNA analysis and for subsequent release above the trap weekly for efficiency tests. Scales will also be collected from which age structure will be determined. Results of trap efficiency tests will be used to estimate the total out-migration. Up to 2,000 Touchet River and 1,000 Mill Creek migrant steelhead will also be PIT tagged to monitor their migration success through the Columbia River dams. All out-migrants will be scanned for PIT tags inserted the previous summer to assess tributary specific smolt contribution in the Touchet River. Tagged migrants will be included in PIT tag study groups.
Capture of PIT and CWT tagged adults will occur one to three years after smolt emigration at adult traps in the Walla Walla basin, at adult PIT tag detection locations and in non-selective fisheries within the Columbia basin. Smolt to adult return rates (SAR) for hatchery origin steelhead released into the Snake and Walla Walla basins ranged between 0.3% and 2% (Schuck, in LSRCP 1998). Assuming a 2% survival rate for wild origin steelhead smolts from the Walla Walla, we would expect 80 and 40 adults to return to the Touchet River and Mill Creek, respectively, from each brood year. Additional adults may return to other locations within the basin and be detected as well. Adult returns are key to calculating spawner : recruit (recruit = adult return) ratios. Calculating age specific survivals (juvenile and SAR) will allow for an informed assessment of whether current productivity within the basin or out-of-basin is limiting population size. Multiple brood years of data will be desirable in understanding within and between year variation in survivals.

Success of the project is highly dependent upon two factors. Successfully enumerating adults (spawners) escaping into a watershed is key for calculating spawner:recruit ratios. Therefore construction of efficient adult traps at existing structures will be essential to accurate results. An accurate estimate of smolts emigrating from each watershed may also be useful in determining limiting factors for the basin and is essential for calculating SARs. Extreme weather and river flow conditions, such as floods, can prevent the collection of data essential to the study.

g. Facilities and equipment

Although some LSRCP M&E activities are currently in place in the Touchet River, they aren't designed to assess egg-smolt and smolt-adult survivals. No actions are currently being conducted in Mill Creek. As described above, existing structures can be modified to provide secure fixed adult trap sites. Modification of the structures will occur in the first budget year, with only maintenance and repair funding required in subsequent years. Much of the expenditures will occur as construction to prepare the sites and alter or install traps to fit the site.

Smolt trapping will require the purchase two rotary migrant traps similar to that currently used by LSRCP M&E personnel on the Tucannon River. All existing smolt trapping equipment is in use on the Tucannon River and is not available for this project. Similarly, a generator will be required for each trap to provide power and light during night trapping, and CWT tagging machines will need to be purchased or rented for the spring out-migration period (about 3 months).

Two computers will be required for the project. However only one new computer has been proposed for purchase. Computers are available at the LSRCP field office in Dayton and will be shared the first field season. If data input and manipulation requires more time than is available from the shared computer, a second computer will need to be purchased in a subsequent fiscal year.

To achieve PIT tag groups of a size necessary for significant detections at the dams, tagging may need to occur daily, or at least several times each week. The existing LSRCP evaluations program has one PIT tagging station which can be shared at the Touchet River site most of the time. An additional tagging station will be needed for the Mill Creek site, and to serve as a backup in case of equipment failure in the other station. Although repairs can usually be effected quickly, relying on a single station for PIT tagging needs in three geographically separate locations would not be workable.

Available office space in Dayton, and a completely functional research operation currently exists. By incorporating this proposals activities with ongoing LSRCP work and Project 9010 work. Costs for vehicles, miscellaneous personnel time, supplies and equipment are made readily available, with no start up delays.

h. Budget

The start up year for a natural production M&E program are high because of equipment and construction needs. These items account for 30% of the first year budget. Subsequent year budgets reflect decreased equipment costs. Migrant trapping is labor intensive when conducted around the clock. Further, safety of personnel during night trapping is paramount and can require two personnel when flows are high and debris loads require constant attention to keep the trap functional without jeopardizing migrants. Intensive around the clock trapping is limited to three months in the spring to minimize costs. Coded wire tagging represents a significant annual operations cost as WDFW currently has no extra tagging machines available to support this project. Monthly rental costs of two machines for three months ($13,200) could be directed to the purchase of equipment (approx. $16,000 each from Northwest Marine Technology, Inc.).

Two years rental would cover the majority of the equipment expense and may be a better use of project funds. Should extra CWT machines become available from WDFW, this cost could be deferred.

Section 9. Key personnel

MARK L. SCHUCK, Principle Investigator/Project Manager

EDUCATION:

B.S. (Fisheries) June, 1974 Colorado State University, Fort Collins, CO

WORK HISTORY

June, 1994 to present Washington Department of Fish and Wildlife, Dayton, WA

Fish Biologist IV - As Project Leader, identifies key research elements necessary to evaluate the success of the Department's lower Snake River salmonid mitigation facilities for chinook salmon and steelhead and rainbow trout. Develops long-range plans to address key research questions and supervises staff project leaders conducting specific research projects including experimental design and protocol, conduct of research, and reporting of results with specific recommendations which affect the ultimate success of salmonid mitigation hatcheries. Coordinates Endangered Species Act (ESA) operation permit authorities and directs compliance with ESA related terms and conditions. Manage, implement, and control unit budgets in order to assure compliance with section, division, and program budget allocations. Directs and coordinates reimbursable study program of the Lower Snake River Fish and Wildlife Compensation Plan (USFWS/COE), Bonneville Power Administration and other funding agencies.

June, 1982 to June 1994 Washington Department of Wildlife, Dayton, WA

Fish Biologist II and III - Lead biologist in evaluating the Lower Snake River Compensation Plan (LSRCP) trout program in Washington. Design, conduct and supervise salmonid population studies to evaluate the effectiveness of the LSRCP mitigation program throughout the Snake River Basin of southeast Washington. Identify specific salmonid research opportunities; develop hypotheses, plan appropriate procedures; determine staff needed and data collection methods; and formulate and write research proposals. Schedule sampling efforts, direct and conduct sampling, analyze findings and draw conclusions. Coordinate cooperative research and surveys in boundary waters with Idaho and Oregon departments of Fish and Wildlife as well as Federal management / research agencies and Tribes. Coordinate reporting of results with cooperating agencies. Present findings and recommendations in scientific reports, oral presentations and, where appropriate, recommend sport fishing regulation changes to the Fish Management Program.

PROJECT EXPERTISE

Conducting salmonid research in Southeast Washington for 16 years has provided a substantial knowledge of the unique biology of salmon and steelhead of the area, and a thorough

understanding of steelhead use patterns within the area. Has been involved with juvenile and adult population sampling (including electrofishing, snorkeling, trapping and spawning surveys) in three Western states and within the Snake River Basin since 1982. Mark has administered LSRCP and BPA projects and has over 14 years of project and supervisory experience.

RECENT REPORTS

Schuck, M., A. Viola, J. Bumgarner and J. Dedloff. 1998. Lyons Ferry Trout Evaluation Study: 1996-97 Annual Report. Washington Department of Fish and Wildlife Report to the USFWS. Report No. H98-10.

Viola, A. and M. Schuck. 1995. A Method to Reduce the abundance of Residual Hatchery Steelhead in Rivers. North American Journal of Fisheries Management 15(2) 488-493.

Schuck, M.L.. 1998. Washington's LSRCP Trout Program. In: Proceedings of the Lower Snake River Compensation Plan Status Review Symposium. Compiled by the U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office, Boise, Idaho. September 1998. 276p.

JOSEPH D. BUMGARNER, Associate Investigator

EDUCATION:

M.S. (Fisheries) June, 1993 University of Washington, Seattle, WA

B.S. (Fisheries) December, 1987 University of Washington, Seattle, WA

WORK HISTORY:

June, 1993 to present Washington Department of Fish and Wildlife, Dayton, WA

Fish Biologist II and III - Responsible for identifying, designing, conducting, analyzing, interpreting, and reporting appropriate research for Lower Snake River Compensation Plan (LSRCP) for spring chinook mitigation in southeast Washington. Relate findings to LSRCP and fish management needs in area rivers. Performs as the WDFW spring chinook specialist for the LSRCP program. Takes primary responsibility for the organization, writing and data analysis for annual Tucannon spring chinook salmon report. Assists in routine professional biological work related to spring and fall chinook salmon production and evaluation at Lyons Ferry Hatchery.

PROJECT EXPERTISE:

Current duties include acting as WDFW's lead fisheries biologist for all spring chinook monitoring and evaluation in the Tucannon River under the LSRCP. Is Project lead biologist for emigrant trapping on the Tucannon River, and oversees the estimation of out-migrant spring chinook and steelhead populations on an annual basis. Has experience in monitoring juvenile populations in river using both electrofishing and snorkeling techniques and had done extensive spawning surveys for spring and fall chinook and steelhead.

RECENT REPORTS:

Bumgarner J.D. 1998. Washington's LSRCP Spring Chinook Program - Tucannon River. In: Proceedings of the Lower Snake River Compensation Plan Status Review Symposium. Compiled by the U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office, Boise, Idaho. September 1998. 276p.

Bumgarner, J., D. Milks, L. Ross, and M. Varney 1998. Tucannon River Spring Chinook Hatchery Evaluation. 1997 Annual Report, #H98-06 to U.S. Fish and Wildlife Service, LSRCP Office, Boise, ID.

STEVEN MARTIN, Principal/ Associate Investigator

Duties: Responsible for coordinating LSRCP evaluation activities with the design, and implementation of this proposed project.

Degrees Earned: Eastern Washington University: BS - Biology 1990 MS - Fisheries Biology 1992

Current Employer: State of Washington, Department of Fish and Wildlife

Current Responsibilities: Conducting research, monitoring, and evaluating the Lower Snake River Compensation Salmon and Steelhead program. Supervise a diverse work crew, procure equipment, write annual reports and publications.

Previous Employment: State of Washington Department of Fish and Wildlife, Snake River Fish Habitat Biologist.

Expertise: Experimental design, field methods, salmonid ecology, hatchery production, sport fishing, and research presentations.

Publication (5 max):

Martin, S.W. et. al. 1993. Investigations of the interactions among hatchery reared summer steelhead, rainbow trout, and wild spring chinook salmon in southeast Washington. Project report.

Martin, S. W., T. N. Pearsons, and S. A. Leider. 1994. Rainbow and steelhead trout temporal spawning distribution in the upper Yakima River basin. Annual report.

Martin, S.W., J.A. Long and T.N. Pearsons. 1995. Comparisons of survival, gonad development, and growth between rainbow trout with and without surgically implanted dummy radio transmitters. North American Journal of Fisheries Management. 15:494-498.

Martin, S. W. 1995. Salmonid distribution and rainbow trout population abundance variation in the upper Yakima River. Annual report.

Martin, S.W. 1992. Investigations of bull trout, steelhead trout, and spring chinook salmon interactions in southeast Washington streams. Master's Thesis, 1992.

GLEN W. MENDEL, (0.25 FTE as Project Manager)

(509) 382-1005, FAX (509) 382-2427.

Project duties: As Project manager for 9010 and District Fish Biologist for SE Washington, will coordinate activities between existing and proposed projectsto take care of administrative duties and guide the project. He is experienced in administering contracts and projects under the LSRCP and past BPA contracts in southeast Washington and experienced in conducting salmonid abundance and habitat condition assessments in the Tucannon River and Asotin Creek as part of his previous LSRCP duties.

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 and Manager for the Washington Department of Fish and Wildlife (WDFW) - (half time management duties April 1997-March 1998, full time since April 1998). Assistant project leader for evaluation of Lyons Ferry Hatchery program for spring and fall chinook salmon and steelhead (Mar. 1994-April 1998).

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.

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 .

Section 10. Information/technology transfer

The success of the proposal relies heavily on cooperative efforts with co-managers, ongoing projects and ancillary state and federal agencies. By using existing water control and fish passage structures in Mill Creek which are owned and maintained by the Corps of Engineers, tasks are much more likely to be accomplished with minimum cost. The Walla Walla basin represents a significant opportunity to more fully understand salmonid populations within the Columbia and to direct recovery efforts espoused by the NPPC and promoted by state, tribal and federal managers. All data will be summarized quarterly and annually in reports. Reports will address milestones and provide data specific recommendations if warranted. A final report with recommendations to the NPPC and fisheries managers will be provided, and it is expected that they will be integrated directly into planning and management documents such as subbasin and watershed master plans. Monthly coordination with co-managers and with agencies such as the Conservation Districts which are striving to improve habitat conditions will ensure efficient use of time and money provided by state and NPPC recovery efforts.

Congratulations!