PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project	
Remove 23 migrational barriers and restore instream and riparian habitat on Chumstick Creek	
BPA project number	**20001**
Contract renewal date (mm/yyyy)	
Multiple actions? (indicate Yes or No)	
Business name of agency, institution or organization requesting funding	
U.S Fish and Wildlife Service	
Business acronym (if appropriate)	**USFWS**
Proposal contact person or principal investigator:	
Name	**Kate Terrell**
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NPPC Program Measure Number(s) which this project addresses

7.6, 7.7, 7.9, and 7.10

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

West Coast Steelhead Briefing Package, Steelhead Conservation Efforts: A Supplemental to the Notice of Determination for West Coast Steelhead Under the Endangered Species Act.

Other planning document references

Chumstick Stream Survey and Flood Damage Assessment, Chumstick Stream Survey, The Wenatchee River Watershed Planning Project, Wenatchee River Watershed Ranking Report, Mid-Columbia River Tributary Compensation Report, Washington State Salmonid Inventory and the Washington State Wild Salmonid Policy.

Short description

Enhance and restore fish passage in the Chumstick Drainage. 23 culverts will be replaced and realigned on private land within the watershed. Instream and riparian habitat will also be enhanced within these reaches.

Target species

Species that will be affected include chinook, steelhead, bull trout, westslope cutthroat, and re-introduced coho.

Section 2. Sorting and evaluation

Subbasin

Wenatchee River Watershed

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		Multi-year (milestone-based evaluation)	X	Watershed councils/model watersheds
X	Resident Fish	X	Watershed project eval.		Information dissemination
X	Wildlife				Operation & maintenance
				X	New construction
					Research & monitoring
					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
99023	Culvert Replacement of Chumstick Creek (Highway209)	Replacing a 153 foot long culvert on Chumstick Creek, one mile upstream of the confluence with the Wenatchee River.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
N/A		

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Complete Watershed Assessment	a	Combine the USFS watershed assessment with the USFWS assessment on private land
2	Develop a restoration plan for 23 sites	a	Re-survey the identified sites.
		b	Develop designs for the restoration projects
		c	Comply with ESA, NEPA, ShiPo, county, state and federal agencies
3	Implement the restoration plan	a	Replace culverts
		b	Restore instream and riparian habitat
4	Develop and implement a monitoring plan	a	Develop monitoring criteria including snorkeling survey, sediment loads, photo points, and cross section.
		b	Install monitoring points.
		c	Implement

Obj 1,2,3	Objective	Task a,b,c	Task
5	Information and Education	a	Conduct a series of workshops for local land owners ans other work groups on the benefit of the restoration project.

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measurable biological objective(s)	Milestone	FY2000 Cost %
1	10/1999	12/1999	Completed Watershed Assessment		6.01
2	12/1999	05/2000	Restoration plan and biological assessment		10.74
3	06/2000	11/2000	Replace culverts, install instream structures and revegetation of the riparian area		76.54
4	12/2000	on going	Develop and implement a restoration plan		2.15
5	02/2001	on going	Information and education		4.56
				Total	100

Schedule constraints
It will be necessary that all instream work be completed during the work window established by the Washington State Department of Fish and Wildlife
Completion date
2001

Section 5. Budget

FY99 project budget (BPA obligated):	$n/a

FY2000 budget by line item

Item	Note	% of total	FY2000 ($)
Personnel	To be supplied by USFWS and NRCS $121,875.00		
Fringe benefits	To be supplied by NRCS and USFWS = $30,000.00		
Supplies, materials, non-expendable property			
Operations & maintenance			
Capital acquisitions or improvements (e.g. land, buildings, major equip.)			
NEPA costs	To be supplied by USFWS 20 bio-days @ $625 per day = $12,500.00		

Construction-related support		52.14	300,000.00
PIT tags	# of tags:		
Travel	to be supplied by NRCS and USFWS $6,000.00		
Indirect costs			
Subcontractor			
Other	Training	0.87	$5,000.00
	TOTAL BPA REQUESTED BUDGET		$305,000.00

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount ($)
USFWS	NEPA costs	2.17	$12,500.00
	Travel	1.04	$6,000.00
	Monitoring $10,000 per year for 10 years	17.38	$100,000.00
	Personnel and benefits	13.20	$75,937.50
NRCS	Personnel and benefits	13.20	$75,937.50
	Total project cost (including BPA portion)		$575,375.00

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	0	0	0	0

Section 6. References

Watershed?	Reference
	Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. In: Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat, W.R. Meehan, ed. Special Publication 19. American Fisheries Society. Bethesda, Maryland.
X	Bugert, B. and D. Bambrick. 1996. Draft: Aquatic species and habitat assessment of the Wenatchee, Entiat, Methow, and Okanogan Watersheds for the Mid-Columbia Habitat Conservation Plan. Wenatchee, Washington.
	Bureau of Land Management, U. S. Department of the Interior. 1993. Riparian Area Management: Process for assessing proper functioning condition. Bureau of Land Management Service Center, Denver CO. BLM/SC/ST-93/003+1737.
	Chamberlain, T.W., R. D. Harr, and F.H. Everest. 1991. Timber Harvesting, Silviculture, and Watershed Processes. In: Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat, W.R. Meehan, ed. Special Publication 19. American Fisheries Society. Bethesda, Maryland.
X	Chelan County Conservation District. 1996. Draft: Wenatchee River Watershed Action Plan. Chelan County Conservation District. Wenatchee, Washington.
X	Hines, R. 1994. Wenatchee River Watershed Ranking Project. Chelan County Conservation District. Wenatchee, Washington
	Hunter, H.J. 1991. Better Trout Habitat. A guide to stream restoration and management. Island Press, Washington D.C.
	Meehan, W.R., F.J. Swanson, and J.R. Sedell. 1977. Influences of riparian vegetation on aquatic ecosystem with particular reference to salmonid fishes and their food supply. Symposium on the Importance, Preservation and Management of the Riparian Habitat. Tuscon. Arizona
	Meehan, W.R., and W.S. Platts. 1978. Livestock Grazing and the Aquatic Environment. Journal of Soil and Water Conservation 33:274-278.

	Megahan, W.F. 1982. Channel sedimentation storage behind obstructions in forested drainage basins draining the granitic bedrock of Idaho batholith. In: Swanson, (and others). Sediment budgets and routing in forested drainages. General Technical Report PNW-141. Portland, Oregon: USDA Forest Service, Pacific Northwest Research Station. 141-121.
X	Mitchell, G., R.A. Lobos. 1996. Chumstick Stream Survey and Flood Damage Assessment. U.S.D.A. Natural Resource Conservation Service. Wenatchee, Washington.
X	Mullan, J.W. 1984. Overview of artificial and natural propagation of coho salmon (*Oncorhynchus kisutch*) on the mid-Columbia River. Report No. FRI/FOA-84-4. Fisheries Assistance Office, U.S. Fish and Wildlife Service. Leavenworth, Washington.
	National Marine Fisheries Service. 1996. Factors for Decline: A supplement to the notice of determination for west coast steelhead under the Endangered Species Act. Available from National Marine Fisheries Service. 525 NE Oregon St. Suite 500, Portland, Oregon 97232. 55 pp.
	Nehlsen, W., J.E. Williams, and J.A. Lichatowich. 1991. Pacific Salmon at the crossroads: stocks at risk from California, Oregon, Idaho, and Washington. Fisheries 16920:4-21.
X	ODFW (Oregon Department of Fish and Wildlife) and WDFW (Washington Department of Fish and Wildlife). 1995. Status report: Columbia River fish runs and fisheries. 1938-1994. Olympia, Washington.
	Petersen, K., R. Eltrich, A. Mikkelsen, and M. Toneth. 1995. Downstream movement and emigration of chinook salmon from the Chiwawa River in 1994. Report H95-09. Washington Department of Fish and Wildlife, Wenatchee, Washington.
X	Peven, C., and K. Truscott. 1995. Spring and summer chinook spawning ground surveys on the Wenatchee River Basin, 1994. Chelan County PUD, Wenatchee, Washington.
	Platts, W.S. 1991. Livestock Grazing. In: influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitat, W.R. Meehan, ed. Special Publication 19.
	Powers, P.D., and J.F. Orsborn. 1985. Analysis of Barriers to Upstream Fish Migration. An Investigation of the Physical and Biological Conditions Affecting Fish Passage Success at Culverts and Waterfalls. Washington State University, Pullman, Washington 99164-3001. 120 p.
	Reeves, G.H., F.H. Everest, and J.R. Seddell. 1993. Diversity of juvenile anadromous salmonid assemblages in basins in coastal Oregon, USA with different levels of timber harvest. Transaction American Fisheries Society.
	Rieman, B. E., and J.D. McIntyre. 1993 Demographics and Habitat Requirements for Conservation of Bull Trout. General Technical Report INT-302. U.S.D.A. Forest Service, Intermountain Research Station. Ogden, Utah.
	Rosgen, D. and H.L. Silvey. Applied River Morphology. Wetland Hydrology. Pagosa Springs, CO. 450 pp.
	Steele, R. 1997 and 1998. Interviewed (telephone) by Kate Terrell. Washington Department of Fish and Wildlife. Wenatchee, Washington.
X	Titus, K. 1997. Stream Survey Report, Chumstick Creek, Washington. U.S. Fish and Wildlife Service. Leavenworth, Washington.
	Washington Department of Fish and Wildlife. 1993. Washington State Salmon and Steelhead Stock Inventory. Olympia, Washington.
	Washington Department of Fish and Wildlife. 1997. Washington State Wild Salmonid Policy. Olympia, Washington.
	Washington Department of Fish and Wildlife. 1998. Washington State Salmon and Stock Inventory: Bull trout/Dolly Varden. Olympia, Washington.
X	U.S.D.A. Forest Service. 1994. Mission Creek Watershed Assessment. Leavenworth Ranger District, Wenatchee National Forest. Leavenworth, Washington.
	U.S.D.A. Forest Service. 1995. Stream Inventory Handbook Level I and II, (Hankin-Reeves Inventory).

PART II - NARRATIVE

Section 7. Abstract

Chumstick Creek is a 3rd order stream, which drains a 78 square mile sub-basin of the Wenatchee River watershed. In 1994, Chumstick Creek was ranked second to Mission Creek as contributing to current and future potential water quality degradation in the Wenatchee River watershed (Hines, 1994). The stream once supported healthy populations of chinook *(Oncorhynchus tshawytscha)*, steelhead *(Oncorhynchus mykiss)* and bull trout *(Salvelinus confluentus)*, however access to Chumstick Creek is now limited due to 23 culverts that are migrational barriers particularly at low flows (Bugert and Bambrick, 1996). Several of these sites were affected by the 1995-1996 floods and the high water run off of 1997. The over all goal of this project is to enhance and improve salmonid migration throughout the Chumstick drainage. In addition to replacing the 23 identified culverts, 10 to 15 sites will be enhanced by improving in-stream habitat and riparian vegetation. All in-stream work will be completed by November 2000. Riparian vegetation will be replanted in the spring of 2001. Two other projects are presently being implemented within the watershed. They are a point source pollution project, funded by Washington Department of Ecology and the replacement of the large culvert on Highway 209, funded by the Bonneville Power Administration. With the completion of all three projects, the health of the watershed will be improved dramatically. These projects will provide access to 78 square miles of habitat for anadromous and resident fish. In addition to the habitat for fish, the migrational corridor for waterfowl, bald eagles, spotted owls, and grey wolves will be improved. Monitoring sites will be set up throughout the watershed. The parameters will include; water quality; cross section; sediment; habitat; and photo points.

Section 8. Project description

a. Technical and/or scientific background

Chumstick Creek is a 3rd order stream, which drains a 78 square mile sub-basin of the Wenatchee River watershed. In 1994, Chumstick Creek was ranked second to Mission Creek as contributing to current and future potential water quality degradation in the Wenatchee River watershed (Hines, 1994). The stream once supported healthy populations of chinook, steelhead and bull trout, however access to Chumstick Creek is now limited due to 23 culverts that are migrational barriers particularly at low flows (Bugert and Bambrick, 1996).

Species of salmonids affected within this watershed include: chinook salmon, steelhead, bull trout, and rainbow trout. For the upper Columbia Evolutionary Significant Unit (ESU), steelhead have been listed as endangered and chinook are proposed for listing under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS). Bull trout are listed as threatened under ESA by the U. S. Fish and Wildlife Service (USFWS). Coho salmon (*O. kisutch*) were once present in some of the tributaries of the Mid-Columbi Region (Mullan, 1984; Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife, 1995), but are now considered extinct (Nehlsen et al. 1991). It has been proposed that non-native coho salmon populations be introduced to the Mid-Columbia Region, specifically Chumstick Creek.

Stream-type chinook salmon (spring run) return to the Wenatchee River from late April through June. The primary spawning areas are the Chiwawa River between Grouse and Phelps Creeks, Nason Creek between Kahler and Whitepine Creeks, the Little Wenatchee River between river kilometer (RK) 1 and 11, the White River between Sears Creek and White River Falls, and the mainstem Wenatchee River between Chiwaukum Creek and Lake Wenatchee (Peven and Truscott, 1995). Limited amount of spawning has also been reported in Peshastin, Chumstick and Mission creeks (Wenatchee National Forest, 1994). Spawning begins in early August in the upstream reaches of the tributaries and continues downstream through September. Juveniles emerge from the gravel from late March through early May. They generally spend their first summer in the subbasins, and leave in late fall through the following spring. The peak of spring migration is late April through May, but downstream movement from the tributaries may be continuous, and not always associated with parr/smolt transformation (Petersen et al. 1995).
Steelhead use the mainstem Wenatchee River and eight of it tributaries; lower Mission Creek, Sand, Brender, Peshastin, Chumstick, Icicle, Chiwaukum, Nason creeks, and the Chiwawa, Little Wenatchee, and White rivers. Some fry and parr rear in the mainstem Wenatchee all year. Steelhead that use the upper reaches of tributary habitats (Peshastin and Chumstick, for example) have probably been more heavily impacted by forest practices, improper grazing, stream channel alterations and unauthorized water withdrawals than have stream-type chinook

salmon (WNF 1994). These problems are in addition to riparian and shoreline impacts (Chelan County Conservation District 1996).

When adult salmon and steelhead enter freshwater, the maturing fish stop feeding and rely on energy reserves stored in body fat and protein to carry them through migration and spawning. The rate of sexual maturity is established by heredity, and cannot adjust to delays. Barriers that cause excessive delay and abnormal energy expenditures can result in mortality either during the migration or in the spawning areas. Physical barriers such as culverts and log jams can obstruct, either partially or totally, salmonid migration. In addition to existing barriers which delay or totally block up stream migration, spawning areas which were originally accessible have become inundated by reservoirs and other in-stream modification. Therefore, existing man-made barriers must be modified to further open the "window of passage" to spawning areas (Powers and Orsborn 1984).

There are six common conditions at culverts that create migration barriers (Powers and Orsborn 1984):

- excess drop at culvert outlet;
- high velocity within the culvert barrel;
- inadequate depth within culvert barrel;
- high velocity and/or turbulence at culvert inlet;
- turbulence within the culvert;
- debris accumulation at culvert inlet.

Culvert barriers are the result of design, improper installation, inadequate maintenance, or subsequent channel changes. They are very often the result of degrading channels that leave the culvert perched. Changes in hydrology because of urbanization are a primary reason for degrading channels. Barriers are also caused by scour pool development at the culvert outlet. The scour pool may be good habitat in itself but it moves the backwater control of the elevation further downstream and therefore to a lower elevation. Large scour pools are often an indicator that a velocity barrier exists within the culvert at high flows (USFWS 1997).

A stream survey was conducted by USFWS and Natural Resources Conservation Service (NRCS) during the fall of 1996 (USFWS, 1996). The survey was a modified Hankin and Reeves (USFS 1991). Information complied into a quantitative and qualitative habitat report focusing on habitat restoration sites. Twenty three culverts were identified as migrational barriers with associated habitat degradation. These sites are the focus of this proposal.

The existing resource condition of Chumstick Creek is described as the following:

Temperature

Temperature in Chumstick Creek did not exceed 11^{o} C at the North Road from August 1995 through May 1996 (Chelan County Conservation District 1996). Salmonids are cold water fish with distinct temperature requirements. Temperature ranging between 23^{o} C and 29^{o} C can be lethal to salmonids and char depending on species and acclimation temperature (Bjornn and Reiser 1991). Temperature is one of the factors which contribute to quality of habitat for fish.
The temperature regime in Chumstick Creek does not appear to be a limiting factor for salmonids.

Pool: Riffle: Side Channels

Pools are the result of local scour or impoundment by structural controls (Chamberlain et al. 1991). Deep or primary pools, can provide a thermal refuge during summer low flows (Reeves et al. 1991). Pools also provide rearing habitat for juvenile salmonids and resting areas for adults. During high flows, pools can help slow the velocity of water, dissipating energy and reducing erosion while providing slower water areas. Chumstick Creek has an acceptable amount of pool habitat; however, the depth in many of these pools do not provide sufficient refuge for fish during low flow periods. Results indicate that a higher frequency of primary pools would enhance fish habitat in Chumstick Creek (Titus 1997).

Riffles are areas of increased gradient and substrate particle size. Riffles are areas of food concentration but offer lower quality habitat for smaller fish (Chamberlain et al. 1991). Riffles are also necessary spawning areas (Hunter 1991). The pool to riffle ratio is an indicator of the habitat components in a stream. In a trout producing stream the pool to riffle ratio should range between 0.5:1 and 1.5:1 (Hunter 1991). In all three reaches, Chumstick Creek falls in within this range indicating that the pool ratio exceeded guidelines signifying that greater depth is need in these pools (USFWS 1996).

No side channels were found on the private lands portion of Chumstick Creek (USFWS 1996). Side channels are important in providing over wintering habitat, refuge during high flow periods, and rearing habitat for juvenile salmonids as well as habitat for waterfowl. Highway 209 and the Burlington Northern Railroad closely parallel Chumstick Creek channelizing the creek and limiting the width of the riparian zone and flood plain. Ditches along roads collect surface runoff and can transport large amount of sediment into the stream (Chamberlain et al. 1991).

Sediment

Excessive fine sediment, such as silt and sand can produce a variety of problems for fish. Suspended sediments may accumulate on gill filaments and inhibit the ability of the gills to function properly (Meehan and Platts 1978). Bedload sediment may limit spawning areas and increase the mortality rates of incubating eggs (Meehan et. Al. 1977) Excessive fine sediment on the stream bottom eliminates habitat for aquatic insects (Nelson et al. 1991), a food source for many fish. Increased sediment load in a system can lead to aggradation of the stream (Hunter 1991). This condition can effectively force water over the banks during high flow events.

The 29-36% fines observed in riffles in the Chumstick Creek would be considered excessive (USFWS 1996). Embryo survival decreases rapidly as the percent fines increases (Bjornn and Reiser 1991). Mortality rates, for rainbow trout and steelhead reportedly reach 50% when fine sediment levels reach 30-40% (Bjornn and Reiser 1991) Due to the soil profile in the watershed, Chumstick Creek may have a normally high level of fine sediment, has likely increased due to disturbance to the riparian vegetation, removal of woody debris, development, road building and culverts (USFWS 1996).

Culverts

A culvert is a buried pipe structure that allows stream flows to pass under a road (Powers and Orsborn 1985). Improperly placed culverts can result in downstream and upstream bank erosion and instability. During bankfull flows this problem is exacerbated and can lead to the loss of a culvert and the road passing over it. Culverts may also pose problems to many fish species. When improperly installed, culverts can serve as migratory barriers to anadromous and resident fish. Twenty three culverts were identified as low flow migrational barriers on Chumstick Creek (USFWS 1996). Problems with these culverts comprise of the following:

- excess drop at culvert outlet;
- high gradient within the culvert;
- inadequate depth within culvert barrel;
- high velocity and/or turbulence at culvert inlet;
- turbulence within the culvert;
- debris accumulation at culvert inlet;
- undersized culverts;
- mis-aligned causing erosion both up and down stream.

Throughout the Chumstick Creek survey area 23 culverts were identified as problems: 18 were classified as too small to pass bankfull flows and associated debris, 9 were identified as exceeding the Washington State Administrative Code (WAC) for gradients and result in low flow barriers. Most of the identified culverts are mis-aligned causing erosion and increased sediment loads in the watershed (USFWS 1996, NRCS 1996).

Large Woody Debris

Large woody debris creates diverse pools and habitat complexity necessary for fish and wildlife (Bureau of Land Management 1993). In addition to creating pools, large woody debris serves to stabilize sinuous streams (Hunter 1991), and can dissipate stream energy associated with high water flows resulting in less erosion to the stream bed and banks. This will increase capacity for sediment storage in the channel and greater habitat diversity (BLM, 1993). While Chumstick Creek had an abundance of small sized woody debris, it is lacking in larger wood. Large wood is of a size that will remain in the creek during bankfull flows, providing long-term benefits (USFWS, 1996)

Bank Stability

Bank stability is a measure of actively eroding banks at an elevation above the bankfull depth (Rosgen 1996). This criteria does not account for the slumping banks associated with areas inundated by reed canary grass which may also be a stability problem. Bank erosion in Chumstick Creek is usually associated with disturbance to the riparian zone. The high rate of unstable banks in Chumstick Creek associated with private lands is the result of increased incidence of culverts and greater disturbance to the riparian zone due to development.

Riparian Vegetation

Riparian vegetation is one of the more critical elements when determining the health of a stream. The root systems of the riparian plants are key in stabilizing stream banks and reducing erosion. Riparian vegetation provides a protective canopy, particularly over small streams, that helps maintain cold stream temperatures in summer (Murphy and Meehan, 1991). A healthy riparian zone can benefit water quality by serving as a buffer, or filter, against surface runoff. Trees in the riparian zone are the ultimate source of large woody debris in a system. Trees provide shade and streambank stability. As trees mature and fall into or across streams, they not only create high-quality pools and riffles but they also help to control the gradient and stability of the stream channel (Platts 1991). During floods, as water moving at high velocities rises, it flattens flexible stream side vegetation such as willow or dogwood into mats that adhere to the streambanks. This reduces the water velocity along the stream edge, causing sediment to filter out and reduced bank erosion (Platts, 1991). Where stream side vegetation is lacking these protective mats and root masses are absent and the banks may erode. Riparian vegetation improves flood-water retention (BLM, 1993), reducing peak flows and frequency of peak flows. Disturbance to the riparian zone has the capacity to increase damages from floods, and on a larger scale, increase the frequency of high flow events, and adversely affect water quality and fish, wildlife and private property.

Chumstick Creek has a dense riparian zone in undisturbed areas. Disturbed areas lack woody vegetation and are frequently characterized by thick growths of reed canary grass, bare soil, and unstable or actively eroding banks. While reed canary grass does provide some protection to the stream bank, it does not form the root mass required for bank stabilization. Disturbance to the riparian zone is common and wide spread in the reaches surrounded by private land owners. Bank erosion in Chumstick Creek is usually related to the lack of riparian vegetation and mis-aligned culverts.

Recommendations

1. Replace or refit culverts which are causing bank instability, migrational barriers or are too small to pass the high flows and debris. Half-arch pipes or bridge replacements are recommend.

2. Revegetate unstable or impacted stream banks with native riparian vegetation including: black cottonwood, red osier dogwood, alder, aspen, willows and native stream bank grasses. Development of root systems will stabilize banks, reduce sediment loads and siltation and promote habitat diversity for fish and wildlife.

3. Increase large wood debris in Chumstick Creek. This can be accomplished by using root wad revetments and establishing in-stream habitat components.

4. Discourage the growth of reed canary grass by revegetating inundated areas with native vegetation.

5. Encourage projects (drop structures and gravel catchment) which promote the formation of clean gravel beds and which scour the stream bed to flush out silt and clean the gravel beds.

b. Rationale and significance to Regional Programs

Steelhead are listed and spring chinook are proposed as endangered in the Wenatchee River drainage under the Endangered Species Act (ESA) by the National Marine Fisheries Service (NMFS, 1997). In addition, bull trout were listed on June 10, 1998 as threatened under the ESA by USFWS (63 FR 31647). Along with the mainstem Columbia River Dams, land use practices and water allocations, loss of habitat is recognized as a factor in the decreasing salmonid populations (NMFS 1996, USFS 1995).

Through the restoration of in-stream habitat, riparian vegetation and the reduction of migrational barriers on Chumstick Creek, a migrational corridor will be re-established for chinook, steelhead, and possible induction of coho. This project will make available 78 miles of spawning and rearing habitat which is currently inaccessible.

This project will further the goals of the Fish and Wildlife Policy (FWP) by improving habitat degradation and migrational barriers within the Wenatchee River Watershed. It will improve the quality and quantity of habitat available in Chumstick Creek thus allowing greater juvenile and adult survival at each freshwater stage and may result in more offspring surviving to begin migration to the ocean.

In addition to the habitat benefits to Chumstick Creek, this project will be used as a demonstration site to promote a watershed approach to bio-engineering and habitat restoration. Results of this project will be presented at a number of workshops to educate local land owners on the benefits of restoration and how to work within the Endangered Species Act. The project area will also serve as an outdoor class room for high school students in the Leavenworth area. This project will provide an opportunity for students to get hands on experience in natural resources and stream restoration.

By replacing the 23 identified culverts and restoring the adjacent habitat, the Chumstick Watershed will have the following benefits:

6. Improved migrational passage for salmonids and other aquatic species.
7. Reduced sediment loads.
8. Increased water quality through the use of riparian buffers.
9. Increased riparian habitat which will improve the travel and migrational corridor for neotropical migratory birds, waterfowl, Canada lynx, deer and other species. This will also improve the prey base for eagles.
10. This project will establish accessibility to 78 miles of spawning and rearing habitat for aquatic species and restore approximately 50 acres of riparian area along the creek.

The Chumstick Creek Restoration Project is a cooperative effort between U.S. Fish and Wildlife Service, the Natural Resource Conservation Service, Washington Department of Fish and Wildlife, Trout Unlimited, Chumstick Watershed Association, Chelan County Conservation District, and local land owners.

c. Relationships to other projects

Along with another project funded by BPA in FY 99 (culvert replacement of Highway 209), the Chelan County Conservation Grant for point source pollution and the Chumstick Watershed Association's riparian revegetation efforts, this proposal provides a key element to a watershed approach to restoration. The Chumstick Watershed will be used as a model project to encourage people living in others watershed to participate in these types of activities.

The Chumstick Creek Restoration Project is a cooperative effort between U.S. Fish and Wildlife Service, the Natural Resource Conservation Service, Washington Department of Fish and Wildlife, Trout Unlimited, Chumstick Watershed Association, Chelan County Conservation District, and local land owners.

d. Project history (for ongoing projects)

This is a new project. This proposal was submitted for the FY99 cycle, however because of budget constraints the project was not funded.

e. Proposal objectives

MAIN GOALS AND OBJECTIVES: Replace 23 culverts that have been identified as migrational barriers and associated habitat degradation on Chumstick Creek. To improve anadromous salmonid passage and enhance in-stream and riparian habitat. Improvement of habitat quality will allow greater juvenile and adult survival at each freshwater stage and thus may result in more offspring to begin migration to the ocean.

1. Combine stream survey on private land with that of the USFS watershed analysis of Chumstick Creek.

2. Develop a restoration plan for the 23 project site.

3. Coordinate with private land owners and co-sponsors on project design. This is necessary to promote a holistic watershed restoration approach.

4. Implement the restoration plan. This includes replacing 23 culverts and restoring associated habitat.

5. Revegetate the project sites.
6. Establish a monitoring plan including photo points and cross sections.

7. Develop a slide presentation and curriculum for workshops and local students.

f. Methods

1. Complete a survey of the project site and combine this information with that of the Forest Service Watershed Analysis.

2. Once both watershed documents have been combined, a restoration plan will be developed. This plan will include the following problems:

a. Replacement of 23 culverts.
b. Restore habitat degradation associated with the culverts.
c. Establish a high poll/riffle ratio.
d. Increase cover.
e. Decrease stream gradient.
f. Increase stream stability.
g. Improve in-stream habitat for salmonids.
h. Improve riparian vegetation.

3. Designs will be developed to implement the restoration plan. These designs will be bio-engineered. This will incorporate new culverts, large woody debris, rock and vegetation.

4. Biological assessment on permits applications will be submitted to the state, local and federal agencies.

5. Construction will take place during the 2000 field season. Structures will include the following:

a. Replacement of the 23 culverts.
b. Installation of root wad revetments.
c. Installation of rock veins and vortex weirs.
d. Installation sunken log habitat structures.
e. Recontour eroding banks.
f. Revegetation of the riparian area adjacent to the project sites.

6. Establish a monitoring plan. This will include the following parameter:

a. Riparian vegetation.
b. Deposition pattern
c. Debris occurrence

d. Meander pattern
e. Sediment supply
f. Bed stability
g. Width/depth ratio

7. Establish monitoring points

8. Re-establish riparian vegetation. This will be accomplished by planting bare root stocks of black cotton wood, quaking aspen, willow sp., red-osier dogwood, snowberry, service berry and wild rose. All disturbed area will be reseed using native streambank grasses.

9. Develop a slide presentation and curriculum for educational presentation.

g. Facilities and equipment

U.S. Fish and Wildlife Service and the Natural Resource Conservation Service will supply all materials necessary to preform the surveys and develop the restoration and monitoring plans. This proposal is a request for on the ground restoration materials and equipment needed for installation of the project. A contractor will be hired to supply all construction equipment, rock, root wads, and culverts necessary for construction of the projects. The IDT will work with the contractor to obtain all materials necessary for the project.

h. Budget

The following is the funding request for BPA:

11. $300,000 for implementation of the restoration plan. This will include the installation of 23 new culverts and associated instream and riparian habitat.

12. $5,000 for training of key personnel. This will include the course Natural Channel design and River Restoration by Dave Rosgen.

Cost share opportunities include the following:

13. **U.S. Fish and Wildlife Service**:

a. NEPA = $ 12,500.00

b. Travel = $ 6,000.00

c. Monitoring = $100,000.00

d. Personnel and benefits = $ 75,937.50

Total $194,437.50

14. Natural Resource Conservation Service:

a. Personnel and benefits = $ 75,937.50

Total 75,937.50

Total Project Contribution:

BPA = $305,000.00 *(53.0% of the total project cost)*

USFWS = $194,437.50 *(33.8% of the total project cost)*

NRCS = $ 75,937.50 *(13.2% of the total project cost)*

Section 9. Key personnel

Kate Terrell is a fish and wildlife biologist with the U. S. Fish and Wildlife Service in Moses Lake, Washington. She joined the U. S. Fish and Wildlife Service in 1992. Prior to working for the USFWS, she worked for the Oregon Department of Fish and Wildlife and the U. S. Forest Service. Her work currently focuses on habitat restoration in anadromous systems.

Currently, she is working with private land owners, local groups and other agencies in the Chewuch, Entiat, Wenatchee, Okanogan and Methow Rivers as well as Swale, Rattlesnake and Chumstick creeks. This work focuses on the development and implementation of restoration plans.

Joseph Lange, P.E. is an engineer for the Natural Resource Conservation Service in Wenatchee, Washington. He received his bachelors degree of engineering from Washington State University in Pullman, Washington in 1987. Since graduation he has worked for the NRCS, where he has focused on designing bio-engineered projects on river systems in the state of Washington. Currently, he is working on habitat restoration projects in eastern Washington.

Construction will be completed by a licenced construction firm experienced in these types of activities.

Section 10. Information/technology transfer

A series of workshops will be held within the region to show the benefits of a watershed approach to restoration. These workshops will include point and nonpoint source pollution, riparian restoration as well as in-stream habitat. It is our goal to educate the public on how to restore and maintain a healthy ecosystem. The Chumstick drainage will also be used as an outdoor classroom for the local schools.