Bonneville Power AdministrationPower Administration
Fish and Wildlife Program FY99 Proposal Form

Section 1. General administrative information

Implement Entiat Model Watershed Plan

Bonneville project number, if an ongoing project. 9031

Business name of agency, institution or organization requesting funding.

Chelan County Conservation District (CCCD)

Proposal contact person or principal investigator:

Name	Peggy Entzel, Office Manager
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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
John Anderson Excavation	P.O. Box 323	Leavenworth, WA 98826	John Anderson
New Horizons Excavation	98 Lakeshore Dr.	Manson, WA 98831	Bob Knauss
Entiat River Native Trees	9575 Entiat River Rd.	Entiat, WA 98822	Rex Pittsinger

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

7.7B.2--model watersheds; 7.8D.1--streambank restoration; 7.8D.2--native plant nurseries

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

The NMFS Biological Opinion for actions affecting upper Columbia steelhead is not completed at this time.

Other planning document references.

The need for this type of instream and riparian restoration on the lower Entiat River has been specifically cited in the following planning documents:

(1) Habitat Assessment, Mid-Columbia Mainstem Habitat Conservation Plan for Chelan, Douglas, and Grant PUDs; Page 47.

(2) U.S. Forest Service Watershed Assessment, Entiat Analysis Area, Version 2.0; Page F.64.

(3) *Wy Kan Ush Me Wa Kush Wit*, recovery plan by Columbia River Intertribal Fish Commission; Page 76.

(4) Northwest Power Planning Council's Entiat River Sub-basin Plan; Page 52

Subbasin. List subbasin(s) where work is performed.

Entiat River Watershed, Washington State (WRIA Number 46).

Short description.

Build 60 instream habitat structures and plant 12,177 m of riparian vegetation along private lands of the Entiat River as part of the Model Watershed Plan.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish	X	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
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.

Entiat Model Watershed Project, habitat restoration, riparian vegetation, native plant nurseries

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9202602	Eastern Washington Model Watershed Coordinators	The Entiat is not directly funded by BPA in this project, but was formed as a AModel Watershed,≅ allowing better regional coordination and adaptive management.
9401800	Washington Model Watershed Projects	Same relationship as above.

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Build instream structures	a	Procure and stage materials
		b	Install structures
2	Plant riparian vegetation	a	Propagate local root stock
		b	Plant selected areas
3	Inform and involve public	a	Create informational signs
		b	Conduct field tours
4	Evaluate project efficacy	a	Public acceptance
		b	Habitat complexity and use
		c	Structure longevity

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	04/1999	08/2001	63%
2	10/1998	03/2001	22%
3	06/1999	09/2001	10%
4	09/1999	09/2001	5%

Schedule constraints.

Objective 1: In general, the instream structures must be built in the summer low flow period (1 July to 15 August), after steelhead spawning and prior to spring chinook spawning. Twenty structures will be built each season (1999, 2000, and 2001; task b), while procurement and staging of materials (angular rock, tree boles, and root wads) will be done outside the work

window (task a). Although we are preparing contingency suppliers, one factor that may affect this schedule would be the inability to secure supplies (root wads, boles, etc.) in a timely manner. If this occurs, structures may be built outside the work window in selected locations where there are no redds (these locations will be identified by the WDFW regional habitat manager).

Objective 2: Immediately upon notice of funding by BPA, CCCD will contract with a local Entiat River nursery to propagate bare root stock (task a). These will be available for planting the following dormant season (10/99; task b). Native root stock propagation will continue through the contract period; plantings will be done during late fall and early spring throughout the contract period. If this nursery cannot meet schedule constraints, a secondary supplier (located in Moses Lake, WA) will be used. Also, the Entiat Ranger District (USFS) will supply root stock Ponderosa pines and Douglas fir.

Objective 3: Demonstration tours will begin after the first field season of construction and plantings begin. The schedule of this objective will be variable, depending upon need. We see no constraints to this schedule.

Objective 4: Baseline habitat quality, use, and fish abundance surveys began late summer 1997 (prior to contract initiation with BPA), and will continue on representative sites for each treatment group (vortex rock weirs, log spurs, bank barbs, rootwad revetments, and conifer streambank treatments). Post-construction surveys will be done in every late-summer thereafter. Personnel time and equipment for these surveys are donated by USFWS, WDFW, USFS, NRCS, and other members of the *Entiat Model Watershed Plan*. We see no constraints to this schedule.

Completion date.

The active restoration component of the *Entiat Model Watershed Plan* (instream structure placement and riparian plantings) will be completed by August 2001. The passive restoration and protection work (and many other elements of the watershed plan) will continue indefinitely. We do not anticipate a need for BPA support for these other projects. The evaluation of instream structures and riparian plantings will also continue indefinitely.

Section 5. FY 99 Budget

Item	Note	FY99
Personnel	Watershed Projects Coordinator	$7,900
Fringe benefits	15% of personnel costs	$1,185
Supplies, materials, non-expendable property	6,000 cubic yards of rock @ $23/cy	$138,000
Operations & maintenance		
Capital acquisitions or improvements		
PIT tags		
Travel	1,200 miles @ $0.31/mile	$372
Indirect costs	Filter fabric, mesh, office supplies etc.	$2,000
Subcontracts	Walking excavator (160 hrs @ $200/hr)	$32,000
Subcontracts	Root stock propagation	$18,171
TOTAL		$199,628

Outyear costs

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	210,000	180,000	0	0
O&M as % of total	<5%	<5%		

Section 6. Abstract

Landowners and technical staff from co-managing agencies and tribes completed their multiple resource management plan for the Entiat Watershed. This consensus plan is based on the *Model Watershed Approach* developed in the 1994 Columbia Basin Fish and Wildlife Program (Program Measure 7.7B). The plan identifies many actions to benefit wildlife and fish, particularly steelhead, listed as "endangered" and spring chinook salmon, a candidate species, under the federal Endangered Species Act (ESA). We request BPA funds to do two active restoration projects identified in the Entiat Plan (although several passive restoration projects have been identified and will be done through other means): (1) build 60 instream structures, and (2) plant 12 km of native riparian vegetation. The types and locations of these projects were identified by a multidisciplinary team of specialists from agencies and tribes, and approved by landowners. This project will be done in three years (funding needs are $199,628 in FY99, $210,000 in FY00, and $180,000 in FY01). Short-term success will be evaluated by the acceptance of other landowners to participate in the plan. Long-term success will be measured in (1) stream characteristics (e.g.; pool:riffle and width:depth ratios), (2) microhabitat use of salmon and steelhead, (3) structure longevity, and (4) cost effectiveness compared to other restoration projects in the watershed.

Section 7. Project description

a. Technical and/or scientific background. In 1992 landowners and technical staff from co-managing agencies and tribes[1] began work on a Model Watershed Plan. The mission statement for this plan is *To voluntarily bring people together to improve communications, reduce conflicts, address problems, reach consensus, and implement actions to improve natural resource management on associated private and public lands in the Entiat Watershed.* Landowners initiated this process based on a 1991 workshop sponsored by the Northwest Power Planning Council (NPPC), and has followed the strategies outlined in Program Measure 7.7B of the NPPC's Columbia Basin Fish and Wildlife Program (FWP). This plan is completed and will be released in January 1988. The plan will be updated as necessary to reflect new scientific, social, and political issues. The action plan includes a multi-year project schedule which addresses water quality problems, public education, and the protection and restoration of salmonid habitat. This plan will be submitted to National Marine Fisheries Service (NMFS) as an important step in development of a multi-species Habitat Conservation Plan (HCP). If approved, this will provide affected landowners a Section 10 incidental take permit for steelhead, listed as Aendangered≅ under the ESA. In June 1995, members of the Entiat Landowner Steering Committee met with NMFS representatives to begin development of an HCP.

Since the majority of the watershed is in public ownership, the *Entiat Model Watershed Plan* works in collaboration with the USFS, who identified the Entiat as a Akey watershed≅ in the President=s Forest Plan. Many of the protection and restoration activities will be done with the USFS, thereby reducing overall costs. Other objectives of the *Entiat Model Watershed Plan* include: (1) water conservation measures, (2) upland restoration, (3) passage improvements, and (4) both passive restoration and protection of habitats, all with the intent of improving conditions for salmon and steelhead on a holistic watershed basis. We expect that some of the actions will be funded in part by: (1) the Mid-Columbia PUDs= HCP, (2) the WDOE and the Washington State Conservation Commission, and (3) Ain-kind≅ contributions from WDFW, USFWS, USFS, and NRCS (refer to Section 8).

b. Proposal objectives. One important objective of the *Entiat Model Watershed Plan* is to restore salmonid habitat that was destroyed or eliminated during several stream channelization projects in the 1950s to control floods (CCCD 1996). The lower Entiat River (about 30 km) was extensively channelized and diked by the Corps of Engineers in 1958. As a result, Activity 1.1 of the *Entiat Model Watershed Plan* states "work with funding agencies...to enlist landowners as cooperators for installation of instream habitat improvements where the river

[1] *The Entiat River Technical Advisory Committee has representatives from Chelan County Conservation District (CCCD), U. S. Fish and Wildlife Service (USFWS), U. S. Forest Service (USFS), Natural Resource Conservation Service (NRCS), Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (WDOE), Yakama Indian Nation (YIN), the Mid-Columbia Public Utility Districts (PUDs), and the Audubon Society.*

passes through or along their property" (*this is Objective 1 of this grant application*).

At the request of the Landowner Steering Committee, the Entiat River was inventoried in 1995 by a team of technical specialists with expertise in riparian ecology, fish ecology, stream geomorphology, aquatic habitat, and geology. The inventory included all reaches that flowed through private lands (CCCD 1996). The results of this inventory was the identification of five alternatives for treatment levels, ranging from "minimal action" to "restoration to pre-settlement conditions." These alternatives were reviewed by the Landowner Steering Committee, who selected Alternative 4, which recommends, among other actions, (1) the placement of 60 instream habitat structures (Objective 1) and (2) the planting of 12 km of riparian vegetation (*Objective 2 of this grant application*) in a 30 km reach of the lower Entiat River (Attachment A). Ten different structure types will be used for this restoration work, based on technical analyses of the physical characteristics of the stream and fish habitat needs. Riparian plantings will be multiple-aged dormant stock of various trees and shrubs *native* to the Entiat River.

To initiate the program, the Landowner Steering Committee selected two sites for restoration in 1998. A grant application was submitted to BPA in 1997 to fund this phase. One purpose of these structures is to demonstrate to Entiat Valley landowners of the type of actions to benefit salmon and steelhead under the *Entiat Model Watershed Plan*. The Landowner Steering Committee will then garner public support in this work (*Objective 3 of this grant application*). Most actions to restore habitat will then begin in 1999 and continue through 2001. These projects will then be evaluated in terms of biological, physical, and social benefits (*Objective 4 of this grant application*). Note that this application is for only two components of the overall watershed plan (instream structures and riparian plantings), both of which require active restoration. Many other components of the watershed plan, requiring protection and passive restoration of habitats, will be accomplished through other means.

c. **Rationale and significance to Regional Programs.** Completion of the *Entiat Model Watershed Plan* fulfills the requirements of Program Measure 7.7B.2. At this stage the Entiat Landowner Steering Committee wishes to implement this plan, thereby meeting Program Measure 7.7B.3, where "...priority on-the-ground..." work is performed. Objective 1 of this proposal will meet Program Measure 7.8D.1 to "...work with model watershed committees... to protect underwater lands..." The result of this work will be an immediate improvement in adult holding and juvenile rearing conditions for natural salmon and steelhead in the Entiat River. The Landowner Steering Committee feels this action is particularly important with the August 11 1997 decision by NMFS to list steelhead in the Entiat River as "endangered" under the ESA. These projects will also provide important overwinter habitat for bull trout, as the USFS identified the Entiat Watershed as a Astronghold≅ for bull trout (Brown 1992).

Objective 2 of this proposal will meet Program Measure 7.8D.2 to A...fund development of additional native plant nurseries.≅ Plants collected in the Entiat Watershed will be propagated and used for streambank stabilization. The success of these plantings, compared by age and size structure, will be evaluated compared to passive revegetation techniques (Kauffman et al. 1997).

d. **Project history.** The *Entiat Model Watershed* planning project has been underway since 1992, based on cost-share or "in-kind" contributions from the Entiat Watershed Landowners, NRCS, Chelan County, the Mid-Columbia PUDs, and the agencies and tribes represented on the plan=s Technical Advisory Committee (TAC). In 1995, this planning process gained momentum because of three factors: (1) the USFS identified the Entiat as a Akey watershed≅ in the President=s Forest Plan; (2) the NMFS announced the impending listing of steelhead under the ESA, and (3) the Mid-Columbia PUDs began development of a watershed protection/restoration program through their HCP.

A Watershed Projects Coordinator was hired in 1995, based on a cost-share process through Chelan County, NRCS, and the Mid-Columbia PUDs. This coordinator facilitated the development of the *Entiat Model Watershed Plan*, landowner/agency coordination, and project selection. This individual will allocate 10 hours/week to coordinate the active restoration projects funded by BPA during the 3-year implementation phase. Implementation of many upland restoration projects began in 1996, but most work will begin in 1998.

e. **Methods.** The TAC for the *Entiat Model Watershed Plan* emphasized passive restoration and protection of habitat (Bugert et al. 1997; Kauffman et al. 1997), yet recognized that active structural work is required on the lower Entiat River to reduce channelization impacts (Objective 1). In many reaches, the stream channel has dikes on both sides. These dikes severely restrict lateral migration of the channel, limit large woody debris recruitment, and give the stream a very high width:depth ratio. In many locations, dike removal would cause extensive damage to private property. Given this situation, the TAC felt installation of instream structures was the only practical restoration alternative for the identified reaches (Attachment B).

All work for Objective 1 will be done during the "hydraulic work window," a period in July and early August before spring chinook spawning, to eliminate risks to salmon and steelhead. Permits will be secured from WDFW, Chelan County, and the U.S. Corps of Engineers for the work. The WDFW regional habitat biologist will review the site for potential impacts to fish prior to permit issuance, and will supervise all work. The USFS will supply some materials for these structures, but some rock will need to be purchased and hauled to the sites. Instream structure construction will generally follow the guidelines of Binns (1986) and Mendel and Ross (1988). Each site has been field reviewed by a fluvial geomorphologist to identify which structure type is hydrodynamically

appropriate (Rosgen 1994). Furthermore, these projects are tied into upland restoration projects underway on both private and public lands.

To accomplish Objective 2, scions will be collected from established riparian areas in the Entiat Watershed for propagation. Multiple-aged species will be planted then as dormant root stock. Species included are red osier dogwood *(Cornus sericea)*, black cottonwood *(Populus trichocarpa)*, Pacific willow *(Salix lasiandra)*, water birch *(Betula occidentalis)*, western red cedar *(Thuja plicata)*, Ponderosa pine *(Pinus ponderosa)*, woods rose *(Rosa woodsii)*, and others native to the area. The sizes of the dormant root stocks will vary from 30 cm to 200 cm. We will then evaluate short-term (6 month) and long-term (30 month) performance of each species and size class. These planted locations will also be compared to locations receiving passive (non-planted) revegetation treatment at the 6 and 30 month stages to determine the cost effectiveness of the various treatment levels.

Actual plantings (and some of the evaluations) will be done by members of the Washington Conservation Corps (on contract to USFS, NRCS, and WDFW), volunteers from the Entiat Valley, and Entiat High School. Most plantings will be in autumn 1999 and 2000, but some will also be done in early spring 1999, 2000, and 2001. Width of the streamside plantings range from 6 m to 40 m (average of 12 m), depending upon the characteristics of the stream reach, need for restoration, and degree of interface with orchards. Some areas will be selected for passive (non-planted) riparian restoration, to allow an evaluation of active versus passive restoration strategies. All plantings and evaluations will be supervised by riparian ecologists from NRCS, USFS, or WDFW.

To meet Objective 3, the Watershed Coordinator will build interpretive signs to inform and involve the public of the restoration process. The CCCD will conduct field tours of these projects (CCCD 1997), and will promote this work through the local media. These tours will be coordinated through Washington State University Cooperative Extension Service, and the Center for Sustaining Agriculture and Natural Resources.

A multidisciplinary team of hydrologists, fishery scientists, and fluvial geomorphologists will carry out Objective 4, based on Ain-kind≅ contributions from co-managing agencies. Many of these evaluations are currently underway by members of the Technical Advisory Committee to the *Entiat Model Watershed Plan.* Habitat quality and use are being monitored using techniques compatible with the President=s Forest Plan for the Entiat Ranger District, Wenatchee National Forest (Haskins et al. 1993; Schuett-Hames et al. 1993; USFS 1995; USFS 1996).

f. **Facilities and equipment.** For Objective 1, a "walking excavator" will be used to construct the instream structures, according to design specifications established by fluvial geomorphologists and fish habitat biologists. Fish habitat biologists with

experience in constructing instream structures will supervise the project, based on Ain-kind≅ contributions. For Objective 2, a native plant nursery located in the Upper Entiat Watershed will propagate the dormant root stock. For Objective 3, interpretive signs will be built by CCCD, with Ain-kind≅ support by USFS and NRCS. All equipment for Objective 4 are Ain-kind≅ donations by co-managers.

g. References.

Binns, N. A. 1986. Stabilizing eroding streambanks in Wyoming: a guide to controlling bank erosion in streams. Wyoming Game and Fish Department. Cheyenne, WY.

Brown, L. G. 1992. Draft management guide for the bull trout, *Salvelinus confluentus* (Suckley) on the Wenatchee National Forest. Washington Department of Fish and Wildlife, Wenatchee, WA.

Bugert, R. M., and twelve coauthors. 1997. Aquatic species and habitat assessment: the Wenatchee, Entiat, Methow, and Okanogan Watersheds. Available from Chelan County Public Utility District, Wenatchee, WA. 104 pages.

CCCD (Chelan County Conservation District). 1996. Entiat River inventory and analysis. Available from Chelan County Conservation District, Wenatchee, WA. 23 pages plus appendices.

CCCD 1997. Long-range plan and 1997-1998 annual plan of work. Available from Chelan County Conservation District, Wenatchee, WA.

Haskins, J., P. Dawson, K. MacDonald, and T. Robison. 1993. Stream health parameter/ desired future condition analysis. Wenatchee National Forest, Wenatchee, WA.

Kauffman, J. B., R. L. Betscha, N. Orting, and D. Lytjen. 1997. An ecological perspective of riparian and stream restoration in the western United States. Fisheries (Bethesda), 22(5):12-24.

Mendel, G., and R. Ross. 1988. Instream habitat improvement in southeast Washington--a summary; with guidelines for construction. Report 88-8, Fisheries Management Division, Washington Department of Wildlife, Olympia, WA.

Rosgen, D. L. 1994. A classification of natural rivers. Catena. 22:160-199.

Schuett-Hames, D., B. Conrad, M. McHenry, P. Petersen, and A. Pleus. 1993. Salmonid spawning gravel composition module. Timber-Fish-Wildlife Ambient Monitoring Program. Available from Northwest Indian Fisheries Commission, Olympia, WA.

USFS (U. S. Forest Service). 1995 Stream inventory handbook for Region 6. Version 9.5. Available from Wenatchee National Forest, Wenatchee, WA.

USFS 1996. Watershed Assessment: Entiat Analysis Area, version 2.0. Wenatchee National Forest, Entiat Ranger District, Entiat WA.

WDF (Washington Department of Fisheries), Yakama Indian Nation, Colville Confederated Tribes, and Washington Department of Wildlife 1990. Entiat River Subbasin Plan. Available from Northwest Power Planning Council, Portland, OR.

Wy Kan Ush Me Wa Kush Wit 1996. Recovery plan by the Columbia River Intertribal Fish Commission. Portland, OR.

Section 8. Relationships to other projects

The need for restoration of instream habitat on the lower Entiat River was identified in the four planning programs listed below. Technical and financial support from the Mid-Columbia HCP will be sought by the *Entiat Model Watershed Plan*, as that HCP is implemented. Support for part of the coordinator=s salary is also being sought from WDOE through the Centennial Clean Water Fund and the Washington State Conservation Commission. We also sought funds from BPA for FY98 activities to meet Objective 3.

Attachment C contains letters of support from co-managing entities involved in the Entiat Model Watershed Plan. Other letters of support will be addressed to BPA under separate cover.

(1) The Mid-Columbia Habitat Conservation Plan

The Mid-Columbia PUDs (Chelan, Douglas, and Grant) own and operate five hydroelectric dams on the mainstem Columbia River, and are in the process of developing a multi-species HCP and settlement agreement with the Federal Energy Regulatory Commission (FERC). As part of this comprehensive 50-year settlement, the PUDs will allocate $100 million for watershed protection and restoration projects in the Mid-Columbia Region, including the Entiat River. As part of that process, a team of agency, tribal, and PUD staff identified preferred actions for protection and restoration of habitat in the Mid-Columbia Region (Bugert et al. 1997): "...the most feasible result for habitat restoration [in the lower Entiat River] lies primarily in structure placement as an immediate improvement, and riparian setbacks as the long-term solution." Both actions will be addressed in the *Entiat Model Watershed Plan*.

(2) President's Forest Plan

The Entiat is a Key Watershed designated by the federal interagency "President's Forest Plan." Although this document specifically addresses those actions to be taken on public lands, it also identifies the need for "...structural and vegetative treatments designed to reduce the width to depth ratio resulting in more diverse habitat..." in the lower Entiat River, where this grant application is focused.

(3) Tribal Recovery Plan

The Columbia River Intertribal Fish Commission recommended the restoration of streambanks on the lower Entiat River to provide habitat for salmon and steelhead

(*Wy Kan Ush Me Wa Kush Wit*.1996, page 76). They also recommended that riparian vegetation be re-established along the lower Entiat River.

(4) Entiat Subbasin Plan

Under the NPPC subbasin planning process, the installation of instream structures for steelhead habitat was recommended for the lower Entiat River (WDF et al. 1990; page 52).

Section 9. Key personnel

Numerous local landowners will be involved in the project, but five individuals will supervise the work:

(1) Phil Jones (B.S. Forestry; minor in Range Management, University of Montana, 1961), has over 35 years experience in land use planning. Phil is the coordinator of the *Entiat Model Watershed Plan* and will lead many of the implementation projects (his resume is in Attachment D);

(2) Bob Steele (B.S. Fisheries Science, University of Washington, 1982), has over 15 years experience as regional habitat manager for WDFW. Bob has installed over 30 instream structures in the Entiat and Wenatchee watersheds;

(3) Barry Southerland (M.P.A. Watershed Management, Brigham Young University 1982), has 20 years experience and course work in stream geomorphology and is a certified soil erosion and sediment control specialist through ARCPACS;

(4) Phil Archibald (B.S. Fishery Science, University of Washington, 1990), has 6 years experience as the Entiat/Chelan Zone Fishery Biologist for Wenatchee National Forest. He is the lead TAC representative on the *Entiat Model Watershed Plan*. His emphasis is on watershed restoration and monitoring;

(5) Bob Bugert (M.S. Fisheries Resources, University of Idaho, 1985), has 12 years experience in fish habitat and hatchery issues for WDFW and the Mid-Columbia PUDs. Bob has supervised restoration projects on the Asotin and Tucannon watersheds.

Section 10. Information/technology transfer

Information transfer is an important element of this project (Objective 3). The key mechanism for information transfer will be in guided tours of these structures to local citizens. As stated above, an important component of this work is to promote the benefits of habitat restoration to affected landowners in the Entiat River. Media coverage by local newspapers will be solicited during the project. Chelan County Conservation District will encourage tours of these sites by landowners in the Wenatchee Watershed who are currently developing watershed plans (CCCD 1997).

For Objective 1 (instream structure placements), long-term success will be measured in (1) stream characteristics (e.g.; pool:riffle ratio and width:depth ratio), (2) microhabitat use of salmon and steelhead, (3) structure longevity, and

(4) cost/benefit ratios compared to other restoration projects in the watershed. This information will be used by the Mid-Columbia Habitat Conservation Plan, and other programs, to identify which actions provide the greatest benefits to salmon and steelhead.

For Objective 2 (riparian plantings), success will be measured in survival, growth, and establishment of planted versus unplanted revegetation sites. Comparisons will be made between species, size class, and planting density.

(Attachments omitted)