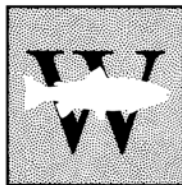


Evaluation of Fisheries Benefits
Arising from the Repair,
Replacement and Removal of Culverts for
Selected Projects Funded by
The National Fish and Wildlife Foundation



*Prepared by
Washington Trout
January 2004*

W A S H I N G T O N T R O U T



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Acknowledgements

Washington Trout would like to thank the National Fish and Wildlife Foundation for commissioning and funding this evaluation. We would like to acknowledge the valuable input received from the National Fish and Wildlife Foundation's national and regional staff and Board of Directors in developing and finalizing this report. We would also like to thank all of the grantee project managers who took time out of their busy schedules to meet with us in the field, discuss their projects over the phone, and respond to our email questionnaire.

This report and all associated work were conducted by Washington Trout staff. The primary author and project lead for this report was Micah Wait. Jamie Glasgow, Ramon Vanden Brulle, Joseph Yacker, and Kurt Beardslee assisted with editing, preparation, and formatting of the report. Field data were collected by Micah Wait, Jamie Glasgow, Mary Lou White, Dale Russell, and Kurt Beardslee.

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Executive Summary

Washington Trout has reviewed and evaluated selected culvert-repair, -replacement, and -removal projects funded by the National Fish and Wildlife Foundation. The purpose of this evaluation was to quantify the conservation benefits and garner lessons derived from the implementation of these projects, allowing NFWF to adapt their fish passage program to maximize conservation benefit. This evaluation was based on information gathered in three ways: 1) review of project files; 2) interviews with project managers and 3) site inspections.

This assessment was based on the examination of biological, physical, and economic factors, including the amount of habitat opened by a project, the number and status of affected fish species, the technical merit of the project, and project expenditures. The majority of projects reviewed and visited through the course of evaluation were successful in achieving conservation benefit; however the type and amount of project relevant data collected and possessed by grantees could be improved.

Washington Trout investigators reviewed 60 NFWF-funded projects in California, Oregon, Washington, Nevada, Idaho, Colorado, Wyoming, and Montana. The projects were implemented between the 1995 and 2002 grant year cycles. The projects varied in scope from the replacement of a single culvert with a bridge to projects containing 39 culvert replacements and removals, and to projects that assessed over 100 potential fish passage barriers in a watershed.

A total of \$5,914,000 NFWF dollars were spent on sixty projects. Total funds expended on these projects equaled \$18,926,000 dollars. As of September 2003, seventy-seven percent of the funded projects had been completed. These completed projects have resulted in a total of 217.5 miles of habitat opened above removed or replaced culverts.

Washington Trout developed an equation to measure the relative conservation benefit of a Foundation funded fish passage project. The utility of this equation was limited by a lack of relevant baseline data that was available from grantees. Conservation benefit was calculated for 25 projects, and obtained values ranged from 5.6 to 269.9. These values are a reflection of the area of habitat opened up by a project, and the number of affected species.

A cost analysis was conducted for 24 of the reviewed projects. The cost analysis conducted for this evaluation consisted of a calculation of the dollars spent for each mile of stream habitat opened. Costs ranged from \$2,000-37,500 Foundation dollars per mile of opened habitat, and from \$8,200-191,200 total project dollars per mile of opened habitat.

The National Fish and Wildlife Foundation's culvert upgrades are resulting in the reconnection of high quality habitat for numerous species. Culvert restorations are extremely efficient in that they result in the restoration of a large amount of habitat, while only resulting in a small on the ground construction footprint. Culvert fish passage

projects have the ability to return fish to mature, functioning riparian habitats. No other type of stream restoration has that ability. Problems observed with funded projects were mostly technical in nature and could be overcome with increased technical oversight and accountability. Recommended changes to the Foundation's program include: 1) requiring grantees to provide pre-project assessments and prioritizations to the Foundation; 2) encourage grantees to address habitat limiting factors in the project watershed; 3) increase the requirements for technical oversight and accountability within grantee organizations; and 4) re-examine the long term effectiveness of implemented projects in the future.

I. Introduction

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Washington Trout reviewed NFWF project files from March 2003 to September 2003, conducted project manager interviews from May 2003 to September 2003, and performed site visits from May 2003 to September 2003.

II. Culverts

Definition

Culverts are closed conduits expected to pass water, sediment, organic debris, fish, and wildlife beneath transportation corridors like roads and railways. Because they are hard-points in dynamic systems, and they often force the constriction of waterways during higher flows, all culverts have the potential to compromise the passage of those items, becoming a constraint in the river continuum. Culverts provide a range of ecological connectivity related to the range of local conditions at the culvert site, including the volume and velocity of water passing through the culvert; the nature of the sediment and organic debris being passed; and the species, life-history, and age-class of the fish and wildlife attempting passage.

Scope of the Problem

The implications of these facts are clear when one considers the number of stream-road intersections in the United States – for example, there currently are an estimated 3,982 culverts in fish bearing streams on the Washington State DOT road system, of which

61% are thought to compromise passage (Washington Department of Fish and Wildlife 2003a) – these numbers are likely underestimates. The US Forest Service estimates that a total of 1620 fish passage barriers exist on the National Forest road system in Washington, and 3300 fish passage barriers on National Forest roads in Oregon (US Department of Agriculture Forest Service 2002). The total number of barrier culverts on the Oregon road system is unknown (Oregon Department of Fish and Wildlife 1999). While California does not yet have a coordinated fish passage program to identify culverts or barriers (California Resources Agency 2004). Washington Trout was unable to find any comprehensive fish passage at road crossings data for Idaho or Montana, and it seems likely that there is no statewide program for identifying and correcting fish passage at road culverts in these states.

Because individual projects have the ability to restore access to miles of habitat, properly performed fish passage restoration projects are one of the most cost-effective means to improve freshwater conditions for native fishes. Washington Trout has long championed fish passage restoration projects as an integral component to sound fish recovery plans, and urges the Foundation to continue funding these types of projects. In doing so, however, we advise the Foundation to consider the following principles common to water crossings, excerpted from the Washington Department of Fish and Wildlife Design of Road Culverts for Fish Passage, (WDFW 2003b):

1. Culverts result in permanent, direct loss of instream and riparian habitat.
2. Installation and maintenance of water crossings that confine or constrict the channel or floodplain will break ecological connectivity, alter channel processes and change adjacent channel character and shape by affecting the movement of debris, sediment, channel migration, flood waters, and aquatic and terrestrial organisms.
3. Water crossings may create an entry point for road-runoff pollutants.
4. Fish passage can be hindered or blocked at water crossings.
5. Water crossings increase the risk of damage to the downstream habitat due to water crossing failure.
6. Cumulative impacts and risks of water crossings can be avoided or minimized by consolidating water crossings; employing full-span bridges, by simulating a natural channel through culverts; or removing water crossings.

In the past decade resource managers and environmental-policy makers have recognized the impact that poorly designed or incorrectly installed culverts have on fish distribution and stream-habitat productivity. This impact is most obvious where a poorly designed culvert is blocking the upstream spawning migration of salmon and other anadromous fishes, but can be equally harmful for populations of resident fish that are isolated from otherwise productive spawning or rearing habitats by barrier culverts.

Fish Passage Requirements at a Culvert

In order to pass through a culvert an upstream-migrating fish must be able to:

- 1) Get to the culvert
- 2) Enter the culvert's downstream end (outlet)
- 3) Negotiate through the barrel of the culvert
- 4) Exit through the culvert's upstream end (inlet)
- 5) Get away from the culvert.
 - Entrance to the culvert's outlet may be prevented by a perch height greater than the fish's leaping ability, excessive velocity at the outlet, insufficient depth in the culvert's plunge pool, or ephemeral, temporary, or permanent obstructions such as woody debris, a tide gate, or a trash rack.
 - Passage through the barrel of the culvert can be blocked by debris or grade-breaks within the culvert, excessive velocities, or water depths too shallow to swim.
 - Fish can be blocked from passage at a culvert's hydraulic inlet by a negative perch (a hydraulic drop at the culvert inlet), excessive hydraulic velocity at the inlet, or by ephemeral, temporary, or permanent obstructions.

The velocity of water through a culvert is determined by its slope, cross sectional area, roughness, and the discharge of the stream. The ability for any culvert to pass fish is flow dependent, and for most culverts there is a window of passability that lies between too little flow and too much flow. The timing of this window is directly related to the hydrograph of a stream, and it is important to note the intersections of peak and low flows in the hydrograph and the timing of fish migrations. Properly functioning road-stream intersections pass fish during a range of flows and the idea behind culvert replacement, repair, and removal is to expand the range of fish passage to the extremes of the hydrograph.

Culverts in the Scientific Literature

Despite the fact that fish passage improvements at road-stream intersections have become one of the most common restoration activities in western watersheds, there is a conspicuous lack of scientific, peer-reviewed information available regarding culverts and fish passage. Washington Trout conducted a search of the journals of the American Fisheries Society, and found no papers with the word culvert in the title, only six with the word culvert in the abstract, and none of these were directed at the scientific basis for culvert replacements and removals. The lack of information regarding culverts and fish passage extended to the rest of the scientific literature as well. No papers directly related to the topic were found in Restoration Ecology, Ecological Management and Restoration, North American Ecological Restoration, and Conservation Biology. The implications of

this are concerning, hundreds of organizations and institutions are implementing culvert/fish passage projects, but there is no peer-reviewed process bringing scientific thought to bear on the subject. Not only is this likely resulting in a multiplicity of repeated mistakes, but opportunities to communicate peer-reviewed standards for design, implementation, and evaluation are lost.

Culverts and Sediment

Culverts can have dramatic chronic or catastrophic effects on the delivery and transport of sediment to stream beds. Most unpaved forest-road networks use culverts extensively to pass streams and road runoff beneath roads. Chronic sedimentation impacts caused by culverts are often the result of the culvert being improperly oriented in the stream channel. Poorly aligned culverts can direct streamflow into the downstream bank of the channel, causing and aggravating chronic bank erosion. High velocity flows at the culvert's outlet resulting from undersized culverts create a focused flow that can rapidly erode the streambed and banks just downstream of the culvert; this issue can be chronic or episodic in nature, depending on the size of the culvert relative to the hydrograph of a particular stream.

Catastrophic sediment inputs can result where undersized culverts cannot transport the volume of water delivered during peak flows. When the culvert cannot pass the amount of water through its outlet that is being delivered to its inlet, ponding occurs; as the standing water upstream from the culvert overtops the road prism, it will run across the road bed. Soft road-fill materials are generally not designed to accommodate running water and catastrophic erosion or mass-wasting can occur. Chronic or prolonged ponding upstream of the culvert can saturate the road prism, resulting in mass wasting. Acute and sudden peaks in the hydrograph or debris flows can result in massive, abrupt failure of the culvert and road prism.

III. Evaluation Process

In order to assess the National Fish and Wildlife Foundation's culvert replacement funding program, Washington Trout collected information in three ways: through NFWF project-file reviews, project-site inspections, and project-management interviews. These data were compiled into a spreadsheet to create an information matrix. The information matrix was then analyzed and used to generate summary and analytical statistics including the conservation benefit equation and the cost analysis. Washington Trout used the information matrix to generate recommendations for how the Foundation can maximize the conservation benefits of future culvert replacement and removal projects it funds.

The majority of projects reviewed in this evaluation were fish-passage, or combination fish-passage/sedimentation projects. A small minority were designed solely to ameliorate road related stream sedimentation either through repair/replacement or removal associated with road decommissioning. Three projects were culvert inventory and assessment projects at the watershed and sub-watershed levels.

NFWF Project File Review

The 60 project-files reviewed by Washington Trout varied widely in quality and comprehensiveness. Project files consisted of three grantee-initiated components: 1) project proposals, 2) progress reports and email correspondences with NFWF, and 3) final reports. Generally, the project proposals followed one of two formats depending on when they were submitted, with earlier project proposals following a less informative format. Project proposals tended to be the best and most consistent source of information. Consequently, some matrix fields (such as project justification, goals, and project costs) were completed using solely project files, while others required the use of interviews and site visits. The progress reports Washington Trout received were generally quite brief, talked only in general terms, and yielded little information. Final reports show the greatest variability in quality, ranging from a one-paragraph statement regarding the status of the project and billing, to quite detailed post-project descriptions including before and after photographs and design plans. This inconsistency made it difficult to complete particular fields of the matrix such as project success, current passability, and conservation benefit, using solely the project files.

Project Management Interviews

Following the document reviews, Washington Trout conducted project management interviews in two formats. WT developed and distributed a common questionnaire to project grantees, designed to generate data that were commonly missing from project files. The questionnaire focused on the physical and biological aspects of the project as well as addressing project monitoring and the unanticipated aspects of the project. A copy of the questionnaire and the received responses can be found in Appendix D. Of the sixty distributed questionnaires, only ten were returned completed. Reviewers then contacted and interviewed project grantees directly, either in person during site inspections or via telephone. Interviews were based on the questionnaire, to address data gaps for the project in the information matrix, and to follow up on information provided in questionnaire responses. Telephone interviews were used to follow up site interviews and gather information when no site interview was conducted.

Project Site Inspections

Concurrent with project management interviews, Washington Trout evaluators conducted site inspections at a subsample of reviewed projects in order to verify and follow up project documentation, and/or responses to the questionnaire and interviews, and to fill in data gaps in the information matrix. When possible, Washington Trout personnel met on site with the project manager or a representative from the grantee organization or project partners. Of the sixty projects reviewed in this evaluation, site visits were conducted for 39 projects (65%).

For projects that had been completed, observation and documentation focused on whether the projects outcomes addressed the specified project goals. Site visits to completed fish passage projects included the collection of specific physical and biological data relevant to fish passage. For completed projects that addressed sedimentation issues rather than fish passage, Washington Trout personnel toured the site and observed the sediment

reduction techniques used and any issues that may have arisen since project completion. On project sites where the project had not yet been implemented, observation and documentation focused on whether the stated project needs were accurate, and if the planned techniques to address those needs were appropriate. At non-completed fish passage project sites, the focus was on whether the barrier was indeed preventing fish migration, and whether the proposed solution was a feasible and appropriate solution given the site conditions. For non-completed sediment reduction project visits Washington Trout personnel observed and documented the sites and their specific issues, and evaluated the grantee’s proposed solutions.

Data Matrix

Data collected through document review, project management interviews, and site visits were compiled into a data matrix. The data matrix fields appear in Figure 1. A brief description of each field follows the table.

Figure 1. Each cell contains the title of a field used in the information matrix.

Project	Number	Grantee	Project Manager	Justification
Goals	% Success	Relative Success	NFWF Funds	Match Funds
Federal Match	Total Funds	Cost Analysis	Proposed Scope	Actual Scope
Monitoring	Supplementation	Current Passability	Threats to Passability	Conservation Benefit
CB Values	CB Score	Notes	Questions	Site Visit

- Project
The title of the project as stated on the grant application
- Number
The grant number used by the National Fish and Wildlife Foundation to track the project and grant.
- Grantee
The project grantee field is a brief description of the name and type of the organization that implemented the project and contact information for relevant personnel within the organization.
- Project Manager
Either the person listed on the project application as the project contact, or the person to whom project authority had been transferred.
- Justification
Project justification was summarized from the grantee’s original application to NFWF. A clearly stated project justification is critical to the determination of whether a project’s goals are achievable given on-the-ground physical and biological constraints.

- Goals
Project goals were actual stated end points that the project grantee was attempting to reach, including target species / processes. This information was taken from both the original application and the final project reports in order to identify any discrepancies between the two. WT rated the success of each project based upon its stated goals and its current and expected function.
- Success
Success was broken into two sub-categories: percentage success and relative success. Percentage success would be strictly defined as a percentage of the stated goals reached. In recognition of the fact that benefits can be derived in circumstances where the project's original goals are not reached, the relative success would measure how the benefits of the project corresponded to the project justification.
- Project Cost
This attributes was broken down into four fields: NFWF funds, match funds, federal match, and total funds. NFWF funds are funds allocated to the project by the Foundation. Match funds are those documenting contributions to the project grantee by partners. Federal match refers to any documented funds received from federal sources that could not be counted as match towards the Foundations grant. The total funds field is a summation of the previous three fields.
- Cost Analysis
Project cost analysis provides a gross measure of the amount of habitat gained per Foundation dollar, and total dollar spent for each target species.
- Proposed Scope
This field documents the proposed scope of the culvert related aspects of the project. When possible, this field includes information such as stream names and the proposed restoration action.
- Monitoring
The monitoring field is a simple description of the type of post project monitoring that was implemented for each culvert project.
- Current Passability
The current passability field intended to contain results from the software tool Fish-Xing 2.2, but the shortcomings of that program for assessing fish passage across regions were shifted to the professional judgment of WT staff in the field and by the responses of project management.
- Threats to Passability
Possible threats to passability were determined using WT's extensive fish passage field experience, and identified maintenance concerns. In many cases new

culverts function well for the first few years following replacement, but ultimately fail to pass fish due to headcutting, the failure of substrate elevation control structures, debris slides, and other unforeseen environmental responses to anthropogenic stressors.

- Conservation Benefit
This field was used to document an initial estimate of the conservation benefit of a project before the actual values used in the conservation benefit equation were acquired. When a conservation benefit was not calculated using the CB equation, this field contains the qualitative ecological benefits of the project.
- CB Values
These were the project values used in the conservation benefit equation.
- CB Score
The Conservation Benefit Score and iterations of the equation used to generate the score are discussed in depth in Appendix E.
- Notes
This field was used for any specific notes on the project in order for Washington Trout researchers to list specific aspects of the project that required further investigation.
- Site Visit
This field was used to identify whether a project was visited by Washington Trout researchers, which evaluators were there and when they were there.

IV. Issues in Evaluation Process

Gathering the necessary information to conduct an evaluation of sixty Foundation funded projects spread across eight states and nine years was limited by various obstacles. Over the course of many of the grants, project management and grantees would often change. Organizational turnover in many of the grantee agencies resulted in a lack of contacts with first-hand knowledge of a project. Many of the grants funded a suite of restoration activities consisting of numerous sub-projects, with fish passage issues being addressed only in some proportion of these sub-projects. Three of the larger grants were to institutions and foundations that administered sub-grants to other organizations to carry out restoration projects. The lack of data gathered by grantee organizations that was relevant to the evaluation of the conservation benefit of a fish passage project limited the results of the evaluation.

Changes in Project Grantees and Management

Changes in project grantees and management were the most common impediment to the gathering of specific project information. Twenty eight percent (17 of 60) of the evaluated projects had changes in either management within the grantee organization, or a change in the project grantee. Seventeen percent (10 of 60) of these were changes in

project management in the grantee organization. Most of these were cases where the project manager was no longer working for the grantee. For projects that were implemented a number of years ago, this would result in a lack of individuals within the grantee organization familiar with project specifics. Twelve percent (7 of 60) of the projects had changed grantees over the course of the project. In most cases the new grantees were easily contacted and familiar with the project, but in some instances the only information that could be gathered was from the project files, and the analysis of these projects was often limited by this lack of information.

Complexity of Projects

Numerous funded projects contained restoration elements other than fish passage. Forty-five percent (27 of 60) of the funded projects addressed fish passage and/or other restoration needs. These projects were difficult to analyze in terms of cost efficiency because in the accounting of these funds the expenditures used for culvert removals and replacements was often inextricable from funds used for other restoration activities. The three large grants that were awarded to grantees that then redistributed the funds were particularly difficult to evaluate, since many of the sub-grants were not related to fish passage; all the information used to evaluate these projects was based on the projects' files.

Evaluating Productivity in Complex Ecological Systems

The number of fish utilizing habitats opened up by a fish passage project is the result of a number of physical, biological, and anthropogenic factors. Physical variables such as flood frequency in the year a given age class of fish were in the gravels, stream temperature in rearing habitats during the juvenile growing season, ocean conditions for anadromous species, and rainfall in the migration season all influence the number of fish returning to spawn above a given culvert. Biological effects such as inter- and intra-species competition, stream productivity, and predation mortality all play a role in the number of returning fish. Anthropogenic effects such as sport and commercial harvest, pollution discharge, hatchery releases, and land use are also a major factor in determining the number of migratory fish making their way up a stream. In order to truly quantify the conservation benefit of a project, it would be necessary to establish the change in the number of returning spawners in the entire watershed without the influence of all of the above variables, which was beyond the scope of this assessment.

Lack of Baseline Data Collected by Grantees

Washington Trout evaluators initially decided to base the evaluation of conservation benefit on how much of what types of habitat were opened up for each species by a culvert replacement. Salmonid species (salmonid species were targeted in 100% of the grants) often have different physical requirements for spawning and rearing habitat, and determining how much of each habitat type, and which of these habitats is limiting in that watershed for the target species is necessary in order to adequately quantify the effects of a fish passage project on the productivity of a given stream.

However, many culverts chosen for replacement were not chosen on the basis of a systematic assessment performed by the grantee. Some proposals were based on recommendation or direction from a government agency or on local, anecdotal knowledge of the barrier. Grantee organizations often lacked the baseline information needed to determine the change in conservation benefit afforded by the project's implementation. For this reason the final iteration of the equation used to quantify conservation benefit was based solely on the fish accessible area of stream above a project and the number and stock status of species using that habitat.

Although this method does not measure the change in stream productivity due to a passage project, it does provide a gross measure of the amount of habitat functionally reconnected for fish species. A lack of landscape connectivity on a level relevant to highly migratory fish species has been a major factor for the decline of migratory fish species in the western United States. Measuring the amount of habitat reconnected by a project takes into consideration the additional habitat available for current fish use and the potential for that habitat to become productive in the future.

V. Evaluation Results

Summary Statistics

The following section will focus on summary statistics for all of the reviewed projects. Sixty seven project files were received for review by Washington Trout. Of these, sixty projects were determined to be related to the removal or replacement of culverts for the purpose of improving fish passage or reducing sedimentation. \$5,914,000 NFWF dollars were spent on these sixty projects. Total funds expended on these projects equaled \$18,926,000 dollars.

As of September 2003, 77% of the funded projects had been completed. These completed projects have resulted in a total of 217.5 miles of habitat opened above removed or replaced culverts. If the miles of stream opened for each species at a culvert are summed, 594 species miles were made accessible through these projects. Over 134 barrier culverts were evaluated in three Foundation-funded fish passage barrier assessments.

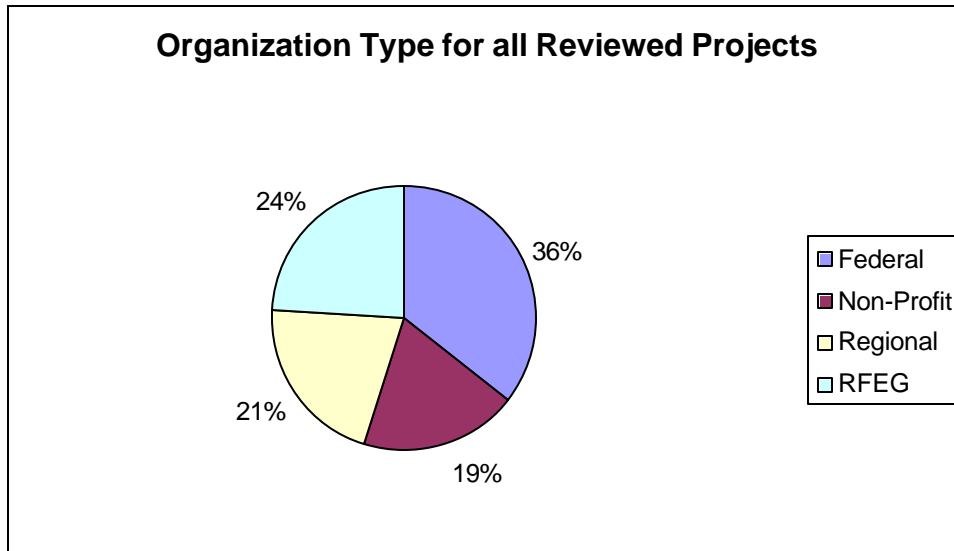
Thirty-one percent (19 of 60) of the projects were in Washington State, making it the state with the most Foundation funded culvert projects. Washington was followed by Oregon, with 25% of the projects (15 of 60). California was next with 20% of the projects (12 of 60). Montana had 7% (4 of 60), while Alaska had 5% (3 of 60). Idaho, Wyoming and Nevada had 3% (2 of 60) and Colorado, with one project, had 2%.

Thirty different project grantees implemented the projects. The US Forest Service was the most common grantee, with eleven different projects in eight different national forests. The Bureau of Land Management was also a major recipient of NFWF funds with eight projects in four different districts. Regional Fisheries Enhancement Groups (RFEG) in Washington State (quasi-governmental, non-profit entities), were also common beneficiaries of NFWF funding. The eight different RFEGs were grantees for 24% of all reviewed projects. Non-profits other than the Washington RFEGs accounted

for 19% of the projects giving a total of 43% of all projects implemented by non-profit groups. Federal agencies were grantees for 36% of the projects, while state, local, and city governments/agencies implemented 21% of the projects (Figure 2).

One hundred percent of the projects were intended to benefit salmonid game species.

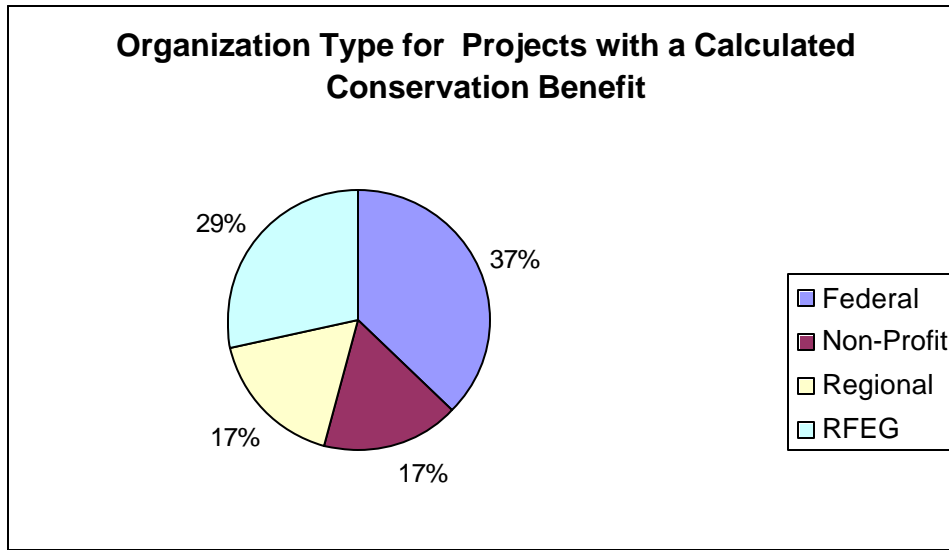
Figure 2. Pie chart of grantee type for all projects



Conservation Benefit

Of the sixty projects, the conservation benefit equation could be applied to twenty five of the projects. The percentage of each type of organization with a calculated CB score is quite similar to the percentage of each type of organization for all reviewed projects (Figure 3). The conservation benefit equation was not used for projects that had not yet been completed, or where the information necessary to calculate conservation benefit was not available. Conservation benefit was calculated in two ways. The first method gave weight to the listing status of a species, while the second method ranked all native fish equally (the former will be referred to as status weighted and the latter will be referred to as non-status weighted). The equation used to calculate CB is described in detail in Appendix E. In the status weighted analysis, CB scores ranged from 5.6 to 269.9, in the non-status analysis CB scores ranged from 0 to 150.4.

Figure 3. Pie chart of grantee type for all projects with a calculated conservation benefit.



For purposes of the evaluation, projects were categorized by regions, roughly analogous to accepted eco-region boundaries. Projects in the coastal watersheds of CA, OR and WA were assigned to the Coastal Region. Projects in ID, MT, and WY were categorized as Inland Northwest projects. Projects in the West of the Cascades Region were in WA and OR watersheds that drained to the Columbia River or Puget Sound. The few projects with CB scores outside these regions, in the Great Basin and Alaska, provided a sample size too small to meaningfully contribute to the analysis and were left out.

When broken down by region, mean CB scores for both status weighted and non-status weighted CB showed the highest mean CB to be for projects in the “West of the Cascades” region, followed by the “Inland Northwest” region, with the “Coastal” region generating the lowest mean CB score (Figures 4 and 5). Due to high variability as demonstrated by the standard deviation of the sampled populations, the median CB for each region was also calculated. Regional rankings did not differ using either status weighted or non-status weighted median CB.

Figure 4. Table showing the mean, standard deviation and median status weighted CB scores for projects by region. Coastal projects were defined as projects in the coastal watersheds of CA, OR and WA. Inland Northwest projects were projects in ID, MT, and WY. Projects west of the Cascades were projects in WA and OR watersheds that drained to the Columbia River or Puget Sound.

Region	Mean CB	Standard Deviation CB	Median CB
Coastal	24.8	20.6	17.5
Inland Northwest	52.7	40.9	42.2
West of the Cascades	107.3	124.1	112.8

Figure 5. Table showing the mean, standard deviation and median non-status weighted CB scores for projects by region. Coastal projects were defined as projects in the coastal watersheds of CA, OR and WA. Inland Northwest projects were projects in ID, MT, and WY. Projects west of the Cascades were projects in WA and OR watersheds that drained to the Columbia River or Puget Sound.

Region	Mean CB	Standard Deviation CB	Median CB
Coastal	8.4	7.3	4.8
Inland Northwest	15.3	14.9	9.7
West of the Cascades	35.3	40.7	37.6

When broken down by organization type, mean status weighted CB scores were highest for non-profit organizations, but only two non-profit organizations were included in this analysis. The next highest scores were for the RFEGs, followed by federal projects, with the lowest mean status weighted CB score going to regional projects (Figures 6 and 7). The order of median status weighted CB scores changed slightly from the order of mean status weighted CB scores, with RFEGs having the highest score. This, and the similarities of both status weighted mean CB and median CB scores for RFEG projects and non-profit projects indicates that there was little difference in the status weighted CB scores of these organization types. In contrast, when using the non-status weighted mean CB the highest score went to the RFEG projects, followed by the non profit projects, and then the federal projects, with the regional projects having the lowest non-status weighted CB score. Projects with federal agency grantees had the lowest non-status weighted median scores. This drop in rankings when switching from the status weighted to non-status weighted CB scores is likely the result of a bias in federal agencies to protect federally listed species. See Appendix D for the Conservation Benefit Equation and a complete table of project scores.

Figure 6. Table showing the mean, standard deviation and median status weighted CB scores for projects by organization type. Regional organizations include state, county and city governments. RFEG refers to the Regional Fisheries Enhancement Groups in Washington State.

Organization Type	Mean CB	Standard Deviation CB	Median CB
Federal	56.5	43.8	41.7
Non-Profit	101.7	119.1	101.7
Regional	38.9	36.1	17.5
RFEG	99.8	81.6	112.8

Figure 7. Table showing the mean, standard deviation and median non-status weighted CB scores for projects by organization type. Regional organizations include state, county and city governments. RFEG refers to the Regional Fisheries Enhancement Groups in Washington State.

Organization Type	Mean CB	Standard Deviation CB	Median CB
Federal	14.6	12.6	9.7
Non-Profit	25.3	30.1	25.3
Regional	13.1	9.7	17.5
RFEG	38.8	22.0	37.6

Figure 8 shows the status weighted and non-status weighted CB scores for the nine highest scoring projects. The scores for the four Hood Canal Salmon Enhancement Group grants (HCSEG) are all equal because these grants funded all operations for the HCSEG in 2001 and 2002, and it was not possible to separate which culvert replacements were conducted using specific grant monies. CB analysis was done by summing the total CB scores for all four projects and dividing by four. Seven of the nine highest scoring grants were in the West of the Cascades region; the two projects from outside this region were the Hungry Horse Fish Passage II project and the Mary's River IV project.

Figure 8. Projects and project grantees for grants with exceptionally high conservation benefits.

Project Name	Project Grantee	Status Weighted CB	Non-Status Weighted CB
Monahan Creek (WA) Fish Passage Enhancement Project	Cowlitz County	89.2	24.3
Hood Canal Salmon Restoration	Hood Canal Salmon Enhancement Group	112.8	37.6
Hood Canal Salmon Restoration Project 2001(II)	Hood Canal Salmon Enhancement Group	112.8	37.6
Hood Canal Salmon Enhancement Group Community-based Salmon Recovery Projects	Hood Canal Salmon Enhancement Group	112.8	37.6
Hood Canal (WA) Salmon Restoration II	Hood Canal Salmon Enhancement Group	112.8	37.6
Hungry Horse Fish Passage II	Flathead National Forest	128.1	42.7
Mary's River IV	BLM Elko District	142.6	28.5
McKenzie River (OR) Habitat Restoration	Oregon Chapter Trout Unlimited	185.9	46.5
Skagit County Fish Passage Improvement	Skagit Fisheries Enhancement Group	269.9	76.0

Cost Analysis

The cost analysis conducted for this evaluation consisted of a simple calculation of the dollars spent for each stream mile opened. Cost was analyzed looking at both Foundation dollars spent, and total dollars spent on the project. This calculation was only done for projects that removed or replaced culverts for the purpose of fish passage, with no other types of restoration involved in the grant. Cost analysis was not done for projects that have not yet been completed. Figure 9 gives the Foundation dollars and total dollars spent per each mile of habitat opened for each project.

Figure 9. National Fish and Wildlife Foundation Dollars and Total dollars spent per mile of habitat opened by each completed fish passage project. Total dollars is the sum of NFWF dollars, match dollars, and documented federal match dollars.

Project	NFWF Dollars/Mile Habitat	Total Dollars/Mile Habitat
Hungry Horse Fish Passage I	\$13,333	\$21,333
McKenzie River Bull Trout II	\$8,800	\$32,750
Hungry Horse Fish Passage II	\$6,545	\$22,909
Mary's River VI	\$2,688	\$14,167
Jack Creek (NV) Bridge	\$2,692	\$30,700
Adobe Creek (CA) Fish Ladder	\$2,000	\$8,200
Lochsa River (ID) Bull Trout Recovery	\$12,500	\$25,000
Lower Rogue and South County Basin Restoration	\$27,624	\$68,774
Squaw Creek (WY) Rehabilitation	\$16,666	\$50,000
Paola Creek Fish Passage	\$3,750	\$10,000
Wendover West Slope Cutthroat Passage	\$3,333	\$13,000
Jordan Creek / Parkway Drive Salmonid Passage Project	\$10,130	\$112,347
Longview Fibre Culvert Replacement	\$36,000	\$72,000
Skagit County Fish Passage Improvement	\$6,034	\$12,995
Squalicum Creek (WA) Restoration Project	\$15,000	\$30,000
McKenzie River (OR) Habitat Restoration	\$9,677	\$41,419
Chena-Badger Slough (AK) Fish Habitat Restoration	\$37,500	\$92,500
Hood Canal (WA) Salmon Restoration	\$20,070	\$62,204
Monahan Creek (WA) Fish Passage Enhancement Project	\$30,541	\$191,208
Regional Fisheries Enhancement Group Support (WBFEG)	\$6,024	\$12,048
Hood Canal Salmon Restoration Project 2001(II)	\$20,070	\$62,204
Hood Canal Salmon Enhancement Group - Community-based Salmon Recovery Projects in Hood Canal, WA	\$20,074	\$62,204
McCready Gulch Barrier Removal Project	\$28,705	\$102,764
Hood Canal (WA) Salmon Restoration II	\$20,074	\$62,204

Examining a graph of cost analysis versus CB scores illustrates which projects with low dollar/miles-opened ratios resulted in a high CB score (Figure 10). Projects with values in the upper left corner of the graph are the ones with a high CB and a low expenditure of

funds per mile of habitat gained. Projects in the lower right corner of the graph are the poorly performing projects that did not have a high CB but had high expenditures for each mile of habitat opened. These graphs were produced for each combination of Foundation dollars, total dollar, non-status weighted CB, and status weighted CB with consistent results between all four graphs. Projects that scored a high CB and a low cost per mile are given in Figure 11, while projects with a consistently low CB and high cost per mile are given in Figure 12.

Figure 10. A graph of status weighted CB versus Foundation dollars spent per mile of habitat opened

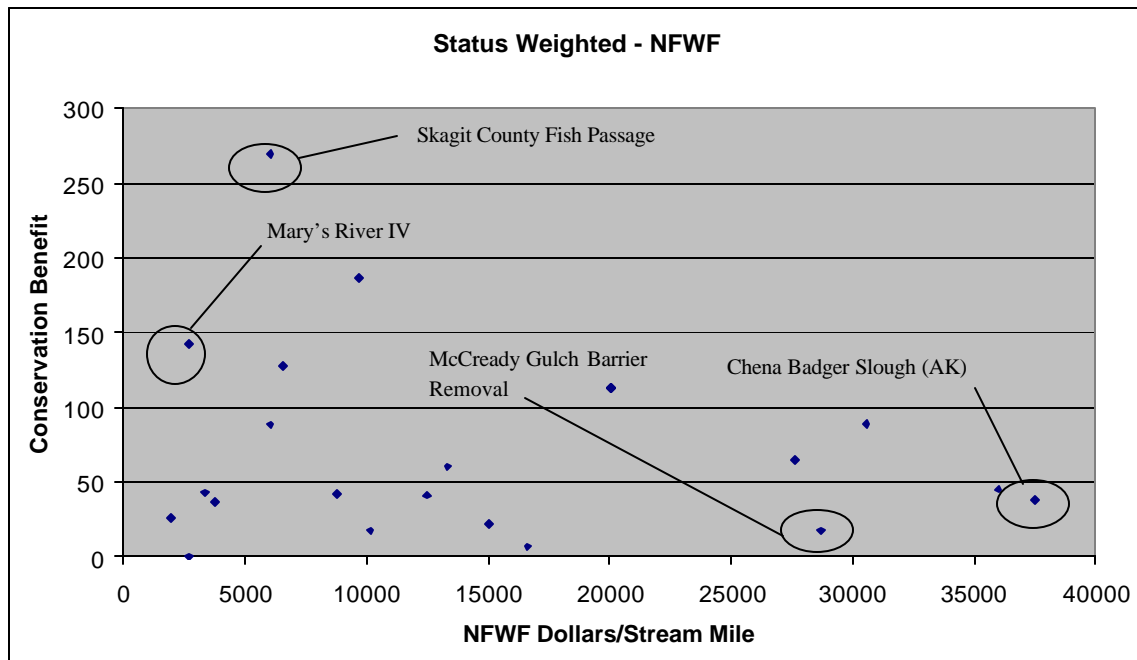


Figure 11. Projects with high CB scores and low costs per mile of stream opened.

Project	Status Weighted CB	NFWF Dollars/Stream Mile
Skagit County Fish Passage Improvement	269.9	\$6,034
Regional Fisheries Enhancement Group Support (WBFEG)	88.4	\$6,024
McKenzie River (OR) Habitat Restoration	185.9	\$9,677
Hungry Horse Fish Passage II	128.1	\$6,545
Mary's River VI	142.6	\$2,688

Figure 12. Projects with low CB scores and high costs per mile of stream opened.

Project	Status Weighted CB	NFWF Dollars/Stream Mile
Chena Badger Slough (AK)	38	\$37,500
McCready Gulch Barrier Removal	17.5	\$28,705
Longview Fibre Culvert Replacement	45	\$36,000
Squaw Creek (WY) Rehabilitation	6.3	\$16,666

VI. Discussion

The majority of projects reviewed and visited through the course of evaluation were successful in achieving conservation benefit. From coastal California to the Flathead Mountains of Montana, National Fish and Wildlife Foundation grants have contributed to the re-connection of historic habitats for native fish. Certain regions, grantee types, and types of projects scored higher in the CB and cost analyses. Projects in the west of the Cascades region and projects implemented by the Regional Fisheries Enhancement Groups had generally higher conservation benefit scores than projects from other regions or managed by other grantees. This does not mean, however, that these are the only types of projects that should be funded. The streams of Washington (all RFEs are in WA, and all but one of the West of the Cascades projects were in WA) generally host diverse salmonid stocks, and generally have much of their historic fish assemblages intact. The particularly high CB score for the Skagit County Fish Passage Improvement Project is just as much a product of the diverse and healthy fish stocks of the Skagit River as a well planned, designed, and implemented project. Likewise, a low score for a project on a severely degraded or small system does not necessarily reflect a poorly planned, designed, and implemented project. The high standard deviations of the CB scores for all regions and project grantee types demonstrates that valuable and less valuable projects were implemented in all regions and by all grantee types.

Some problems were common enough to raise concerns for the Foundation. In some cases bridges were installed in situations where culvert removal was likely just as feasible a solution. Cattle and cattle related degradation were observed in riparian areas that were recently opened by projects. Up stream head-cutting as a consequence of improper grade control has resulted in the development of barriers to juvenile passage just up stream of a recently implemented project, and improper grade control has also resulted in mass wasting events that likely delivered a large load of sediment to a nearby river, and created a barrier to fish passage. Changes in the scope of projects from proposal to implementation were common place, and while flexibility on the part of a funding foundation is important, these changes make it difficult to hold a project grantee accountable for the resulting final product. Other issues and concerns included the spread of non-native species, the installation of under-sized pipes, and overly steep angles of repose adjacent to a project.

In two cases culverts were replaced with bridges that were likely not necessary. In the Jordan Creek/Parkway Drive Salmonid Passage project in California, a culvert was removed and replaced with a flat car bridge at the request of the landowner, but the project managers stated that the landowner has never used that bridge. It is likely that the landowner could have been paid a fee smaller than the costs of bridge installation to

compensate for their loss of use. The McCready Gulch Barrier Removal Project in California resulted in the replacement of a culvert with a bridge on a driveway that should have been decommissioned. There was a suitable path for the driveway that would not have crossed the stream which could have been installed at a lower cost.

Cattle were observed in stream reaches just above two Foundation funded projects, and cattle damage was observed in a third. It is well documented that cattle have a detrimental effect on stream health as a result of bank erosion, and the direct input of pollutants into the stream system. Cattle were observed in project sites for both the Jordan Creek Culvert Replacement Project in California, and the Lower Rogue and South County Basin Restoration grant in Oregon, and cattle damage was observed on a third stream associated with the Lower Rogue and South County Basin Restoration grant. These are problems that could easily be solved with riparian fencing which would require a fraction of the expenses already invested into these streams.

Stream bed elevations often change dramatically due to culvert replacement projects as the stream bed adjusts to a new constraint or release from a former constraint. Grade control devices are often a necessary component to a successful culvert removal or replacement project. The success of two projects was diminished by a lack of successful grade control following culvert replacement and removal. Head cutting as a response to the Wendover Westslope Cutthroat Passage project (# 2000-0001-018) has resulted in the creation of a barrier to juvenile fish passage just up stream of the project site. The installation of grade control structures at this project site might have prevented the creation of this barrier. Another project that had unintended negative impacts due to head cutting was the White River Floodplain Restoration in Washington (#2000-0001-026). Culverts were removed in this project as an aspect of a road decommissioning, but instead of restoring the natural stream gradient across the road cut, the streams that ran across the former road bed were allowed to remain at the same repose as the former road. This has resulted in head cutting that on one stream has led to a small mass wasting event and the creation of a fish passage barrier.

Changes in project scope occurred in 35% of the assessed grants, and 45% of the projects were not completed in the anticipated timeframe. Some of the changes in scope likely led to increased conservation benefit for the project, but in many cases the actual number of culverts repaired, replaced, or removed was less than anticipated in the project proposal. Nearly half of the funded projects were not finished in the given time frame, the widespread nature of this problem suggests that the timeframe which the Foundation gives to project grantees may be impractical.

Another observed issue was the opening of habitat for non-native fish species. This was only documented in one project, the Squaw Creek (WY) Restoration project (#1998-0026-030), which opened habitat for brook trout. It is likely that other Foundation funded projects assessed in this evaluation opened habitat for non-native species, but as most organizations do not focus on non-natives, or may be unfamiliar with the fish assemblages in the project watershed, these species may have been inadvertently disregarded in project documentation.

VII. Recommendations

RFP/Application Recommendations

During the course of this evaluation, Washington Trout developed an equation to estimate the conservation benefit (CB) afforded by each NFWF-funded fish passage restoration project. The CB equation incorporated a variety of parameters, including metrics representing the population status of the species affected by the project, the types of habitats made accessible by the project (spawning, rearing, migratory corridor), the spatial extent of each type of habitat made available by the project; and a metric representing the affected species' need for the type of habitat made available by the project (limiting factors). This initial CB equation required fundamental but site-specific information regarding the affected fish populations and the affected habitat conditions; none of the evaluated project grantees possessed this information. Consequently, WT was forced to simplify the equation to include only those parameters that were available for the majority of the projects evaluated. If the Foundation wants to consider the conservation benefits afforded by their fish passage restoration projects, WT recommends that the Foundation require project grantees to collect this information prior to project selection, through either a limiting factors analysis or a watershed-wide fish barrier prioritization process.

The benefits of a fish barrier prioritization process driven by a limiting factors analysis include:

- Assurance that the proposed project is scientifically justified, and that the acquired data will allow for a more accurate calculation of the conservation benefit afforded by the project.
- Data generated by post-project evaluative analysis is more substantive.
- Determining the types of habitat to be opened by a fish passage project and knowledge of the limiting factors in a watershed increases the likelihood that the project will result in greater fish productivity.
- Assurance that the project is not opening spawning habitat for a fish population that is limited by rearing habitat, or vice versa, which would result in little realized benefit to that population.
- Assurance that the project is not indirectly harming target populations by taking financial resources away from other projects that could address those factors limiting the production of target populations. This can be viewed as the opportunity cost of a poorly chosen fish passage project.

Prior to awarding a culvert replacement grant the Foundation should consider requiring the project grantee to review all available options and determine whether the chosen restoration strategy is the most cost effective means of accomplishing the project goals. Several of the projects that Washington Trout visited had invested large sums of money replacing barrier culverts with new culverts or bridges, where removal without replacement may have been possible. This type of costly oversight was evident at Jordan Creek Parkway Drive Salmonid Passage Project, and the McCreedy Gulch Barrier

Removal Project discussed in the issues section of this document. Each time the Foundation funds a project, both the grantee and proposal reviewers should be required to investigate opportunities to remove the culvert entirely and still meet site-specific transportation requirements. In order of best to worst case, as site constraints dictate, barrier culverts should be replaced with 1) nothing; 2) a bridge; 3) a new culvert. In some cases, a culvert retrofit (internal baffles, etc.) may provide a cost-effective solution to fish passage problems (where large amounts of fill exist above the culvert, for example); however, retrofitting a barrier culvert will not address the processes that made the original culvert impassable, and long-term maintenance issues are likely. While properly sized culverts are a good investment, a bridge is almost always a better choice. The typical lifespan of a standard corrugated steel culvert is 10-35 years before perforation. Bridges consistently provide a longer term solution to road-stream intersection issues, and because they don't constrict stream flow to the same extent, bridges allow for greater opportunities to restore natural stream processes. In light of this, the Foundation may want to consider subsidizing a concrete prefabricated bridge company, or buying flatcars in bulk. This would allow the Foundation to provide bridge structures to grantees at a discount price.

The following is a list of questions the Foundation reviewers may want to ask when examining Fish passage grant applications:

- What process led to the identification of this project?
- What species will benefit from this project?
- What are the (federal/state) statuses of those species?
- The lack of what type of habitat (rearing, spawning, migration corridor) is limiting the production of each of your target species?
- What other physical factors are affecting the target species in your watershed (water quantity, water quality, other barriers)?
- What types of habitat will be made accessible by your project; and how much of each type?
- To what extent does the current culvert block passage?
- How will the barrier be remedied? Removal, bridge, new culvert, retrofits? If not removal, why not?
- How will design accommodate the site's hydrograph?
- How will the design attempt to restore natural processes at your site?
- What steps will be taken to control post-implementation streambed elevation?
- Who in your organization will be responsible for the technical aspects of the project?
- What pre-project, implementation, and post-project monitoring will be performed?

Types of projects that yielded high conservation benefit

Projects that had high conservation benefit were often the projects that addressed the needs of multiple species. Funding projects in watersheds that are species rich is one of

the most cost effective ways to ensure that culvert replacement projects are achieving the greatest possible conservation benefit.

Another project type that ultimately provides high potential for conservation benefit is fish passage barrier inventory and assessment. Since 2001 the Foundation has funded three fish passage barrier assessments all of which have proven to be a cost effective means of facilitating the scientifically justified restoration of fish passage. Providing the inventory and prioritization process leads to the on-the-ground restoration projects to address the identified high priority problems, the initial investment in an assessment project can realize substantial conservation benefits with modest expenditures.

Accountability

Many of the Foundation funded projects are multifaceted restoration packages with complex partnerships and many layers of institutional authority. This has resulted in a “fog” of accountability around some of the Foundation funded projects, especially with regard to the technical aspects of a project. A way to increase accountability within a grantee organization for a project’s technical success would be to require project grantees to designate a person who is responsible for technical aspects of the project.

Other Recommendations

If the observed frequency of scope changes is an indication of the uncertainty in proposed scope fidelity, and the regularity of delayed projects is an indication of the time scale at which these projects operate, the foundation may want to consider changing its grant funding cycle to two years. This would limit the amount of time spent dealing with grant extensions and the associated administrative costs.

A time scale issue that was brought up by federal project grantees was the matching grant window. The limitations placed on the matching funds time window makes it difficult for bureaucratic institutions working in partnership with private corporations to coordinate financial and project outcomes.

In summary, the Foundation should look to fund project that: 1) have utilized a limiting factors analysis, 2) have hydrograph data to back up their proposed design, 3) affect multiple species, 4) have ample amount of limiting habitat above the proposed fix, 5) have a culvert inventory and prioritizations to back up decision. At the same time it is important that the Foundation continue to fund obvious projects that provide outstanding conservation opportunities and not to eliminate these potentially beneficial projects solely on the basis that it does not have the above qualities. Additionally, certain projects have a social element that affords benefits that cannot be measured through biologically based conservation metrics.

VIII. References

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Appendix A: Project Descriptions and Assessments

Hungry Horse Fish Passage I

The Hungry Horse Fish Passage I project was sponsored by the Flathead National Forest, and managed by Pat Van Eimeren out of the Hungry Horse Ranger District. This project replaced culverts on three streams, Margaret Creek, Riverside Creek, and Murray Creek, which are tributary to the Hungry Horse Reservoir in western Montana. The new culverts were all pipe arch style culverts. The project intended to open habitat above these culverts to westslope cutthroat trout, bull trout, and mountain whitefish. It was projected that the project would result in significant increases in the recruitment of adfluvial westslope cutthroat trout to the Hungry Horse Reservoir, thereby increasing the amount of forage for bull trout, the primary species of the sport fishery in the reservoir, and a species listed as threatened on the Endangered Species List. This site was visited in late August of 2003, and all three of the pipes were judged to be passable, as the stream substrate and gradient in the culverts was equivalent to the substrate and gradient above and below the culverts.

The total cost of the project was \$106,667, with the Foundation supplying \$66,667 of that money. This has resulted in the opening of 5 miles of habitat at a cost of \$21,333 total dollars per mile of habitat opened, and \$13,333 Foundation dollars per mile of habitat opened. The status weighted conservation benefit (CB) for this project was 60.1 and the non-status weighted CB was 20.

McKenzie River Bull Trout II

The McKenzie River Bull Trout II project was sponsored by the Willamette National Forest, and managed by David Nolte of Oregon Trout Unlimited. This project installed a new culvert on Ollallie Creek, parallel to the old Ollallie Creek culvert underneath Highway 126. The new culvert was fitted with baffles which increase surface roughness and slow water velocities through the pipe. The project was intended to open habitat for bull trout, and spring chinook. This site was visited during extremely high flows due to spring runoff, and it was quite obvious that the old pipe was impassable, and the passability of the new parallel culvert was questionable at the observed flows. We were unable to obtain detailed culvert data due to the dangerously high velocities at the pipes' inlets and outlets. While the newly installed pipe was not likely passable at the time of the site visit it is very likely that the pipe is passable at the time of the bull trout spawning migration in the fall.

The total cost of the project was \$65,500, and the Foundation supplied \$17,600 of the total funds. This has resulted in an opening of 2 miles of habitat at a cost of \$32,750 total dollars per mile of habitat opened and \$8,800 Foundation dollars per mile of habitat

opened. The status weighted CB for this project was 42.2 and the non-status weighted CB was 8.5.

Big Creek Watershed Restoration

The Big Creek Watershed Restoration Project was sponsored by the Flathead National Forest, and managed by Pat Van Eimeren out of the Hungry Horse Ranger District. This project used road closures and LWD placement to reduce sedimentation in Big Creek, a tributary to the Flathead River. Included in the road decommissioning was the removal of culverts and pipes underneath reclaimed roads. The project was intended to improve habitat conditions for bull trout in the Big Creek and Flathead Basins. Project reviewers were in the vicinity of Big Creek in late August 2003, but were unable to access the watershed due to fires in the area.

The total cost of the project was \$48,1896, and the Foundation contributed \$13,556 of the total funds. This has resulted in the closure of 4 miles of forest road in the Big Creek watershed.

Applegate River Key Watershed

Project has been completed; no culverts were removed as a result of this project.

Beaver Creek Migration Barrier II

This project created a barrier to fish migration, in order to protect a population of Colorado River cutthroat trout from invasive species. As the project did not address improved fish passage or reduction of sedimentation, it was not reviewed as a part of this analysis.

Coos Bay Watershed Restoration I and II

The original project sponsor for the Coos Bay Watershed Restoration projects was the Coos Bay BLM, but due to bureaucratic complications project sponsorship was turned over to the Coos Bay Watershed Association, and the two phases of the grant were combined into one project under the management of the Coos Bay Watershed Association's Jon Souter. This was a multifaceted project, which involved stream restorations as well as experimental tidegate installations. Foundation funds are being used to fund the monitoring of these experimental tidegates. Tidegates are made up of culverts that only allow for unidirectional flow, on an incoming tide they prevent water from flowing into the system above the gate, as tides recede they allow for the flow of water above the tidegate to flow out of the system. Traditional tidegates generally allow for some adult fish passage, but due to turbulence near the outlet, prevent all juvenile

passage. Because less energy is required to trigger newer “fish friendly” tidegates, they are believed to decrease turbulence around the outlet, and therefore increase juvenile fish passage. This project resulted in the installation of two sets of fish friendly tidegates in the Coos Bay Estuary, one on Larson Slough and one on Coalbank Slough. Monitoring of the effectiveness of these tidegates will include water velocities, bathymetric surveys, head difference measurements, aquatic vegetation surveys as well as water quality and salinity.

Hungry Horse Fish Passage II

The Hungry Horse Fish Passage II project was sponsored by the Flathead National Forest, and managed by Pat Van Eimeren out of the Hungry Horse Ranger District. This project replaced culverts on two streams, Felix Creek and Harris Creek, which are tributary to the Hungry Horse Reservoir in western Montana. Both of the new culverts were pipe arch style culverts. The project intended to open habitat above these culverts to westslope cutthroat trout, bull trout, and mountain whitefish. It was projected that the project would result in significant increases in the recruitment of adfluvial westslope cutthroat trout to the Hungry Horse Reservoir, thereby increasing the amount of forage for Bull Trout, the primary species of the sport fishery in the reservoir, and a species listed as threatened on the Endangered Species List. This site was visited in late August of 2003, and both of the pipes were judged to be passable, as the stream substrate and gradient in the culverts was equivalent to the substrate and gradient above and below the culverts.

The total cost of the project was \$252,000, with the Foundation supplying \$72,000 of that money. This has resulted in the opening of 11 miles of habitat at a cost of \$22,909 total dollars per mile of habitat opened, and \$6545 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 128.1 and the non-status weighted CB was 42.7.

Mary's River VI

The Mary's River VI project was sponsored by the Elko District of the Bureau of Land Management and was managed by Roy Price. This project replaced a set of undersized culverts on the Mary's River with a bridge. The project intended to connect habitat for Lahontan cutthroat trout, a species listed as threatened on the Endangered Species List. The Recovery Plan for the Lahontan Cutthroat Trout has identified the Mary's River Drainage as having significant metapopulation potential. This project partially fulfills the recovery plan actions required to delist this fish.

The total cost of the project was \$340,000, with the Foundation supplying \$64,500 of that money. This has resulted in the opening of 24 miles of habitat at a cost of \$14,167 total dollars per mile of habitat opened, and \$2,688 Foundation dollars per mile of habitat

opened. The status weighted CB for this project was 142.6 and the non-status weighted CB was 28.5.

Coquille River III, IV, and V

The original project sponsor for the Coquille River projects was the Coos Bay BLM, but due to bureaucratic complications project sponsorship was turned over to the Coquille Watershed Association, and the three phases of the grant were combined into one project currently under the management of the Coquille Watershed Association's, Jennifer Hemple. There were numerous restoration elements to these projects, culvert restorations were just on aspect of these projects. Other work done included large woody debris installation and stream bank stabilization. A total of twelve culverts have been removed or replaced as a part of this project, with one more scheduled for the 2004 field season. The projects were intended to benefit winter steelhead, spring chinook, coastal cutthroat trout, and Oregon Coast coho salmon, a species listed as threatened on the Endangered Species List. Washington Trout visited three of the completed projects and the project scheduled for 2004. The three newly installed culverts that were visited were all determined to be passable and there were no upstream headcutting issues at any of the sites. The culvert that is slated to be replaced was determined to be undersized, a partial barrier to adult migration, and a total barrier to juvenile migration.

The total cost of these three projects was \$671,000 with the Foundation supplying \$240,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Jack Creek (NV) Bridge

The Jack Creek Bridge project was sponsored by the Humboldt National Forest, and managed by Jay Frederick of the Ruby Mountain Ranger District. This project replaced an undersized culvert on Jack Creek, a tributary to the Jarbidge River, with a bridge. The goal of the project was to connect a genetically isolated population of resident bull trout in Jack Creek to fluvial populations in the Jarbidge River, and to open spawning and cold water refuge in Jack Creek to the fluvial population in the Jarbidge. The Jarbidge River is home to the southernmost population of bull trout, populations at the fringes of a species distribution often have a genetic makeup that is adapted to the regional extremes in their environment. This project also has beneficial implications for redband trout and mountain whitefish.

The total cost of the project was \$160,000, with the Foundation providing \$14,000 of that money. This has resulted in the opening of 5.2 miles of habitat at a cost of \$30,700 total dollars per mile of habitat opened, and \$2,692 Foundation dollars per mile of habitat opened.

Adobe Creek (CA) Fish Ladder

The Adobe Creek Fish Ladder project was sponsored by the National Marine Fisheries Service, and was managed by Rich Wantuck. This project built a fish ladder out of boulders and cement that raised the stream bed elevation downstream of a perched culvert on Adobe Creek, a tributary to the Petaluma River. Rather than replacing the culvert, which had a ten foot perch, the downstream bed elevation was raised artificially by installing a series of boulder drops held together by cement. The purpose of this habitat was to increase access to spawning habitat for steelhead in Adobe Creek, which are listed as threatened on the Endangered Species Act. This site was visited by WT in late May of 2003, and was determined to be passable for adult migration and a partial barrier to juvenile migration.

The total cost of this project was \$41,000 and the Foundation supported \$10,000 of the total. This project resulted in the opening of approximately five miles of habitat above the culvert site, at a cost of \$8,200 total dollars per mile of habitat opened, and \$2000 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 26.4 and the non-status weighted CB was 5.3.

Lochsa River (ID) Bull Trout Recovery

The Lochsa River Bull Trout Recovery Project was sponsored by the Clearwater National Forest, and managed by Pat Murphy. This project resulted in the replacement of an impassable culvert on the West Fork of Squaw Creek, a tributary to the Lochsa River, with a pipe arch culvert. The project was intended to open habitat for bull trout, a species listed as threatened on the Endangered Species List. Washington Trout researchers were in the vicinity of this project in late August, but were unable to visit the site due to roads closed for fires.

The total cost of this project was \$125,000, with the Foundation supporting \$62,500 of the total. This project resulted in the opening of five miles of habitat being opened at a cost of \$25,000 total dollars per mile of opened habitat and \$12,500 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 41.2 and the non-status weighted CB was 9.5.

Lower Rogue and South County Basin Restoration

The Lower Rogue and South County Basin Restoration project was sponsored by the Curry County Soil and Water Conservation District, and managed by Harry Hoogesteger. This project resulted in the replacement of twelve culverts on seven streams, Lobster Creek, Morton Creek, Hubbard Creek, Edson Creek, Taylor Creek, and Indian Creek. The projects were intended to benefit winter steelhead, chinook, coho, and coastal cutthroat. WT researchers visited the area in July 2003, and toured nine culvert

replacement sites on six streams. All nine sites were determined to be passable for adult and juvenile migration.

The total cost of this project was \$622,409, with the Foundation supporting \$250,000 of the total. This project resulted in the opening of 9.05 miles of habitat being opened at a cost of \$68,774 total dollars per mile of opened habitat and \$27,624 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 64.5 and the non-status weighted CB was 17.9.

Squaw Creek (WY) Rehabilitation

The Squaw Creek Rehabilitation project was sponsored by the Shoshone National Forest and managed by Ray Zubik of the Clark's Fork Ranger District. This project resulted in the replacement of a set of three culverts and two road crossings that were acting as barriers to fish migration. The three undersized culverts were replaced with a pipe arch culvert and the remaining fish passage barriers were corrected by the relocation of the road out of the riparian zone. The project was intended to allow passage of Yellowstone cutthroat trout above the project reach.

The total cost of this project was \$150,000, with the Foundation supporting \$50,000 of the total. This project resulted in the opening of 3 miles of habitat being opened at a cost of \$50,000 total dollars per mile of opened habitat and \$16,666 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 6.3 and the non-status weighted CB was 0.

Oregon Salmonid Habitat Restoration

The Oregon Salmonid Habitat Restoration projects were sponsored by the Oregon Wildlife Heritage Foundation. The project intended to improve conditions for coho salmon in western Oregon, a species listed as threatened on the Endangered Species List. This project resulted in the replacement of 15 culverts on 15 streams. The scope of this project included in stream restoration and restoration plans as well as culvert replacements.

The total cost of this project was \$925,638, with the Foundation supporting \$250,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Garcia and Mattole River Restoration

The Garcia and Mattole River Restoration project was sponsored by the California Chapter of Trout Unlimited, and was managed by Steve Trafton, and is currently being managed by David Katz. The project intended to assist in the recovery of Garcia and

Mattole stocks of coho salmon, a part of the federally listed northern California coastal coho ESU. This project focuses on many different types of restoration with only a portion of the funds directed towards culverts. This project has occurred mostly on Mendocino Redwoods Company Land, which has been a major partner on both this project and the North Coast Coho project. The majority of this project has not yet occurred, but is scheduled for the 2004 field season.

The total cost of this project was \$90,000, with the Foundation supporting \$30,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Paola Creek Fish Passage

The Paola Creek Fish Passage project was sponsored by the Flathead National Forest, and managed by Pat Van Eimeren of the Hungry Horse Ranger District. This project removed a culvert underneath a decommissioned road on Paola Creek, a tributary to the Middle Fork Flathead River. The road was decommissioned as a part of the Grizzly Bear Recovery strategy, but the culvert was scheduled for removal before the decision to close the road was made. The project was intended to restore passage above the project site for bull trout and westslope cutthroat trout. Bull Trout are listed as threatened on the Endangered Species List. The drainage is currently unoccupied by either species, but it was hoped that with the removal of this passage barrier recolonization would occur. WT researchers visited the site in August of 2004 and determined that the site of the former culvert was passable.

The total cost of this project was \$40,000, with the Foundation supporting \$15,000 of the total. This project resulted in the opening of 4 miles of habitat at a cost of \$10,000 total dollars and \$3750 Foundation dollars spent per mile opened. The status weighted CB for this project was 37.2 and the non-status weighted CB was 9.3.

Upper Puyallup Culvert Project

The Upper Puyallup Culvert Project was sponsored by the South Puget Sound Salmon Enhancement Group. This project resulted in the replacement of a culvert on the South Fork of Ohop Creek in the White River watershed. Funds were also spent on the design of two oxbow reconnection projects that are currently stalled due to Pierce County's flooding concerns.

The total cost of this project was \$50,490, with the Foundation supporting \$10,689 of the total. This project resulted in the opening of 4 miles of habitat being opened at a cost of \$15,295 total dollars per mile of opened habitat and \$2672 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 10.1 and the non-status weighted CB was 3.4.

San Pedro Creek (CA) Restoration (Capistrano St) and San Pedro Creek Fish Barrier Removal(Adobe St)

Both of these projects were sponsored by the City of Pacifica, and managed by Scott Holmes. They are being evaluated together in this assessment because the success of either is closely tied to the success of the other, due to their proximity in the watershed. These projects have not yet occurred, but they are currently scheduled to begin in either the late summer of 2004, or the spring of 2005. The proposed plan has two components: to remove the bridge and fish ladder structure at the Capistrano Street bridge and to replace it with a natural looking structure, and to construct a pool/run complex at the Adobe Bridge Site. These projects are intended to allow for the upstream migration of winter steelhead, a species listed as threatened on the Endangered Species List. WT researchers visited the site in late May of 2003 and confirmed that both structures were barriers to fish passage.

The combined cost of the two projects was \$871,000, with the Foundation supplying \$97,000 of that money. Cost analysis and conservation benefit were not calculated for this project because it has not yet been completed.

North Coast Coho Project (CA)- II and III

The North Coast Coho Project II and III were sponsored by the California Chapter of Trout Unlimited, and were managed by Steve Trafton. These projects were a combination of road decommissioning, sediment reduction projects, and culvert removal projects on the Albion River, Hollow Tree Creek, and the Garcia, Navarro, and Noyo Rivers.

The combined total cost of the project was \$620,000, with the Foundation supplying \$160,000 of that money. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Sawmill Creek (AK) Restoration and Monitoring

The Sawmill Creek Restoration and Monitoring project was sponsored by the City of Haines and managed by Robert Venebles. As of May 2002 no funds had been expended.

Wendover West slope Cutthroat Passage

The Wendover West Slope Cutthroat Passage project was sponsored by the USFS, Clearwater National Forest and managed by Karen A. Smith. This project replaced the undersized culvert at Highway 12 on Wendover Creek with a new culvert designed for a 100 year event (stream simulation design). The project intended to remove the fish passage barrier of the original undersized culvert. This project potentially opened 3miles of habitat for West slope cutthroat, steelhead, and bull trout, which is a species listed as threatened on the Endangered Species List. This site was visited in late August of 2003.

The culvert appeared to be passable but project may have created an upstream juvenile salmonid passage issue due to headcutting above the culvert.

The total cost of this project was \$40,000, with the Foundation supporting \$10,000 of the total. This project resulted in the opening of 3 miles of habitat being opened at a cost of \$13,000 total dollars per mile of opened habitat and \$3333 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 43.2 and the non-status weighted CB was 10.

White River (WA) Floodplain Restoration

The White River (WA) Floodplain Restoration project was sponsored by Chelan-Douglas Land Trust/Lake Wenatchee Ranger District USFS and managed by Gordon Congdon and Heather Murphy. This project removed roads, which included removal of twelve culverts to reestablish the natural function of a White River floodplain oxbow. The White River, a major tributary to Lake Wenatchee, provides critical spawning habitat for chinook, sockeye, steelhead, bull trout (listed as threatened on the Endangered Species List), and West-slope cutthroat trout as well as several other aquatic and terrestrial species. This site was visited in early August of 2003. The success of the project was unknown at the time of the survey. A number of stream channels crossing the decommissioned road appeared not have been returned to their historical grade, resulting in sedimentation events and barriers to fish passage due to headcutting. Please see the photo appendix for an illustration of these issues.

The total cost of this project was \$161,500, with the Foundation supporting \$25,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Chester Creek Fish Passage

The Chester Creek Fish Passage project was sponsored by the USFWS and managed by Anita Goetz and Steve Klosiewski. The scope of this project has changed several times since the original proposal to include much more dramatic alterations of the Chester Creek floodplain. Chester Creek has been observed to support a small native coho run and resident Dolly Varden and rainbow trout; anecdotal evidence suggested that chinook, chum, and pink salmon also return to the creek to spawn. This project would provide unrestricted access to approximately 7.7 kilometers of spawning habitat.

The total cost of this project was \$1,100,000, with the Foundation supporting \$300,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Jordan Creek / Parkway Drive Salmonid Passage

The Jordan Creek / Parkway Drive Salmonid Passage project was sponsored by Del Norte Community Development and managed by Earnest Perry. This project removed a 92 ft. long perched (~4ft.) box culvert and replaced it with a 55 ft. long 8ft. x 16ft. bottomless arch culvert, and removed two 60-inch corrugated metal pipes and replaced them with a 62ft. long X 10ft. 4inch flat car crossing. The culvert replacements restored access to 2.3 miles of habitat in Jordan Creek. The project has improved access to high quality habitat for coho steelhead and cutthroat in the major tributary to one of Northern California's healthiest lagoon systems, Lake Earl. Coastal cutthroat trout was listed by CDFG as a fish species of special concern and is currently being reviewed by the USFWS as a candidate for listing under the ESA. Steelhead was listed by CDFG as a fish species of special concern. Coho salmon are listed in Northern California as threatened under the ESA. Additionally the pool at the base of this stream crossing had served as a significant access point for poachers, which have had a considerable impact on fish populations. This site was visited in early June of 2003. The culvert sites were judged to be passable, as the stream substrate and gradient in the sites was equivalent to the substrate and gradient above and below the sites.

The total cost of this project was \$258,400, with the Foundation supporting \$23,300 of the total. This project resulted in the opening of 2.3 miles of habitat being opened at a cost of \$112,347 total dollars per mile of opened habitat and \$10,130 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 17.5 and the non-status weighted CB was 4.4.

Oregon Salmon Restoration Projects

The Oregon Salmon Restoration projects were sponsored by Oregon Watershed Enhancement Board and managed by Kenneth Bierly. This grant application included 25 projects selected for inclusion based on their long term benefit to listed coho and chinook salmon, steelhead, and cutthroat trout. Of these projects, ten were fish passage improvement projects designed to benefit coho, steelhead, cutthroat, chinook, and bull trout. Five of these projects were culvert replacements, which opened 9.55 miles of habitat in the Coquille and Umpqua watersheds.

The total cost of this project was \$925,638, with the Foundation supporting \$250,000 of the total. This project resulted in the opening of 9.55 miles of habitat. Due to the nature of this project, cost analysis and conservation benefit were not calculated.

North Fork Newaukum Ck Restoration Project/King County (WA) Salmon Restoration

The North Fork Newaukum Ck Restoration Project/King County (WA) Salmon Restoration project was sponsored by Mid-Puget Sound Fisheries Enhancement Group and managed by Troy Fields. Two of three planned culvert removals were implemented

for this project. Replaced the Savisky culvert with a 3-sided box culvert, and replaced the Ernaga culvert with a bridge. This project on North Fork Newaukum Creek was to stop erosion and stream sedimentation at the sites and improve fish passage for coho, cutthroat, and steelhead during all stages of their life history. These sites were visited in mid-August of 2003. Both of the sites were judged to be passable, as the stream substrate and gradient under the bridge and through the culvert was equivalent to the substrate and gradient above and below the two sites.

The total cost of this project was \$125,900, with the Foundation supporting \$46,700 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Longview Fibre Culvert Replacement

The Longview Fibre Culvert Replacement project was sponsored by Lower Columbia Fish Enhancement Group and managed by Jim Stolarzyk. This project removed a culvert and associated fill at the Rock Creek road failure site, replaced a 60inch diameter undersized corrugated metal round culvert on West Valley Creek with a 12ft.x 60ft. bottomless arch opening 0.5 miles of habitat, and replaced an undersized corrugated metal round culvert on Goble Creek with a 60ft concrete bridge opening 2.5 miles of habitat. Barriers to fish passage and sedimentation of spawning gravels have been identified as limiting factors for anadromous salmonids in WRIAs 25 and 26. This project addressed these issues for the benefit of listed fall chinook, chum and winter steelhead, as well as proposed coho and cutthroat.

The total cost of this project was \$252,200, with the Foundation supporting \$123,000 of the total. This project resulted in the opening of 3.5 miles of habitat being opened at a cost of \$72,000 total dollars per mile of opened habitat and \$36,000 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 45 and the non-status weighted CB was 12.3.

Skagit County Fish Passage Improvement

The Skagit County Fish Passage Improvement project was sponsored by Skagit Fisheries Enhancement Group and managed by Alison Studley. This project replaced two road crossing structures on Klahowya Creek, removed a culvert and closed its associated road on Alder Creek, removed and replaced a culvert on the West Fork of Colony Creek, and installed a bridge on Red Creek replacing an undersized perched culvert. The project opened up 10 miles of spawning and rearing habitat for chinook, coho, pink, chum, steelhead, and cutthroat on Alder Creek; opened up 3,000 ft of spawning habitat and provided access to a large wetlands complex for coho cutthroat, and steelhead on Colony Creek; opened up 3,500 ft of habitat for coho, chum, pink, steelhead, and cutthroat on Red Creek; and opened up 3,100 ft of habitat for coho and other salmonids on Klahowya Creek. These sites were visited in mid-August of 2003. The final product of this grant

reclaimed 12 miles (5 acres) of stream habitat for spawning and rearing. The sites visited were judged to be passable.

The total cost of this project was \$133,200, with the Foundation supporting \$61,850 of the total. This project resulted in the opening of 12 miles of habitat being opened at a cost of \$12,995 total dollars per mile of opened habitat and \$6,034 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 269.9 and the non-status weighted CB was 76.

Squalicum Creek (WA) Restoration Project

The Squalicum Creek (WA) Restoration project was sponsored by Nooksack Salmon Enhancement Association and managed by Wendy Scherrer. This project was to remove three fish passage barriers on Squalicum Creek. At the time of the survey the culvert on the Deets property was removed and replaced with a bridge. There was a suite of partial fish passage barriers upstream of the Deets property, but generally salmon have been observed upstream of these culverts. All other culvert projects were either in design or in the permitting phase. The proposed fish passage improvements are to increase the available useable habitat for coho, chum, and cutthroat. Out-migration studies have shown that viable native stocks still exist and have the potential for restoration. Puget Sound coho salmon are a candidate species for listing as a "threatened species" under the Endangered Species Act. This project was visited in mid-August of 2003. The Deets site was observed to be passable.

The total cost of this project was \$150,000, with the Foundation supporting \$75,000 of the total. This project resulted in the opening of 5 miles of habitat at a cost of \$30,000 total dollars per mile of opened habitat and \$15,000 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 22.4 and the non-status weighted CB was 6.6.

Upper Puyallup Culvert Project II

The Upper Puyallup Culvert Project II project was sponsored by South Puget Sound Salmon Enhancement Group and managed by Todd Alsbury. The entire project was not complete as of July 2003. Loss of spawning and rearing habitat was a key limiting factor for the survival of salmon and steelhead in the Puyallup River watershed. Puyallup stocks include the White River spring chinook, which is the last remaining spring chinook in the South Sound. In 1999 the federal government listed Puget Sound chinook salmon as a "threatened species" under the Endangered Species Act.

The total cost of this project was \$141,000, with the Foundation supporting \$40,000 of the total. Due to the nature of this project, cost analysis and conservation benefit were not calculated.

McKenzie River (OR) Habitat Restoration

The McKenzie River (OR) Habitat Restoration project was sponsored by Trout Unlimited and managed by David A. Nolte. This project had replaced seven fish passage blockages at the time of the survey on four tributaries to the McKenzie River. The McKenzie River provides the majority of the remaining bull trout and spring chinook spawning and rearing habitat in the Willamette Basin. Habitat fragmentation was limiting the productivity of these species, and the reestablishment of migration corridors through the removal of blocking culverts was seen as essential for the recovery of these listed species. This project was visited in early July of 2003. The three observed sites were passable.

The total cost of this project was \$642,000, with the Foundation supporting \$150,000 of the total. This project resulted in the opening of 15.5 miles of habitat being opened at a cost of \$41,419 total dollars per mile of opened habitat and \$9677 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 185.9 and the non-status weighted CB was 46.5.

Chena-Badger Slough (AK) Fish Habitat Restoration

The Chena-Badger Slough (AK) Fish Habitat Restoration project was sponsored by the United States Fish and Wildlife Service and managed by Elaine Mayer. This project opened up habitat for Arctic Grayling in the Chena-Badger Slough.

The total cost of this project was \$185,000, with the Foundation supporting \$75,000 of the total. This project resulted in the opening of 2 miles of habitat at a cost of \$92,500 total dollars per mile of opened habitat and \$37,500 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 38 and the non-status weighted CB was 12.7.

Lagunitas Watershed Salmonid Protection (CA) Lagunitas Watershed Coho & Steelhead Project

The Lagunitas Watershed Salmonid Protection (CA) Lagunitas Watershed Coho & Steelhead project was sponsored by The Salmon Protection and Watershed Network of Turtle Island Restoration Network and managed by Todd Steiner. This project examined 34 culverts, 13 dams, and 10 miscellaneous structures in San Geronimo sub-watershed, a tributary to Lagunitas Creek. Key barriers were identified and prioritized. Scores of culverts were present in the San Geronimo sub-watershed a tributary to Lagunitas Creek, the most important wild coho stream in California. The Central California population of coho was listed as threatened in 1996, and steelhead was listed as threatened in 1997. The project was visited in late May 2003. No culvert replacements had been completed at that time.

The total cost of this project was \$240,500, with the Foundation supporting \$78,500 of the total. This project resulted in 34 culverts being surveyed at a cost of \$6300 total dollars spent per culvert assessment and \$2,065 Foundation dollars per culvert assessment.

San Pedro Creek (CA) Fish Barrier Removal

The San Pedro Creek (CA) Fish Barrier Removal project was sponsored by the City of Pacifica CA and managed by Scott Holmes. This project was visited in late May 2003. The project was not complete. The design, drawings, and plans for the Capistrano Bridge Fish Passage Project were at 75% completion. These plans included the following: 1) structural reinforcement of the Capistrano Bridge (included addressing footing undercutting, concrete condition & age, bridge abutments, etc.) 2) the existing concrete fish ladder structure will be removed and then replaced with a natural appearing fish-passage system 3) existing bank slopes at the site will be regraded. San Pedro Creek is the northern most steelhead stream along California's central coast. The Central California population of steelhead was listed as threatened in 1997.

The total cost of this project was \$700,000, with the Foundation supporting \$40,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

North Coast Coho Project (CA)- III Trout Unlimited North Coast Coho Project: Phase III

The North Coast Coho Project (CA)- III Trout Unlimited North Coast Coho Project: Phase III project was sponsored by Trout Unlimited and managed by Steve Trafton. This project decommissioned 4.5 miles of road along the Little North Fork Navarro River and removed and replaced a culvert with baffles, this was a partial barrier to fish passage, with a boxcar bridge on John Smith Creek. The project reduced sedimentation of coho and steelhead habitat in the Little North Fork Navarro River and improved access to available habitat in John Smith Creek. The Central California population of coho was listed as threatened in 1996, and steelhead was listed as threatened in 1997. This project was visited in late May 2003. The John Smith site was judged to be passable and stable.

The total cost of this project was \$372,631, with the Foundation supporting \$100,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Jordan Creek Culvert Replacement Project

Jordan Creek Culvert Replacement Project was sponsored by Rural Human Services Inc and managed by Dan Burgess. This project replaced two 42 inch undersized culverts with a boxcar, fabricated bridge. The project has improved access to high quality habitat for

coho steelhead and cutthroat. Jordan Creek is the major tributary to Lake Earl, the largest undisturbed lagoon system in northern California. Coastal cutthroat trout was listed by CDFG as a fish species of special concern and is currently being reviewed by the USFWS as a candidate for listing under the ESA. Steelhead was listed by CDFG as a fish species of special concern. Coho salmon are listed in Northern California as threatened under the ESA. This project was visited in early June 2003. The project site was judged to be passable.

The total cost of this project was \$65,282, with the Foundation supporting \$21,000 of the total. This project resulted in the opening of 2.3 miles of habitat being opened at a cost of \$28,383 total dollars per mile of opened habitat and \$9,130 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 17.5 and the non-status weighted CB was 4.4.

Hood Canal (WA) Salmon Restoration

Hood Canal (WA) Salmon Restoration project was sponsored by Hood Canal Salmon Enhancement Group and managed by Neil Werner. This program entailed Foundation funding for four years of organizational operation. All four years were considered one grant for the purposes of this analysis, as it was impossible to tease apart projects and funding from year to year. Over the course of four years the Hood Canal Salmon Enhancement group has removed 51 barrier culverts in the Hood Canal watershed.

The total cost of this project was \$4,416,500, with the Foundation supporting \$1,425,000 of the total. This project resulted in the opening of 71.2 miles of habitat being opened at a cost of \$62,204 total dollars per mile of opened habitat and \$20,070 Foundation dollars per mile of habitat opened. The status weighted CB for this project was 112.8 and the non-status weighted CB was 37.6.

Monahan Creek (WA) Fish Passage Enhancement Project

Monahan Creek (WA) Fish Passage Enhancement project was sponsored by Cowlitz County and managed by Jeff Schmidt. This project was to remove two existing 10 ft. wide box culverts, which were perched 5 ft. and replace them with one 32 ft. wide structural steel plate arch culvert. Rock grade control structures and roughed channel were being installed through the project reach to control velocity. The new culvert was sized for peak flows and fish passage. 4.8 miles of habitat have been opened up for coho salmon, steelhead, and coastal cutthroat. Salmon recovery in this watershed would benefit the overall Lower Columbia River salmon population. This project was visited in early September 2003. The project was under construction at the time of the survey.

The total cost of this project was \$917,800, with the Foundation supporting \$146,600 of the total. This project resulted in 4.8 miles of habitat being opened at a cost of \$191,208 total dollars spent per mile of opened habitat and \$30,541 Foundation dollars spent per

mile of opened habitat. The status weighted CB for this project was 89.2 and the non-status weighted CB was 24.3.

Oregon Coast Watershed Restoration

Oregon Coast Watershed Restoration project was sponsored by Oregon Watershed Enhancement Board and managed by Kenneth Bierly. This project removed fish passage barriers on Wildcat Creek, Feagle Creek, Middle Cow Creek, and Fate Creek, opening up more than 10 miles of spawning and rearing habitat for coho and other anadromous and resident species.

The total cost of this project was \$1,330,276, with the Foundation supporting \$268,484 of the total. This project resulted in the opening of 10 miles of habitat at a cost of \$133,028 total dollars per mile of opened habitat and \$26,848 Foundation dollars spent per mile of opened habitat. Due to the nature of this project, conservation benefit was not calculated.

Curry (OR) Agricultural Restoration Package

Curry (OR) Agricultural Restoration Package project was sponsored by Curry County Soil and Water Conservation and managed by Harry Hoogesteger. This project replaced a culvert on the L.A. Merryman property to enhance flow and restore fish passage to rearing habitat above the new culvert. Four fish passage barrier culverts on Swanson and Turner Creeks (2 each) were removed and replaced with bridges and a culvert. Coho salmon are listed as threatened under the Endangered Species Act. These fish are estimated to be at less than 10% of their historic abundance in South Coastal Oregon, and are continuing to decline. Fish passage barriers have been identified as one of three principle limiting factors for the production of salmonids in Curry County. Removal of passage barriers have reclaimed lost spawning and rearing habitat for coho, chinook, steelhead and cutthroat trout. This project was visited in early July 2003. The project sites were judged to be passable.

The total cost of this project was \$300,000, with the Foundation supporting \$100,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Gray's River (WA) Salmon Conservation

Gray's River (WA) Salmon Conservation project was sponsored by Columbia Land Trust and managed by Ian Sinks. This project decommissioned and removed tide gates and associated culverts providing fish access to crucial estuarine rearing and over-wintering habitat for both natal and non-natal stocks. The project opened 220 acres of river delta-estuarine habitat in the Gray's River. Runs of coho, chinook, chum, steelhead and cutthroat are supported in the Gray's River, with the chum population being the strongest

in the Columbia River ESU. This project addresses limiting factors including floodplain connectivity and side channel access. This project was visited in early September 2003. The project sites were judged to be functioning naturally.

The total cost of this project was \$242,000, with the Foundation supporting \$75,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Clark Lake Outflow Restoration

The Clark Lake Outflow Restoration project was sponsored by the City of Kent Parks Recreation, and Human Services. The project manager was Perry Brooks. This project removed barriers to salmon migration, the outflow streambed, enhanced surrounding property values, and made it possible for salmon to return to Clark Lake.

The total cost of this project was \$47,000, with the Foundation supporting \$30,000 of the total. Cost analysis and conservation benefit were not calculated.

Scappoose Bay (OR) Fish Habitat Restoration

The Scappoose Bay (OR) Fish Habitat Restoration project was sponsored by BLM Salem District and was managed by Matthew Walker. Many culvert and small dams in the Scappoose Bay watershed now partially or completely blocked access to miles of potential spawning and rearing habitat for chinook, coho, steelhead, and cutthroat. This project assessed, inventoried, and prioritized instream man-made structures that influenced fish passage. Also the project removed a logging road and culvert and placed an 18ft. arched pipe under the main highway at the mouth of Cedar Creek a tributary to the North Fork Scappoose Creek. This project was visited in mid July 2003.

The total cost of this project was \$629,000, with the Foundation supporting \$200,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Nestucca River (OR) Fish Habitat Restoration

The Nestucca River (OR) Fish Habitat Restoration project was sponsored by BLM Salem District and was managed by Matthew Walker. Many road culverts now partially or completely block access to potential habitat for salmon and steelhead in the Nestucca watershed, which in recent decades, has seen a dramatic decline in populations of all species of salmonids, including chinook, chum, coho, steelhead, and cutthroat. This project determined the number and locations of road crossing culverts, or dams, (100+ locations assessed) that now constitute fish passage barriers within the Nestucca River watershed, the additional miles of potential stream habitat that would be available to

benefit several species of anadromous and resident fish if these barriers were replaced or corrected, and the estimated cost of this work. 100+ sites have been assessed. This project was visited in mid July 2003.

The total cost of this project was \$140,000, with the Foundation supporting \$40,000 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

Muddy Creek (WY) Fish Passage

The Muddy Creek (WY) Fish Passage project was sponsored by BLM Rawlins field office and managed by Mike Bower. This project planned to create an unobstructed route to areas critical for fulfilling the life history requirements of the species of concern by replacing an existing perched 6ft culvert with a corrugated culvert of appropriate size and retrofit it to the stream channel with four head dams (weirs) of <1ft. rise.

The total cost of this project was \$20,000, with the Foundation supporting \$10,000 of the total. Due to the nature of this project, cost analysis and conservation benefit were not calculated.

Mid-Puget Sound Fisheries Enhancement Group Support and Habitat Restoration Project

The Mid-Puget Sound Fisheries Enhancement Group Support and the Habitat Restoration project was managed by Troy Fields. This project removed and replaced two culverts on North Fork Newaukum Creek. Site number one was a sedimentation reduction project where the under-sized pipe was causing downstream erosion of a stream bank. The under sized pipe was replaced by a prefabricated bridge. Site number two was a 4ft. round culvert that was replaced by a 12 x 5ft. concrete box pipe that was countersunk 3ft. and back filled with material. The project primarily benefited coho and resident cutthroat trout. This project was visited in early August of 2003. The project sites were judged to be functioning well and passing fish.

The total cost of this project was \$100,000, with the Foundation supporting \$50,000 of the total. Due to the nature of this project, cost analysis and conservation benefit were not calculated.

Regional Fisheries Enhancement Group Support (WBFEG)

The Regional Fisheries Enhancement Group Support (WBFEG) project was sponsored by the Willapa Bay Fisheries Enhancement Group and was managed by Ronald Craig. This project replaced two fish passage blocking culverts in the Green Creek watershed, and one blocking culvert on Bear Creek. Two culverts are to be replaced on Oxbow Creek in the near future. The Stringer Creek culvert site was not completed; the property owner

choose not to participate in the project. These streams are tributaries to the Willapa River. The project reclaimed habitat for coho, chum, steelhead, and cutthroat. This project was visited in September of 2003.

The total cost of this project was \$100,000, with the Foundation supporting \$50,000 of the total. This project resulted in 8.3 miles of habitat being opened at a cost of \$12,048 total dollars per mile of opened habitat and \$6,024 Foundation dollars spent per mile of opened habitat. The status weighted CB for this project was 88.4 and the non-status weighted CB was 29.5.

Klickitat River Mill Restoration

The Klickitat River Mill Restoration project was sponsored by the Mid-Columbia Regional Fisheries Enhancement Group and managed by Liz Kinne. This project removed a dam with a pond and two culverts on Snyder Creek, a tributary to the Klickitat River. The stream channel was reestablished through the three sites. The project operation took place during the summer of 2003. Approximately four miles of steelhead habitat was reclaimed by this project. Middle Columbia Basin steelhead are listed as threatened under the Endangered Species Act. This project was visited in September of 2003. An assessment of how well the sites function needs to occur after, or possibly during, the spring runoff.

The total cost of this project was \$170,000, with the Foundation supporting \$40,000 of the total. Due to this project not being completed, cost analysis and conservation benefit were not calculated.

Upper Russian River Restoration Program (CA)

The Upper Russian River Restoration Program (CA) project was sponsored by the Mendocino County Resource Conservation District and managed by Tim Walls. This project assessed and inventoried roads, so recommendations for decreasing sedimentation in the Russian River tributaries of York, Feliz, and McNabb Creeks could be made. The project was to help improve the quality of the habitat for coho, chinook, and steelhead in the Russian River. Coho, chinook, and steelhead in the Russian River have been listed as threatened under the ESA. This project was visited in late May of 2003.

The total cost of this project was \$197,534, with the Foundation supporting \$53,249 of the total. Due to the nature of this project cost analysis and conservation benefit were not calculated.

McCready Gulch Barrier Removal Project

The McCready Gulch Barrier Removal project was sponsored by the Humboldt Fish Action Council and managed by Curtis Ihle. This project removed a blocking, baffled, 64ft. long concrete box culvert, and replaced it with a flatcar bridge. The project has opened up 1.7 miles of habitat for 2 listed species on Freshwater Creek, a tributary to McCready Gulch. Steelhead trout and coho salmon are both federally listed species within the Freshwater Creek watershed. This project was visited the first of June 2003. This restoration site is judged as passable to fish.

The total cost of this project was \$174,700, with the Foundation supporting \$48,800 of the total. This project resulted in the opening of 17 miles of habitat being opened at a cost of \$102,764 total dollars per mile of opened habitat and \$28,705 Foundation dollars spent per mile of habitat. The status weighted CB for this project was 17.5 and the non-status weighted CB was 4.

Oregon Gulch Migration Barrier Removal Project (CA)

Oregon Gulch Migration Barrier Removal Project (CA) was sponsored by the Trinity County Planning Department, Natural Resources Division and managed by Janet Clements. This project was thwarted by a gravel mine owner that was able to sway county officials to derail the project.

Salmon Passage Improvement

Salmon Passage Improvement project was sponsored by the Skagit Fisheries Enhancement Group and managed by Alison Studley. This project was visited in mid-August of 2003 and was not yet complete. The day of the site visit a culvert replacement was under way on an unnamed tributary to the Skagit River. The culvert being installed was a 12ft. round pipe that was to be counter sunk 6ft. and filled with material to a 2.9% grade. The culvert replacement was to improve fish passage for coho and cutthroat trout. Coho are candidate species for listing under the Endangered Species Act.

The total cost of this project was \$182,000, with the Foundation supporting \$50,000 of the total. Cost analysis and conservation benefit were not calculated for this project as it was not completed by September 2003.

Appendix B: Photos

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1995-0063-002: Hungry Horse Fish Passage I



Margaret Creek
8/25/03
Looking downstream at culvert inlet.



Margaret Creek
8/25/03
Looking downstream at culvert inlet.



Margaret Creek
8/25/03
Looking upstream at habitat above the culvert.



Margaret Creek
8/25/03
Looking upstream at culvert outlet.

**1995-0063-002: Hungry Horse Fish Passage I,
Cont.**



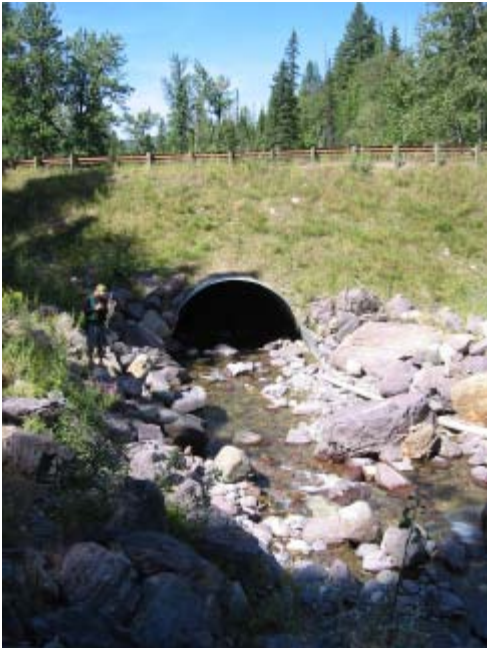
Margaret Creek
8/25/03

Looking downstream at habitat below culvert site.



Margaret Creek
8/25/03

Juvenile cutthroat taken downstream of culvert site.



Riverside Creek
8/25/03

Looking downstream at culvert inlet.



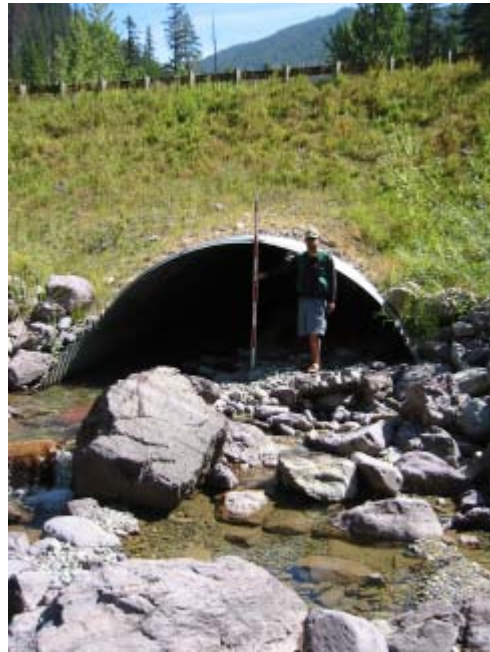
Riverside Creek
8/25/03

Looking downstream at culvert inlet.

**1995-0063-002: Hungry Horse Fish Passage I,
Cont.**



Riverside Creek
8/25/03
Looking upstream at upstream habitat.



Riverside Creek
8/25/03
Looking upstream at culvert outlet.



Riverside Creek
8/25/03
Looking upstream at culvert outlet.



Riverside Creek
8/25/03
Looking upstream at culvert outlet.

**1995-0063-002: Hungry Horse Fish Passage I,
Cont.**



Murray Creek
8/25/03
Looking downstream at culvert inlet.



Murray Creek
8/25/03
Looking upstream at upstream habitat.



Murray Creek
8/25/03
Looking downstream at habitat below project site.

1995-0063-004: McKenzie River Bull Trout II



Ollalie Creek
7/ 8/03

Looking downstream at left bank culvert inlet.



Ollalie Creek
7/ 8/03

Looking upstream at habitat from the perspective used to take the downstream left bank culvert inlet shots.



Ollalie Creek
7/ 8/03

Looking downstream at the right bank culvert inlet.



Ollalie Creek
7/ 8/03

Looking upstream at right bank culvert outlet. This is the one with the baffle installation.

**1995-0063-004: McKenzie River Bull Trout II,
Cont.**



Ollalie Creek
7/ 8/03

Looking upstream at the left bank culvert outlet.



Ollalie Creek
7/ 8/03

Habitat shot upstream of the project culvert.

1996-0092-030: Hungry Horse Fish Passage II



Harris Creek
8/25/03
Looking downstream at culvert inlet.



Harris Creek
8/25/03
Looking downstream inside culvert.



Harris Creek
8/25/03
Looking upstream at habitat above the culvert.



Harris Creek
8/25/03
Looking upstream at culvert outlet.

1996-0092-030: Hungry Horse Fish Passage II, Cont.



Harris Creek
8/25/03
Looking upstream inside culvert.



Harris Creek
8/25/03
Looking downstream at habitat below culvert.



Felix Creek
8/25/03
Looking downstream at culvert inlet.



Felix Creek
8/25/03
Looking downstream at culvert inlet.

**1996-0092-030: Hungry Horse Fish Passage II,
Cont.**



Felix Creek
8/25/03
Looking upstream at habitat above the culvert.



Felix Creek
8/25/03
Looking upstream at culvert outlet.



Felix Creek
8/25/03
Looking upstream inside culvert.



Felix Creek
8/25/03
Looking downstream at habitat below the culvert.

**1996-0092-030: Hungry Horse Fish Passage II,
Cont.**



Ryle Creek
8/25/03

Looking upstream at the Ryle Creek culverts. Ryle Creek is a tributary to the Hungry Horse Reservoir, between Margaret Creek and Riverside Creek. It is likely that the five NFWF funded projects in the Hungry Horse tributaries looked something like this prior to the projects.

1997-0110-001: Adobe Creek (CA) Fish Ladder



Adobe Creek-Petaluma
5/28/03

Looking upstream at elevation control log weir downstream of culvert on Adobe Creek.



Adobe Creek-Petaluma
5/28/03

Looking upstream at rock weir used to raise elevation of streambed up to perched culvert.



Adobe Creek-Petaluma
5/28/03

Looking upstream at rock control structure used to raise stream bed elevation to the culvert outlet.



Adobe Creek
5/28/03

Looking at fishway inside box culvert.

1998-0026-012: Coos Bay (OR) Watershed Restoration II



Mouth of Larson Creek
7/11/03

"Fish Friendly" tide gates that swing open from side mounted hinges.



Mouth of Larson Creek
7/11/03

MaryLou White standing on tide gate w/Coos Bay in background.



Mouth of Palouse Creek
7/11/03

This acts as a before shot for Larson. This is an example of a non-fish friendly tide gate w/ top mounted hinges.



Coalbank Slough
7/11/03

Looking upstream at culvert inlets to tidegate.

**1998-0026-012: Coos Bay (OR) Watershed
Restoration II, Cont.**



Coalbank Slough
7/11/03

Looking upstream at 2 tide gate flaps and MaryLou White and
Jon Souder of the CWA.

**1998-0026-023: Lower Rogue and South
County Basin Restoration**



Edson Creek
7/10/03
Looking upstream at culvert outlet.



Edson Creek
7/10/03
Looking downstream at culvert inlet.



Edson Creek
7/10/03
Large scour pool just upstream of culvert inlet.



Squaw Creek
7/10/03
Looking downstream at culvert inlet. There were a series of
three culverts on Squaw Creek that were replaced.

1998-0026-023: Lower Rogue and South County Basin Restoration, Cont.



Squaw Creek
7/10/03

Looking downstream at culvert inlet that drains a large riparian wetland area.



Ranch Creek
7/10/03

Looking downstream at culvert inlet. Upstream disturbance by cows has muddied water.



Ranch Creek
7/10/03

Looking downstream at inlet of the upstream most culvert replaced on Ranch Creek. Harry Hoogesteger and Dana Hicks of the Curry County Soil and Water Conservation District are on road.



Ranch Creek
7/10/03

Juvenile coho taken from pool upstream of both the culvert replacements on Ranch Creek.

1998-0026-023: Lower Rogue and South County Basin Restoration, Cont.



Indian Creek
7/10/03
Looking downstream at inlet of culvert.



Indian Creek
7/10/03
Looking upstream at culvert outlet.



Indian Creek
7/10/03
Juvenile trout taken upstream of the culvert replacement on Indian Creek.



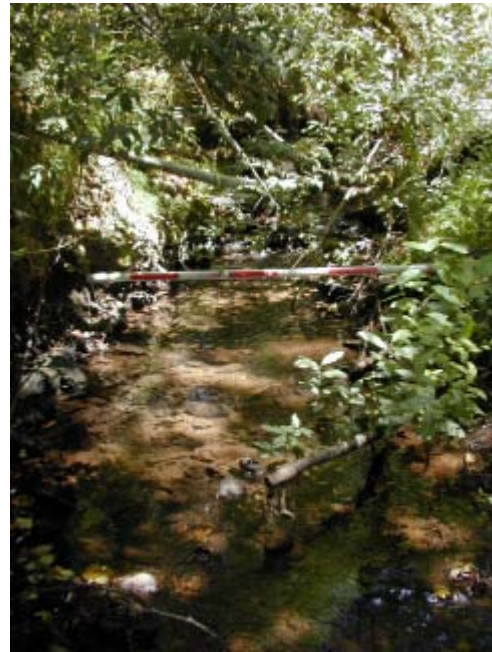
Turner Creek
7/10/03
Looking upstream at bridge.

1998-0026-023: Lower Rogue and South County Basin Restoration, Cont.



Turner Creek
7/10/03

Looking upstream at culvert outlet. There were 2 projects on Turner Creek. The downstream most project was the bridge installation. This culvert is upstream of the bridge.



Turner Creek
7/10/03
Habitat upstream of the culvert.



Taylor Creek
7/10/03

Looking upstream at culvert outlet. This shot is a good example of how upstream landuse and fluvial geomorphic processes can affect a culvert installation. This culvert obviously wasn't sized large enough for the bed load received.



Taylor Creek
7/10/03
Looking downstream at inlet of overfilled culvert.

1998-0026-023: Lower Rogue and South County Basin Restoration, Cont.



Hubbard Creek
7/10/03
Looking downstream at culvert inlet.



Hubbard Creek
7/10/03
Looking upstream at outlet.



Hubbard Creek
7/10/03
MaryLou White and Micah Wait examining juvenile fish collected downstream of the culvert on Hubbard Creek.



Hubbard Creek
7/10/03
Juvenile trout taken downstream of the culvert on Hubbard Creek.

1998-0026-023: Lower Rogue and South County Basin Restoration, Cont.



Morton Creek
7/10/03

This is a shot of the herd and MaryLou White. Cattle frequently access the creek near the project site.



Morton Creek
7/10/03

Looking downstream from bridge at cattle damage.



Morton Creek
7/10/03

Looking upstream from bridge at cattle damage.



Morton Creek
7/10/03

Looking downstream at bridge.

**1998-0026-023: Lower Rogue and South
County Basin Restoration, Cont.**



Morton Creek
7/10/03

Juvenile coho brought to hand upstream of the bridge. There were approx. 200 fish in the school.

**1999-0017-013: Coquille River Watershed
Restoration V**



Little Easy Creek
7/13/03
Looking upstream at outlet.



Little Easy Creek
7/13/03
Looking downstream at culvert.



Hantz Creek
7/14/03
Juvenile trout taken upstream of the culvert that is going to be replaced.



Hantz Creek
7/14/03
Looking downstream at pipe inlet with negative perch.

**1999-0017-013: Coquille River Watershed
Restoration V, Cont.**



Hantz Creek
7/14/03
Looking upstream at culvert outlet.



Wimer Creek
7/14/03
Looking downstream at culvert inlet.



Getty's Creek
7/14/03
Juvenile coho taken upstream of culvert.



Getty's Creek
7/14/03
Looking upstream at culvert outlet.

**1999-0017-013: Coquille River Watershed
Restoration V, Cont.**



Getty's Creek
7/14/03
Looking downstream at culvert inlet.

1999-0017-019: Paola Creek Fish Passage



Paola Creek
8/26/03

Looking upstream at site of former culvert and road crossing.
Road is now decommissioned.



Paola Creek
8/26/03

Looking upstream at plunge created by rock weir installed to
control the stream grade in former culvert location.



Paola Creek
8/26/03

Looking across the stream from right bank to left bank at the
former road crossing site.



Paola Creek
8/26/03

Rock weir upstream of former road crossing site. Immediately
upstream of this weir all flow is in the gravels and there is no
surface water.

**1999-0017-019: Paola Creek Fish Passage,
Cont.**



Paola Creek
8/26/03

Creek bed upstream of the second weir. Flow is all subsurface.



Paola Creek
8/26/03

Dry creek bed upstream of the second rock weir.

**1999-0203-008: San Pedro Creek (CA)
Restoration**



Adobe St Bridge on San Pedro Creek
5/28/03
Looking upstream at the culvert.



Adobe St Bridge on San Pedro Creek
5/28/03
In culvert looking upstream.



Adobe St Bridge on San Pedro Creek
5/28/03
Juvenile rainbow trout observed in pool below culvert.

**2000-0001-018: Wendover Westslope
Cutthroat Passage**



Wendover Creek
8/18/03
Kurt Beardslee with a duck bridge formed by upstream
headcutting above a new culvert installation.



Wendover Creek
8/24/03
Looking upstream at outlet.



Wendover Creek
8/24/03
Habitat downstream of culvert site.



Wendover Creek
8/24/03
Looking downstream at the culvert inlet.

**2000-0001-018: Wendover Westslope
Cutthroat Passage, Cont.**



Wendover Creek
8/24/03

The current upstream extent of headcutting above the culvert installation (approx -200ft). The stream has unzipped to the base of a log weir, which has resulted in a 16in plunge into a 25in deep pool likely creating a juvenile migration barrier.



Wendover Creek
8/24/03

Upstream most log weir that is likely creating a partial barrier to juvenile migration.



Wendover Creek
8/24/03

Road crossing at Wendover campsite downstream of the culvert installation.



Wendover Creek
8/24/03

Habitat upstream of the headcutting that has occurred as a result of the culvert installation. The channel is much less incised and has a better connection to its floodplain.

2000-0001-026: White River (WA) Floodplain Restoration



White River Floodplain
9/ 8/03

Kurt Beardslee and Gordon Congdon examining a stream crossing on the decommissioned road. Upstream headcutting that has occurred post-project has resulted in a plunge of approx. 3.5 ft just upstream of the road crossing. As the head-cut moves upstream it will result in increased sedimentation of the White River.



White River floodplain
9/ 8/03

Looking upstream at former culvert/road crossing site. The streambed gradient is the same as the former culvert, which has led to upstream head cutting.



White River Floodplain
9/ 8/03

Kurt Beardslee and Gordon Congdon looking at stream/road crossing with headcutting issue.



White River Floodplain
9/ 8/03

The plunge created by head cutting resulting from the culvert removal.

2000-0001-026: White River (WA) Floodplain Restoration, Cont.



White River Floodplain
9/ 8/03

Ponded water upstream of the road prism has found its way through a buried culvert that should have been removed.



White River Floodplain
9/ 8/03

One of the oxbows the project intended to reconnect.



White River Floodplain
9/ 8/03

Looking back across the oxbow towards the river.



White River Floodplain
9/ 8/03

Oxbow habitat.

2000-0001-026: White River (WA) Floodplain Restoration, Cont.



White River Floodplain
9/ 8/03
Former road-bed between oxbow and river.



White River Floodplain
9/ 8/03
Oxbow habitat.



White River
9/ 8/03
Kurt Beardslee and Gordon Congdon looking at the river side of the river/oxbow connection.



White River
9/ 8/03
Kurt Beardslee and Gordon Congdon checking out the river.

2000-0001-026: White River (WA) Floodplain Restoration, Cont.



White River
9/ 8/03
Looking at the river habitat.



White River Floodplain
9/ 8/03
Kurt Beardslee and Gordon Congdon looking at oxbow reconnection site.



White River Floodplain
9/ 8/03
Kurt Beardslee and Gordon Congdon looking at sinkhole where the stream found an old culvert.



White River
9/ 8/03
White River and an associated floodplain wetland.

2000-0001-026: White River (WA) Floodplain Restoration, Cont.



White River
9/ 8/03
River with some woody debris.



White River
9/ 8/03
Shot of the river and floodplain forests.

2000-0245-002: Jordan Creek / Parkway Drive Salmonid Passage Project



Jordan Creek
6/ 2/03

Looking downstream at bottomless arch culvert underneath Parkway Drive.



Jordan Creek
6/ 2/03

Looking upstream at flatcar bridge.



Jordan Creek
6/ 2/03

Looking at habitat upstream of the project site.



Jordan Creek
6/ 2/03

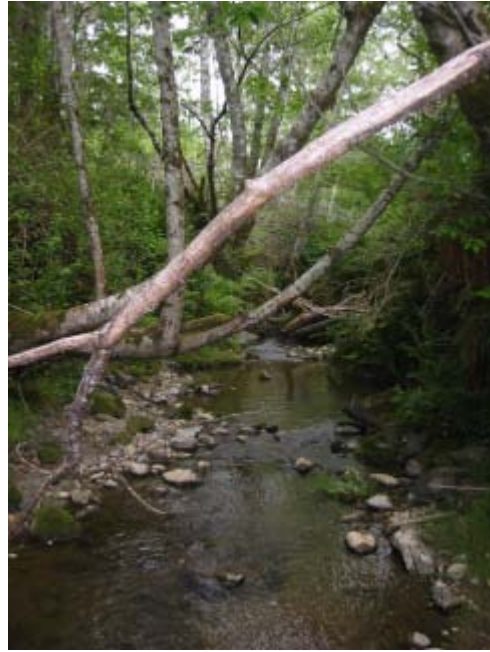
Looking across the flatcar bridge. This picture demonstrates the lack of use this bridge/road receives.

2000-0245-002: Jordan Creek / Parkway Drive Salmonid Passage Project, Cont.



Jordan Creek
6/ 2/03

Looking upstream from the flatcar bridge at rock weir grade control structures.



Jordan Creek
6/ 2/03

Looking downstream at habitat below the project site.



Jordan Creek
6/ 2/03

Looking upstream at bottomless arch culvert.

**2000-0274-000: North Fork Newaukum Creek
Restoration Project**



North Fork Newaukum Creek
8/11/03

Looking across from right bank to left bank of lower culvert.



North Fork Newaukum Creek
8/11/03

Looking downstream at bridge.



North Fork Newaukum Creek
8/11/03
Looking upstream at bridge, lower site.



North Fork Newaukum Creek
8/11/03
Looking upstream at box culvert.

**2000-0274-000: North Fork Newaukum Creek
Restoration Project, Cont.**



North Fork Newaukum Creek
8/11/03
Looking upstream at left bank of upper culvert.



North Fork Newaukum Creek
8/11/03
Looking upstream at lower bank of upper culvert.



North Fork Newaukum Creek
8/11/03
Looking downstream from the upper culvert at stream habitat.



North Fork Newaukum Creek
8/11/03
Looking upstream from the upper culvert.

**2000-0274-000: North Fork Newaukum Creek
Restoration Project, Cont.**



North Fork Newaukum Creek
8/11/03
Looking downstream at box culvert.



North Fork Newaukum Creek
8/11/03
L-log structure placed on the right bank just above the upper
culvert inlet.

2000-0362-000: Skagit County Fish Passage Improvement



Klahoya Creek
8/18/03
Looking downstream at culvert, downstream-most site.



Klahoya Creek
8/18/03
Looking upstream at culvert, MaryLou White and Alison Studly.



Klahoya Creek
8/18/03
Looking upstream at culvert.



Klahoya Creek
8/18/03
Habitat downstream of lowest culvert replacement site.

2000-0362-000: Skagit County Fish Passage Improvement, Cont.



Klahoya Creek
8/18/03
Upstream habitat from the lowest site.



Klahoya Creek
8/18/03
Looking upstream at upper site, MaryLou White and Alison Studly.



Klahoya Creek
8/18/03
Habitat downstream of upper bridge site, above lower culvert site.



Klahoya Creek
8/18/03
Looking downstream at bridge site.

2000-0362-000: Skagit County Fish Passage Improvement, Cont.



Shoeshel Creek
8/18/03
Creek downstream of the excavator work.



Shoeshel Creek
8/18/03
Hydraulic excavator culvert construction.



Alder Creek
8/18/03
Looking upstream from bridge.



Alder Creek
8/18/03
Looking upstream at bridge site, MaryLou White.

2000-0362-000: Skagit County Fish Passage Improvement, Cont.



Alder Creek
8/18/03
Looking upstream at habitat above bridge.



Alder Creek
8/18/03
Looking downstream at bridge.



Red Creek
8/18/03
Looking downstream at bridge.

**2000-0368-000: Squalicum Creek (WA)
Restoration Project**



Squalicum Creek
8/18/03
Former road crossing site.



Squalicum Creek
8/18/03
MaryLou White at new bridge.



Squalicum Creek
8/18/03
Habitat upstream of bridge.



Squalicum Creek
8/18/03
Habitat downstream of Bridge.

**2000-0368-000: Squalicum Creek (WA)
Restoration Project, Cont.**



Squalicum Creek
8/18/03
MaryLou White on Bridge.



Squalicum Creek
8/18/03
Upstream Habitat.

2001-0005-009: McKenzie River (OR) Habitat Restoration



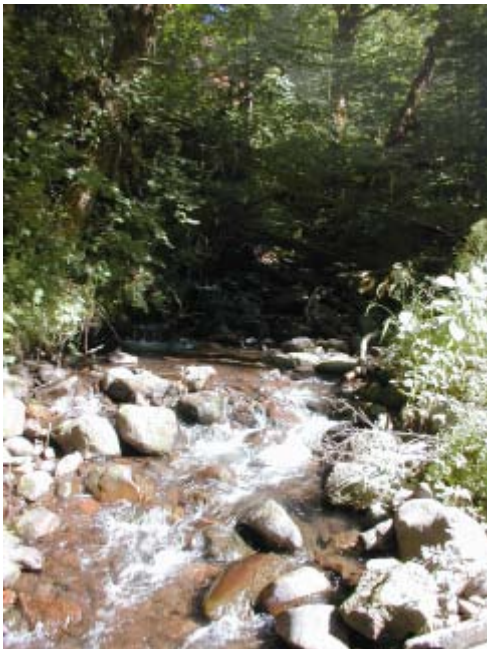
Tributary to Gate Creek
7/9/03

Looking downstream at culvert inlet. This tributary enters Gate Creek approx. 2 miles upstream of its mouth on the McKenzie. Culvert is on Weyerhaeuser lands and a BLM road.



Tributary to Gate Creek
7/9/03

Looking downstream at culvert inlet.



Tributary to Gate Creek
7/9/03
Upstream habitat.



Tributary to Gate Creek
7/9/03

Looking upstream at culvert outlet.

2001-0005-009: McKenzie River (OR) Habitat Restoration, Cont.



Tributary to Gate Creek
7/9/03
Looking upstream at outlet.



Finn Creek
7/9/03
Juvenile cutthroat taken just upstream of the installed culvert. A high density of fish in this size class were observed upstream of the culvert.



Finn Creek
7/9/03
Looking downstream at the culvert inlet.



Finn Creek
7/9/03
Habitat upstream of the culvert.

2001-0005-009: McKenzie River (OR) Habitat Restoration, Cont.



Finn Creek
7/ 9/03
Upstream habitat.



Finn Creek
7/ 9/03
Looking upstream at culvert outlet.



Finn Creek
7/ 9/03
Looking upstream at culvert outlet.

**2001-0202-006: Lagunitas Watershed
Salmonid Protection (CA)**



Barnaby Creek Lagunitas Watershed
5/28/03

Todd Steiner and Rueven Walder at the highest priority culvert replacement site in the Lagunitas Watershed.



Lagunitas Creek
5/28/03

Looking at habitat downstream of Barnaby Creek confluence.



Larsen Creek in San Geronimo watershed
5/28/03

The fish ladder traps and strands juvenile salmonids. Project sponsor is working with NMFS and CDFG on a solution, and is considering sealing the bottom of the baffles with an epoxy sealant.



Larsen Creek San Geronimo Watershed
5/28/03

Looking upstream at baffles proposed for sealing.

**2001-0202-006: Lagunitas Watershed
Salmonid Protection (CA), Cont.**



Larsen Creek Baffles
5/28/03

Close-up of baffles proposed for sealing. Note leakage on right.

2001-0202-009: San Pedro Creek (CA) Fish Barrier Removal



Capistrano St Bridge on San Pedro Creek
5/28/03
On right bank looking across bridge at road closure.



Capistrano St Bridge San Pedro Creek
5/28/03
Looking upstream at fish ladder underneath bridge.



Capistrano St bridge San Pedro Creek
5/28/03
Close-up of fish ladder looking upstream.



Capistrano St Bridge San Pedro Creek
5/28/03
Looking upstream at the upper fish ladder.

**2001-0202-011: Trout Unlimited North Coast
Coho Project: Phase III**



Upper Russian River Watershed
5/30/03

Not a NFWF funded site, but an example of the type of work Mendocino Redwood Co. is undertaking on this road system.



South Branch of the North Fork Navarro Watershed
5/30/03

Failed culvert site slated for replacement by Mendocino Redwood Co.
Not a NFWF project, but a good example of what the NFWF project looked like pre-replacement.



South Branch of the North Fork Navarro Watershed
5/30/03

Not NFWF funded site, but an example of the work Mendocino Redwood Co. is doing on their lands.



Little North Fork Navarro
5/30/03

This is a rolling dip put in to drain the road surface and reduce sediment inputs to the stream. The work done here was conducted by Pacific Watershed Associates.

**2001-0202-011: Trout Unlimited North Coast
Coho Project: Phase III, Cont.**



Little North Fork Navarro
5/30/03
Culvert removal site and associated decommissioned road.



Little North Fork Navarro
5/30/03
Decommissioned road site, Jamie Glasgow.



Little North Fork Navarro
5/30/03
Dry channel stream crossing on a decommissioned road.



Little North Fork Navarro
5/30/03
Decommissioned road-stream crossing, Jamie Glasgow with Chris
Surfleet, hydrologist for Mendocino Redwood Company.

**2001-0202-011: Trout Unlimited North Coast
Coho Project: Phase III, Cont.**



John Smith Creek
5/30/03

This bridge was installed by Trout Unlimited over John Smith Creek, a tributary to the Little North Fork Navarro, Micah Wait and Chris Surfleet.



John Smith Creek
5/30/03

This shot is on the North Fork of the Navarro looking upstream at the bridge over John Smith Creek.



North Fork Navarro
5/30/03

Log Jam installed on the North Fork Navarro just below the John Smith Creek site.



John Smith Creek
5/30/03

Looking across to the right bank of the project site, Micah Wait with Chris Surfleet.

2001-0202-014: Jordan Creek Culvert Replacement Project



Jordan Creek
6/ 2/03

Looking upstream at flatcar bridge, and habitat below. Creek is turbid just downstream of cattle observed in the stream.



Jordan Creek
6/ 2/03

Looking downstream at flatcar bridge.



Jordan Creek
6/ 2/03

Looking upstream from the bridge. The area used by cattle to access the stream can be seen on the upper right side of the picture.



Jordan Creek
6/ 2/03

Looking upstream at a cow in the creek. This is just upstream of the project site.

**2001-0202-014: Jordan Creek Culvert
Replacement Project, Cont.**



Jordan Creek
6/ 2/03

Two size classes of juvenile cutthroat taken in the project area.

2001-0267-000: Hood Canal (WA) Salmon Restoration



Indian George Estuary
8/12/03
Imported gravels, and estuary at low tide.



Indian George Estuary
8/12/03
Mud flats, low tide.



Tarboo Creek
8/12/03
Grading the road above the Tarboo installation.



Tarboo Creek
8/12/03
Looking at culvert inlet from top of road fill.

2001-0267-000: Hood Canal (WA) Salmon Restoration, Cont.



Tarboo Creek
8/12/03

Looking downstream at culvert being installed on Tarboo. Steam roller in background.



Tarboo Creek
8/12/03

Recently installed culvert on Tarboo Creek.



Johnson Creek
8/12/03

Looking downstream at inlet.



Stimson Creek
8/12/03

Looking upstream at log weirs installed upstream of a new culvert.

2001-0267-000: Hood Canal (WA) Salmon Restoration, Cont.



Stimson Creek
8/12/03

Looking downstream at culvert inlet below log weirs.



Upper Stimson Creek
8/12/03

Creek goes dry in summer, but provides a seasonal connection to large wetlands complex.



Haven Lake
8/12/03

Fishway providing access to Haven Lake.

2001-0270-000: Monahan Creek (WA) Fish Passage Enhancement Project



Monahan Creek
9/ 3/03

Crane is lifting pieces of the culvert up to workers who are bolting the pieces to the main pipe.



Monahan Creek
9/ 3/03

Culvert construction process. Crane lifts the individual pieces of the culvert from the staging area to the top of the pipe, where workers guide it into place and bolt the pipe together.

2001-0350-023: Curry (OR) Agricultural Restoration Package



Merriman Creek
7/10/03

Looking downstream at culvert inlet. Pipe drains a large wetland/pond. Upstream, the concrete blocks were installed by the landowner likely to raise water levels in the pond, but they are probably a barrier to juvenile passage at observed flows. The grantee said he would contact the landowner.



Merriman Creek
7/10/03
Pond/wetland habitat upstream of pipe.



Merriman Creek
7/10/03
MaryLou White and Harry Hoogesteger with wetland-pond upstream of pipe in the background.



Merriman Creek
7/10/03
Concrete blocks installed by landowner and wetlands in background.

2001-0350-023: Curry (OR) Agricultural Restoration Package, Cont.



Merriman Creek
7/10/03
Looking upstream at culvert outlet.



Swanson Creek
7/10/03
Looking upstream at bridge w/MaryLou White and Harry Hoogesteger.



Swanson Creek
7/10/03
Looking downstream at bridge.

2001-0363-000: Gray's River (WA) Salmon Conservation



Gray's River
9/ 3/03

Dale Russell looking at connection between Gray's River and Seal Slough. Connection was dug with a track hoe.



Gray's River
9/ 3/03

Hydraulic connection between river and Slough in the estuary. These were dug at sites where the river had previously overtopped the dike and crossed the now decommissioned road.



Gray's River Estuary
9/ 3/03

Below is an estuarine floodplain acquisition. Tidal inundation will be restored through the removal of a levee/tidegate complex.



Deep River Estuary
9/ 3/03

Dale Russell with Ian Sinks and Lindsay Cornelius from Columbia Land Trust. This estuarine floodplain forest was acquired as part of the NFWF funded project.

**2002-0002-005: Scappoose Bay (OR) Fish
Habitat Restoration**



Cedar Creek
7/15/03
Looking downstream at inlet.

2002-0002-006: Nestucca River (OR) Fish Habitat Restoration



East Beaver Creek
7/15/03

Looking upstream at outlet of culvert that was identified in the project process and is slated for replacement.



East Beaver Creek
7/15/03

Looking downstream at the culvert inlet.



East Beaver Creek
7/15/03

Two juvenile coho taken from pool above the culvert that is going to be replaced.



East Creek
7/15/03

Looking downstream at culvert inlet.

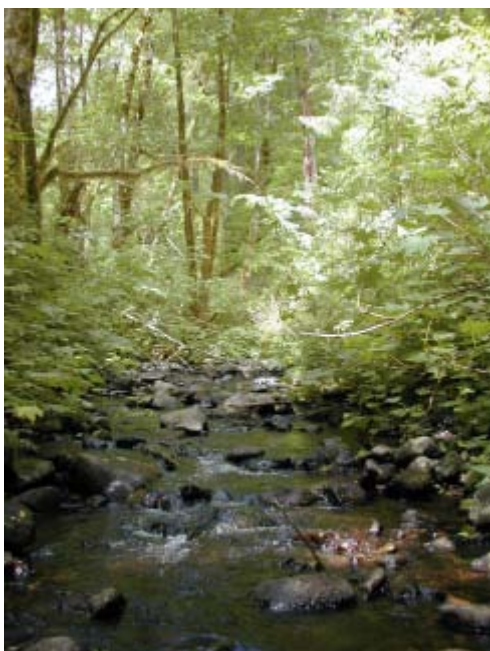
2002-0002-006: Nestucca River (OR) Fish Habitat Restoration, Cont.



East Creek
7/15/03
Looking upstream at culvert outlet.



Fan Creek
7/15/03
Looking upstream at outlet. This culvert is not the one that will be replaced.



Fan Creek
7/15/03

Habitat upstream of culvert that we examined, which won't be replaced, but the one upstream of here will, so the photo only serves to show what type of habitat there is in Fan Creek.



Ginger Creek
7/15/03

Looking upstream at culvert outlet.

**2002-0002-006: Nestucca River (OR) Fish
Habitat Restoration, Cont.**



Ginger Creek
7/15/03

Cascade approximately 200 ft upstream of the slated culvert replacement.



Ginger Creek
7/15/03

Looking downstream at culvert inlet.

**2002-0310-010: Willapa Bay Fisheries
Enhancement Group Support**



BPA Creek
9/ 3/02

Log weir with a perch, likely a result of head cutting as a result of the culvert installation.



BPA Creek
9/ 2/03

Looking upstream at culvert outlet.



BPA Creek
9/ 2/03

Looking downstream at downstream habitat.



BPA Creek
9/ 2/03

Looking downstream at culvert inlet.

2002-0310-010: Willapa Bay Fisheries Enhancement Group Support, Cont.



BPA Creek
9/ 2/03
Looking upstream at upstream habitat.



Green Creek
9/ 2/03
Stream meander restoration done downstream of the Green Creek culvert replacement.



Green Creek
9/ 2/03
Looking upstream at culvert outlet.

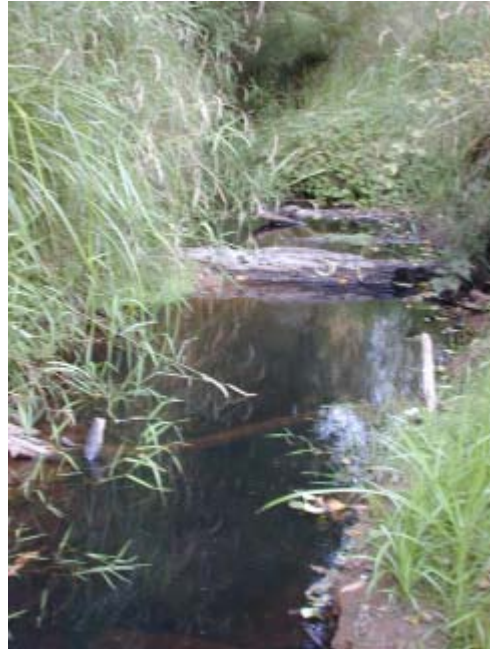


Green Creek
9/ 2/03
Looking downstream at culvert inlet.

2002-0310-010: Willapa Bay Fisheries Enhancement Group Support, Cont.



Green Creek
9/ 2/03
Looking downstream at culvert inlet.



Green Creek
9/ 2/03
Looking upstream at upstream habitat.



Stringer Creek
9/ 2/03
Site of a proposed fish passage restoration project. The project fell through when the landowners requested \$30,000 in order to allow the project.



Oxbow Creek
9/ 2/03
Site of a culvert restoration that will occur soon. Culvert was identified using NFWF funds.

**2002-0310-010: Willapa Bay Fisheries
Enhancement Group Support, Cont.**



Bear Creek
9/ 2/03
Looking upstream at culvert outlet.

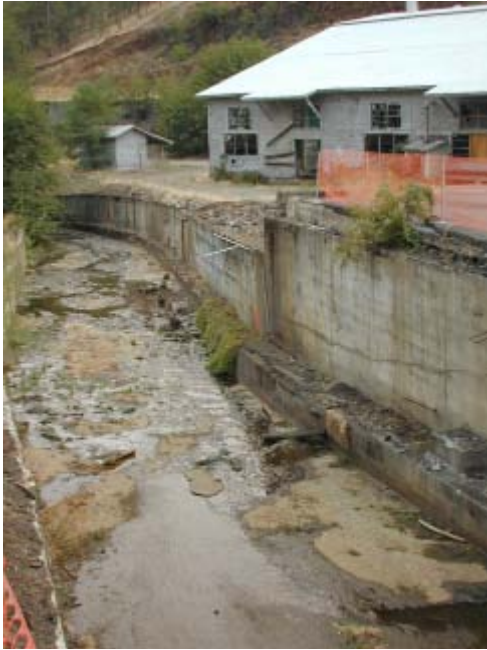


Bear Creek
9/ 2/03
Looking downstream at culvert inlet.



Bear Creek
9/ 2/03
Looking upstream at habitat above the culvert.

2002-0310-012: Klickitat River Mill Restoration



Snyder Creek
9/ 3/03

Looking upstream at sluiceway that serves as the main channel for Snyder Creek. Flows directly through an abandoned mill site.



Snyder Creek
9/ 3/03

Looking upstream at mill and sluiceway.



Snyder Creek
9/ 3/03

Culvert removal site. A bridge will be installed. Creek is being diverted through white plastic pipe.



Snyder Creek
9/ 3/03

Top of culvert removal site with old pipe in background.

**2002-0310-012: Klickitat River Mill
Restoration, Cont.**



Snyder Creek
9/ 3/03
Bottom half of project site.



Snyder Creek
9/ 3/03
Old pipe that was removed for bridge installation.



Snyder Creek
9/ 3/03
Old pipe that was removed to make way for bridge.



Snyder Creek
9/ 3/03
Old oil house over creek with stack in background.

**2002-0310-012: Klickitat River Mill
Restoration, Cont.**



Snyder Creek
9/ 3/03

Dale Russell and Liz Kinne in front of pool at the lowest end of the mill sluiceway. We observed 5 fish (salmonid shaped) in between 3" and 8" in the pool.

**2002-0368-009: Upper Russian River
Restoration Program (CA)**



Feliz Creek Watershed
5/29/03
Looking upstream at culvert replacement site.



Feliz Creek Watershed
5/29/03
Looking downstream at culvert inlet.



Feliz Creek Watershed
5/29/03
Looking downstream at culvert inlet.



Feliz Creek Watershed
5/29/03
In culvert looking downstream.

2002-0368-009: Upper Russian River Restoration Program (CA), Cont.



Feliz Creek Watershed
5/29/03

Major culvert replacement site in Feliz Creek watershed. Road is failing, and contributing sediment.



Feliz Creek Watershed
5/29/03

Failing road stress fracture on downstream side of road.



Russian River Watershed
5/29/03

This is a trash rack designed to build up a natural apron of wood by diverting pieces of wood too large to pass through the culvert onto the banks.



Russian River Watershed
5/29/03

Natural landslide contributing sediments to system.

**2002-0368-013: McCready Gulch Barrier
Removal Project**



Freshwater Creek
6/ 1/03

This site is where Humboldt Fish Action Council collects fish for hatchery operations and research.



Freshwater Creek
6/ 1/03

Jamie Glasgow and Steven Holz of the Humboldt Fish Action Council. This site is where Humboldt Fish Action Council collects fish for hatchery operations and research.



Freshwater Creek
6/ 1/03

This site is where Humboldt Fish Action Council collects fish for hatchery operations and research.



McCready Gulch
6/ 1/03

Looking upstream at the bridge.

**2002-0368-013: McCready Gulch Barrier
Removal Project, Cont.**



McCready Gulch
6/ 1/03
Looking downstream at bridge site.

Appendix C: Data Matrix Report

1995-0063-002 Hungry Horse Fish Passage I

Sponsor: USFS Flathead National Forest

Project Manager: Pat Van Eimeren - (406) 387-3863

Justification: West Slope cutthroat trout, bull trout, and mountain whitefish have been cut off from numerous streams flowing into the Hungry Horse Reservoir. This project attempts to reconnect reservoir and stream migration corridors.

Goals: Restore migration for WS cutthroat to 11 miles of stream. Increase WS cutthroat annual recruitment by 5,521 individuals resulting in greater forage for bull trout resulting in an increased sport fishery.

%Success: 100%

Relative Success: Project resulted in the restoration of access to 5 river miles, which fits well with the project justification.

Match: \$ 40,000.0	Total: \$ 106,667.
Cost - NFWF P/A \$ 66,667.00	Federal Match \$ 0.00

Cost Analysis: 13,333 in NFWF funds were spent for every mile of restored river, a total of 21,333 dollars were spent for each mile of restored access.

Proposed Scope: The project proposal is very non-specific about which Hungry Horse tributaries were to be fixed under this grant. Both Felix and Harris Creeks are mentioned in the proposal, but Felix and Harris weren't addressed until Hungry Horse II.

Actual Scope: Replaced blocking culverts on Margaret, Murray, and Riverside Creeks with pipe-arch culverts.

Monitoring: Yes

Supplementation: None

Current Passability: This project was visited by Micah Wait and Jamie Glasgow on 8-25-03, all three culverts were analyzed and considered passable.

Threats to Passability: All three streams have steep gradients, and natural barriers to juvenile migration are likely common. As the project was intended to open up spawning habitat for adfluvial fish from the reservoir this should not be an issue.

Conservation Benefit: This project has resulted in the connection of spawning grounds in the watersheds of three large creeks which drain into Hungry Horse Reservoir. This will benefit west slope cutthroat trout, bull trout, and mountain whitefish.

CB Values: 5 miles of habitat gained w/ BFW of 18', 40', 18' giving an average BFW of 25.3'. The project opened habitat for ESA bull trout, and species of concern westslope cutthroat trout.

CB Score ESA Weighted: 60.1

CB Score Non-ESA Weighted: 20

Notes: Call Pat with questions.

Site Visit? Yes, Wait and Glasgow on 8-25-03

1995-0063-004 McKenzie River bull trout II

Sponsor: McKenzie Ranger District Willamette National Forest

Project Manager: James Capurso USFS - (503) 822-3317, Neil Armantrout BLM - (503) 683-6600.

Justification: Bull trout had been cut off from 2 miles of quality habitat by Highway 126 In August of 1995 the culvert on Ollalie Creek underneath Highway 126 was replaced.

Goals: Restore migration between the McKenzie River and Ollalie Creek above Highway 126.

%Success: 100%

Relative Success: N/A

Match: \$ 47,900.0	Total: \$ 65,500.0
Cost - NFWF P/A \$ 17,600.00	Federal Match \$ 0.00

Cost Analysis: 8,800 in NFWF funds were spent for each river mile of restored access, a total of 32,750 dollars were spent for each river mile of restored access.

Proposed Scope: To restore access to Ollalie Ck for fish in the Upper McKenzie.

Actual Scope: Partially restored access to Ollalie Ck for fish of the Upper McKenzie by placing a passage culvert parallel to the historic culvert.

Monitoring: Twice annual USFS monitoring continued for at least 1 year beyond culvert replacement.

Supplementation: These funds were not spent on culvert replacement, but rather were spent seeding areas opened up by culvert replacement with bull trout fry from nearby streams

Current Passability: Micah Wait and Mary Lou White visited the site on July 8th and observed extremely high flows due to snow melt. It seemed likely that under the observed conditions many fish would not be able to pass through the observed structure. The structure would currently allow for fish passage during normal flows, but there might also be issues with passage at low flows.

Threats to Passability: The project was accomplished by installing a passage culvert with baffles. Under high flow conditions the passage culvert is probably not passable.

Conservation Benefit: Fish passage was restored to 2 miles of habitat in Ollalie Creek. Even though the passage culvert is not passable year round, it is likely passable during bull trout migration periods.

CB Values: 2 miles of habitat gained w/ a BFW of 40'. The project opened habitat for ESA listed bull trout and chinook salmon.

CB Score ESA Weighted: 42.2

CB Score Non-ESA Weighted: 8.4

Notes: The project proposal that NFWF sent to us is for monitoring and seeding of waters opened up by a culvert replacement, while the final report they sent was for the project that replaced the culvert.

Site Visit? Yes, Wait and White on 7-8-03

1995-0063-011 Big Creek Watershed Restoration

Sponsor: USFS Flathead National Forest

Project Manager: Pat Van Eimeren - (406) 387-3863

Justification: Sedimentation in the Flathead Basin has resulted in a decline of bull trout habitat. This project focuses on using road closures and LWD placement to reduce sedimentation in Big Creek, a tributary to the Flathead River. Included in the road decommissioning was the removal of culverts and pipes underneath reclaimed roads.

Goals: Reduce sedimentation in the Big Creek watershed for the benefit of bull trout.

%Success: N/A

Relative Success:

Match: \$ 34,630.0	Total: \$ 48,186.0
Cost - NFWF P/A \$ 13,556.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Road closures in the Big Creek water shed included culvert removals.

Actual Scope: Road closures in the big creek water shed included culvert removals.

Monitoring: Unknown

Supplementation: No

Current Passability: Unknown. Micah Wait and Jamie Glasgow were in the region from 8/24/03-8/26/03, but were unable to visit the project site due to fires in the area.

Threats to Passability: Formation of natural barriers.

Conservation Benefit: The removal of culvert in this project resulted in the reclamation of 4 miles of Road # 316A.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No, inaccessible due to fires.

1996-0092-001 Applegate River Key Watershed

Sponsor: USFS Rogue River National Forest, Talent Irrigation District

Project Manager: Gerald Hellinga (541) 858-2326, S. Bulkin (541) 858-2324

Justification: The Little Applegate River has been designated as a Key Watershed for restoration and maintenance of habitat for salmonid stocks-at-risk, this project will work towards this end through the revegetation of riparian forests, reduction of sediment sources, and addition of habitat complexity to the aquatic environment.

Goals: Improve salmonid survival and increase macroinvertebrate productivity, reduce sediment to the Little Applegate, improve instream habitat diversity, restore riparian habitat, stabilize priority mass wasting areas, improve culverts.

%Success: N/A

Relative Success: N/A

Match: \$ 52,000.0	Total: \$ 72,000.0
Cost - NFWF P/A \$ 20,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: Rogue River National forest - Forest Monitoring Framework Applegate AMA monitoring team, fish survival will be monitored through spawner surveys by ODFW, reduction of erosion from improved culverts will be monitored by USFS and volunteers.

Supplementation: No

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: Increased Fish passage and reduction of sediment inputs in the Little Applegate Watershed.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No, couldn't make contact with the project sponsors.

1996-0092-005 Beaver Creek Migration Barrier II

Sponsor: USFS Uncompahgre and Gunnison National Forest

Project Manager: Jeff Cameron - (970)874-6650

Justification: Colorado River Cutthroat Trout are a species of concern. In order to maintain a pure population, this project proposes the construction of a migration barrier that will prevent exotic species from entering the Beaver Creek drainage.

Goals: Prevent upstream migration of non-native species into Beaver Creek. Specific objectives are as follows: 1) repair and maintain the migration barrier constructed in 1995 2) re-establish a pure population of Colorado river cutthroat trout in portions of their historic habitat.

%Success: 100%

Relative Success: N/A

Match:	Total:
Cost - NFWF P/A \$ 25,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Repair and maintain a barrier to upstream migration, poison the river, reintroduce Colorado River cutthroat trout.

Actual Scope: Barrier repaired, river poisoned.

Monitoring: Say they will monitor intensively in the proposal, including electroshocking, genetic analysis, and structural evaluation of the barrier, but no specific details are given in the final report.

Supplementation: Yes, following treatment of the river, Colorado River cutthroat trout will be reintroduced.

Current Passability: Unknown

Threats to Passability: Threats to impassability: structural failure due to flow, bed load, or LWD.

Conservation Benefit: Potentially maintains a pure meta-population of Colorado River cutthroat trout in Beaver Creek.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No

1996-0092-029 Coos Bay Watershed Restoration I

Sponsor: BLM Coos Bay - New Project Sponsor Coos Bay Watershed Association

Project Manager: William Hudson - (541) 756-0100 BLM, Coos Bay WA. contact Jon Souder (541)888-5922, cell (541)670-0938, or s

Justification: Fish passage barriers are impeding access of Coho salmon to spawning areas. This project attempts to identify and address these barriers.

Goals: Facilitate adult and juvenile fish passage at culvert barriers by replacement of culverts.

%Success: N/A

Relative Success: N/A

Match: \$ 53,527.0	Total: \$ 80,527.0
Cost - NFWF P/A \$ 27,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace culverts identified as barriers to fish migration, non-specific about how many were identified. Culverts to be treated will be selected based on quantity and quality of habitat accessed vs. cost of correction.

Actual Scope: The only culvert replacements that occurred as a part of the combined Coos Bay projects was associated with experimental tidegate replacements on two systems, Larson Ck and Coalbank Slough. These tide gates are side hinged as opposed to top hinged, which potentially decreases turbulence around the gates on an outgoing tide, facilitating juvenile passage.

Monitoring: Spawning surveys were slated to be conducted during the fall of 1998.

Supplementation: No, but there is no indication of whether these fish are wild or of hatchery origin.

Current Passability: Unknown

Threats to Passability: Tidegates are still only passable with an outgoing tide, as they shut during the flood tide, when fish are most likely to move upstream. But these types of tidegates are more likely to pass juvenile fish than top hinged gates.

Conservation Benefit: Opens up important connections to juvenile rearing habitat for listed coho. Recent studies have shown the importance of non-natal habitats for juvenile coho rearing in the Coos estuary, and increasing the passability of tidegate structures is critical for opening these habitats up for non-natal rearing. Side hinged tide gates are being put forward as a solution to juvenile passage issues for tidegates, but there is little empirical evidence from natural systems to back these claims up.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Page 2 of this project proposal is missing. No further analysis using documents for this project will be done as it is clear that what we have received is not representative of the work done. See the letter from Suzanne Piluso at the back of this project file. Conservation benefits will be quantified through interviews and site visits.

Site Visit? Yes, Wait and White on 7-11-03.

1996-0092-030 Hungry Horse Fish Passage II

Sponsor: USFS Flathead National Forest

Project Manager: Pat Van Eimeren - (406) 387-3863

Justification: West Slope cutthroat trout, bull trout, and mountain whitefish have been cut off from numerous streams flowing into the Hungry Horse Reservoir. This project attempts to reconnect reservoir and stream migration corridors.

Goals: Restore fish passage to Felix and Harris Creeks. It is expected that passage to Felix Creek will result in the recruitment of an additional 1130 west slope cutthroat trout Hungry Horse Reservoir, while restoration of passage to Harris Creek will result in an increase in recruitment of 534 adult fish.

%Success: 100%

Relative Success: N/A

Match: \$ 180,000.	Total: \$ 252,000.
Cost - NFWF P/A \$ 72,000.00	Federal Match \$ 22,909.09

Cost Analysis: 6,545 NFWF dollars were spent for every mile of habitat gained, 22,909 total dollars were spent for every mile of habitat gained.

Proposed Scope: Replace culverts on Felix and Harris Cks.

Actual Scope: Replaced culverts on Felix and Harris creeks with pipe arch culverts.

Monitoring: Forest Service monitoring protocol.

Supplementation: No

Current Passability: Both culverts are passable.

Threats to Passability: Both streams have steep gradients, and natural barriers to juvenile migration are likely common. As the project was intended to open up spawning habitat for adfluvial fish from the reservoir this should not be an issue.

Conservation Benefit: This project has resulted in the connection of 11 miles spawning grounds in the watersheds of three large creeks which drain into Hungry Horse Reservoir. This will benefit west slope cutthroat trout, bull trout, and mountain whitefish.

CB Values: 11 miles of habitat gained w/ BFW of 15 and 34 giving an average BFW of 24.5'. The project opened habitat for ESA bull trout, and species of concern westslope cutthroat trout.

CB Score ESA Weighted: 128.1

CB Score Non-ESA Weighted: 42.7

Notes:

Site Visit? Yes, Wait and Glasgow on 8-25-03.

1997-0108-002 Mary's River VI

Sponsor: BLM-Elko district

Project Manager: Roy Price - (775) 753-0200 Roy is now gone, current manager is Pat Coffin at the same number.

Justification: A set of culverts crossing the Mary's River is blocking Lahontan Cutthroat migration. These culverts are also resulting in upstream headcutting, and excessive sedimentation downstream. This project attempts to address these issues through the removal of the culverts and the installation of a bridge crossing. The Recovery Plan for the Lahontan Cutthroat Trout has identified the Mary's River Drainage as having significant metapopulation potential. This project partially fulfills the recovery plan actions required to delist this fish.

Goals: Restore the Mary's River system to provide a quality self-sustaining Lahontan Cutthroat population for public enjoyment, reduced sedimentation, and improved water quality

%Success: 100%

Relative Success: N/A

Match:	Total:
Cost - NFWF P/A \$ 64,500.00	Federal Match \$ 0.00

Cost Analysis: \$2,688 NFWF dollars spent for each mile of habitat gained, \$14,167 total dollars spent for each mile of habitat gained.

Proposed Scope: Remove culverts and replace w/ bridge.

Actual Scope: Removed culverts and replaced w/ bridge.

Monitoring: Extensive, including habitat inventories, water quality sampling, and valley cross-sections, but there is only one reference to fish passage monitoring, and it only states that it is expected to occur.

Supplementation: None listed

Current Passability: Currently passable.

Threats to Passability: Bridge failure, natural barrier formation processes.

Conservation Benefit: Migration in the Mary's River has been restored between two formerly distinct portions of the stream, benefiting Lahontan cutthroat trout, a federally listed threatened species. This project addresses habitat fragmentation and works towards the establishment of genetic flow between formerly isolated populations.

CB Values: 24 miles of habitat gained with a BFW of 22.5. The project opened habitat for ESA listed Lahontan cutthroat trout.

CB Score ESA Weighted: 142.6

CB Score Non-ESA Weighted: 28.5

Notes:

Site Visit? No

1997-0108-013 Coquille River III

Sponsor: BLM Coos Bay, Coquille Watershed Association

Project Manager: William Hudson - BLM - (541) 756-0101, Jennifer Hemple at Coquille WA (541)396-2229

Justification: Native anadromous fish are at historically low levels in the Coquille basin. Culverts in the basin may serve as barriers to salmonid migration including coho, winter steelhead, spring chinook, cutthroat trout, and Pacific lamprey. Inventories of these culverts will result in the replacement of man-made barriers to juvenile and adult migration.

Goals: Replace 4 large culverts to provide enhanced fish access to 7 miles of historically anadromous habitat.

%Success: N/A

Relative Success: They replaced 4 culverts which fits with the project justification.

Match:	Total:
Cost - NFWF P/A \$ 55,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace culverts on Steele, Swain, and Getty's Creeks, as well as the South Fork Coquille.

Actual Scope: Replaced Culverts on Dutch John Ck, Klondike Ck, Little Easy Ck, and Wimer Ck.

Monitoring: Observations of fish have been made above all culverts, but no comprehensive monitoring for fish passage is outlined in the final report. Road, fish distribution, habitat and water quality, and riparian surveys are discussed in the proposal, but results are not detailed in the final report.

Supplementation: No, but in later projects high school seeding of coho occurs.

Current Passability: Unknown, however final report implies passability at each site.

Threats to Passability: Little easy, low gradient and energy system at the culvert site. Pipe will likely remain passable, one concern is beavers and woody debris clogging the pipe. Wimer Ck- no observed threats to passability, Getty's Ck-no observed threats to passability.

Conservation Benefit: Access was restored through culvert replacement in 4 basins. This will potentially provide additional spawning and rearing habitat for OR coastal coho, a formerly listed species.

CB Values: Waiting on values from Jennifer

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and White on 8-13-03

1997-0108-024 Jack Creek (NV) Bridge

Sponsor: USFS Humboldt National Forest Ruby Mountain Ranger District

Project Manager: Jay Frederick (702) 752-3357 Jay Klott (208) 736-2375. Current contact Kelly Amy (775)738-5171.

Justification: Jack Creek is a major tributary of the Jarbidge River, which supports an isolated population of bull trout, at the time a candidate species. Jack Creek was once a major spawning and refuge tributary, and still supports an isolated population of bull trout, but immigration into this population has been cut off by an undersized culvert.

Goals: Replace a blocking culvert with a bridge, reconnecting resident and fluvial populations, and allowing access for spawning and refuge to 5.2 miles of habitat.

%Success: 100%

Relative Success: N/A

Match:	Total:
Cost - NFWF P/A \$ 14,000.00	Federal Match \$ 0.00

Cost Analysis: \$2692 NFWF dollars were spent for each mile of habitat gained. A total of \$30700 was spent for each mile of habitat gained.

Proposed Scope: Replace a culvert on Jack Creek with a bridge.

Actual Scope: Jack Creek bridge was installed.

Monitoring: Nevada Division of Wildlife will conducted surveys for bull trout for 4 years following the replacement of the culvert to assess changes in bull trout numbers/redds in Jack Creek. Monitoring techniques will include a combination of electrofishing and snorkeling. Also, habitat evaluations will determine the condition and trend of habitat in Jack Creek.

Supplementation: No

Current Passability: Likely passable

Threats to Passability: Very low risk of future blockage.

Conservation Benefit: Opened up a significant amount of spawning and refuge habitat for a fringe metapopulation of bull trout. There is high conservation significance for this population because it is the southernmost population of bull trout. Populations at the fringes of a species distribution often have a genetic makeup that is adapted to the regional extremes in their environment. This project also has beneficial implications for redband trout and mountain whitefish.

CB Values: The project opened 5.2 miles of habitat w/ an unknown average BFW. This project opens habitat for ESA listed bull trout and for redband trout.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No

1997-0110-001 Adobe Creek (CA) Fish Ladder

Sponsor: NOAA - NMFS

Project Manager: Rick Wantuck - (707) 575-6050

Justification: A 10 ft vertical barrier restricts steelhead migration in Adobe Ck. This ESU of steelhead are listed as threatened under the federal Endangered Species Act. In addition, although still conceptual, projects such as this could encourage similar ventures between NMFS and other high schools.

Goals: Construct a fish ladder of natural materials to eliminate the migration barrier.

%Success: 100%

Relative Success: N/A

Match:	Total: \$ 43,000.0
Cost - NFWF P/A \$ 10,000.00	Federal Match \$ 10,000.00

Cost Analysis: This project resulted in the opening of approximately five miles of habitat above the culvert site, at a cost of \$8,200 total dollars per mile of habitat opened, and \$2000 Foundation dollars per mile of habitat opened.

Proposed Scope: Construct a fish ladder of natural materials, allowing passage through the existing culvert which is perched 8-10ft.

Actual Scope: Retrofitted the existing culvert access by constructing a series of step pools (using large rocks) which functions as a fish ladder, allowing fish to pass through the box culvert which was previously perched 8-10ft.

Monitoring: The proposal states that photos and video tapes would be taken and submitted before, during, and after the project is completed. Additional post project monitoring plans are unknown, but the final report states that fish have been observed using the ladder.

Supplementation: Yes, there is a hatchery built in association with the local high school.

Current Passability: Unknown

Threats to Passability: Flow depth within the culvert may be too shallow, impeding or completely blocking passage.

Conservation Benefit: Increased habitat for threatened steelhead in the Petaluma River. Also this has been a part of a much larger program w/in the Casa Grande restoration of Adobe Creek process, which has involved hundreds of H.S. kids for 20 years.

CB Values: This project opened 5 miles of habitat w/ an average BFW of 20'. This project opens habitat for ESA listed steelhead.

CB Score ESA Weighted: 26.4

CB Score Non-ESA Weighted: 5.3

Notes: Very little substance concerning design, passability, monitoring, and upstream habitat quality.

Site Visit? Yes, Wait and Glasgow on 5-28-03

1998-0026-013 Coquille River Watershed Restoration IV

Sponsor: BLM Coos Bay

Project Manager: Jennifer Hemple at Coquille WA (541)396-2229

Justification: Native anadromous fish are at historically low levels in the Coquille basin. Culverts in the basin may serve as barriers to salmonid migration. Inventories of these culverts will result in the replacement of man-made barriers to juvenile and adult migration of coho, winter steelhead, spring chinook, cutthroat, and Pacific lamprey.

Goals: Replace 20 culverts to provide fish passage to 50 miles of historic anadromous fish habitat. Tide gate improvements and retrofits are mentioned, but there is no follow through.

%Success: 25%

Relative Success: High, it is likely that the project scope was limited by cash resources. But a lot was accomplished with a little funding.

Match:	Total:
Cost - NFWF P/A \$ 35,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace 20 culverts to restore fish passage to 50 miles of historic habitat, improve, retrofit or replace tide gates to allow access to estuarine wetland refugia.

Actual Scope: Replaced 6 culverts. 1) Wimer Creek - replaced 2 culverts with railcars, and 1 culvert with an oversized used culvert; 2) Two-mile Creek - replaced culvert with bridge; 3) Wood Creek - replaced 2 culverts (48" round and 36" round) with 96" x 48" aluminized open-bottom pipe arches. Total number of replaced culverts on all creeks = 6.

Monitoring: Short and long term monitoring strategies were being developed. An intense survey and monitoring campaign was supposed to occur in 98-99.

Supplementation: Coho released by local high school students each year after project completion.

Current Passability: Bridges are likely fine, culverts are unknown.

Threats to Passability: Low risk to bridges, but the replacement culvert on Wood Creek Site #1 looks undersized.

Conservation Benefit: Restored access in three sub-basins in the Coquille watershed. Enhancing access for the listed Oregon Coast Coho ESU.

CB Values: N/A Project has not been completed.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and White on 8-13-03

1998-0026-022 Lochsa River (ID) bull trout Recovery

Sponsor: USFS Clearwater National Forest

Project Manager: Pat Murphy (208) 476-8213

Justification: USFWS has proposed bull trout for ESA listing. Nearly 5 miles of rearing and spawning habitat in the West Fork of Squaw Creek were inaccessible to bull trout, but this is a hindsight justification, taken from the final report not the proposal.

Goals: Obliterate a minimum of 10 miles of road, increase instream wood, conduct snorkel surveys, and collect and analyze genetic samples from bull trout.

%Success: Non-applicable, because project resulted in restoring access, but that was not a listed objective.

Relative Success: N/A

Match: \$ 62,500.0	Total: \$ 125,000.
Cost - NFWF P/A \$ 62,500.00	Federal Match \$ 0.00

Cost Analysis: \$12,500 NFWF dollars were spent for each mile of spawning and rearing habitat gained. \$25,000 total dollars were spent for each mile of habitat gained.

Proposed Scope: Proposed scope did not include culvert replacement, but instead requested funds for road obliteration, LWD placement, and snorkel surveys.

Actual Scope: Replaced the undersized West Fork Squaw Creek culvert with an arched culvert.

Monitoring: Project effectiveness was to be monitored through annual redd counts.

Supplementation: No

Current Passability: Unknown

Threats to Passability: Standard threats, also the footing may be susceptible to undermining, resulting in upstream headcutting.

Conservation Benefit: Opened up five miles of spawning and rearing habitat for bull trout, a federally listed species. Also benefitted ESA listed steelhead and SOC westslope cutthroat.

CB Values: 5 miles of habitat opened w/ an estimated average BFW of 12 ft (from photos). Open habitat for ESA listed bull trout, steelhead, and SOC westslope cutthroat trout.

CB Score ESA Weighted: 41.2

CB Score Non-ESA Weighted: 9.5

Notes: James Capurso was original project manager, he was also manager for the McKenzie project.

Site Visit? No, Wait and Beardslee were in the area on 8-24-03, but were unable to access the site due to fires.

1998-0026-023 Lower Rogue and South County Basin Restoration

Sponsor: Curry County Soil and Water Conservation

Project Manager: Harry Hoogesteger (541) 247-2755 Jennifer Dwyer (541) 247-8058

Justification: Anadromous fish populations, including coho, winter steelhead, spring chinook, and cutthroat in Southern Oregon are at historic lows, the range and distribution of fish was limited by fish passage barriers, and this project attempts to increase fish ranges and habitat usage through the removal of these barriers.

Goals: Prioritize reduced historical salmonid ranges for fish passage enhancement, remove barriers and increase salmonid distribution to historic ranges. Hoping to open 10-20 miles of habitat.

%Success: 100%

Relative Success: The realized outcomes of this project fit the project justification well. The question is: were the right projects/culvert chosen through the prioritization process?

Match: \$ 372,409.	Total: \$ 622,409.
Cost - NFWF P/A \$ 250,000.00	Federal Match \$ 0.00

Cost Analysis: \$27624 NFWF dollars spent for each mile of habitat opened. \$68774 total dollars spent for each mile of habitat opened.

Proposed Scope: Anticipated 10-20 miles of spawning, rearing, and resident habitat would be opened up through this project.

Actual Scope: Replaced 12 or more culverts on 7 creeks. Lobster Creek / Lincoln Timber - replaced failing and /or undersized culverts on forest road crossings above mainstem Lobster Creek. Morton Creek / Waller Ranch - replaced culvert with flatcar bridge. Hubbard Creek - replace one fish barrier culvert. Edson and Taylor Creeks - replaced fish barrier culverts under County roads. Squaw creek - replaced up to five culverts. Ranch Creek - replaced 2 fish passage barriers and fencing to reduce sediment. Indian Creek - replaced one blocked culvert and several undersized/failing culverts.

Monitoring: Monitoring strategy is based on population and spawning surveys, which will be used to monitor fish distribution and abundance.

Supplementation: Not identified

Current Passability: Unknown

Threats to Passability: Standard threats

Conservation Benefit: Habitats upstream of the culvert replacement projects were opened up to Chinook, Coho, steelhead and cutthroat.

CB Values: 2.75 miles of habitat were opened in Ranch Ck (BFW = 15'), for coho(ESA), steelhead(SOC), and coastal cutthroat(SOC) in the Lower Rogue Basin. 0.15 miles of habitat in Indian Ck (BFW = 12') were opened to steelhead and coastal cutthroat trout. Taylor Ck 0.6 miles of habitat (BFW of 8') for steelhead and coastal cutthroat. Edson Ck 0.7 miles of habitat (BFW of 8') for steelhead and cutthroat. Squaw Ck 1.05 total miles between 3 culvert replacements with BFW of 8.5' for cutthroat. Morton Ck 3.8 miles of habitat (BFW 16') for coho, steelhead and cutthroat.

CB Score ESA Weighted: 64.5

CB Score Non-ESA Weighted: 17.9

Notes: Complex project, will need to make sure to inquire about the locations of all culverts replaced and get a breakdown of which were for fish passage and which were for sedimentation issues.

Site Visit? Yes, Wait and White on 7-10-03.

1998-0026-030 Squaw Creek (WY) Rehabilitation

Sponsor: USFS Shoshone National Forest Clarks Fork Ranger District

Project Manager: Ray Zubik (307) 527-6241

Justification: In an emergency situation Park County road crews installed 3 undersized culverts in Squaw Creek, which are backing up sediments and water, and creating barriers to upstream fish migration including Yellowstone cutthroat trout.

Goals: Move the road out of the riparian zone, eliminating two road crossing culverts that are acting as barriers, and replacing a third blocking culvert with a bottomless arch.

%Success: 100%

Relative Success: N/A

Match: \$ 50,000.0	Total: \$ 100,000.
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 50,000.00

Cost Analysis: \$16666 NFWF dollars spent for each mile of habitat opened. \$50,000 total dollars spent for each mile of habitat opened.

Proposed Scope: Move the road grade and replace an existing culvert w/ a bottomless arch culvert.

Actual Scope: Same as Proposed

Monitoring: Only sediment monitoring is mentioned.

Supplementation: No

Current Passability: Likely passable

Threats to Passability: If the proper gradients or channel width were not established in the reconfigured channel, deposition could block the channel prohibiting fish passage. Footing on the new bottomless arch culvert could become undermined and the stream may headcut. Wood debris could block the culvert.

Conservation Benefit: Opened up habitats above the three blocking culvert, to Yellowstone cutthroat trout, but conversely also opens up habitat to brook trout, a non-native. Reduces instream sediment sources, improving water quality.

CB Values: 3 miles of habitat were opened w/ a BFW of 20 ft for SOC yellowstone cutthroat trout and non-native brook trout.

CB Score ESA Weighted: 6.3

CB Score Non-ESA Weighted: 0

Notes:

Site Visit? No

1998-0026-012 Coos Bay (OR) Watershed Restoration-II

Sponsor: Coos Watershed Association

Project Manager: Bill Hudson - (541) 756-0100

Justification: Native anadromous and resident fish populations, particularly coho and cutthroat trout, are at historically low levels throughout the Coos River Watershed.

Goals: Correct passage barriers at four culverts to facilitate passage by adult and juvenile anadromous fish, especially coho and cutthroat trout.

%Success: N/A

Relative Success: N/A

Match:	Total:
Cost - NFWF P/A	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: This project was combined with the other Coos Bay Projects and grantsmanship was transferred to the Coos Bay Watershed Association.

Site Visit? Yes, Wait and White on 7-11-03.

1998-0029-000 Oregon Salmonid Habitat Restoration

Sponsor: Oregon Wildlife Heritage Foundation

Project Manager: Rod Brobeck (503)255-6059

Justification: There has been extensive loss of quality habitat in all the major river and stream basins for coho salmon in western Oregon. The population of naturally spawning coho is severely depressed from a number of causes, but loss and degradation of habitat is one of the principle reasons that stocks are in their current condition.

Goals: To restore lost and degraded habitat in selected areas designated either by the previously published Salmonid Habitat Restoration Plans or by new biological studies/plans so salmon/steelhead smolt production levels may be increased.

%Success: Unknown

Relative Success: Unknown

Match: \$ 675,638.	Total: \$ 925,638.
Cost - NFWF P/A \$ 250,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: There is no specific scope in the proposal.

Actual Scope: Culvert replacements on Palouse CK, a Tributary of the West Fork of Millicoma-Cougar, Bills Ck, an unnamed trib of Kentucky Ck, Jeans Ck, Doe Ck, Brush Ck, Cabin Ck, Swamp Ck, Foley Ck, tributaries of the Nehalem and E. Fork Nehalem, Bewely Ck, Little N.F. Wilson, and Simmons Ck, opening passage to 15.6 miles of habitat.

Monitoring: ODF&W staff, field staff of the ODF, and industry foresters/biologists will perform monitoring of restored sites. With stream surveys being mentioned as the likely technique.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No, project sponsors did not follow through on directions to the sites.

1998-0220-006 Garcia and Mattole River Restoration

Sponsor: Trout Unlimited

Project Manager: David Katz (707)543-5877

Justification: North Coast coho are listed on the ESA, and the Garcia and Mattole Rivers are potentially good habitat, but little restoration effort is being focused there. In addition, EPA has recently designated the Garcia as "water quality limited: meaning the state must find ways to improve the water quality." Land ownership is fairly consolidated in a few major landowners and population and development threats are not an immediate concern. Finally, participation of the B LM helps ensure the scientific integrity of the project.

Goals: Remove a nonfunctioning culvert on Glantz Creek and replace it w/ a flatcar bridge. Several "Humboldt" crossings will also be removed. Note -This project focuses on many different types of restoration with only a portion of the funds directed towards culverts.

%Success: N/A

Relative Success: N/A

Match: \$ 60,000.0	Total: \$ 90,000.0
Cost - NFWF P/A \$ 30,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replacement of one nonfunctioning culvert with a railroad car and removal of three Humboldt crossings on McNasty Creek or its tribs.

Actual Scope: Numerous culvert removals and / or replacements in the S.F. Garcia Watershed. Culvert replacements were completed utilizing culverts or railcar bridges.

Monitoring: Apparently MRC biologists are conducting monitoring on the S.F. Garcia.

Supplementation: Steelhead stocking has occurred in the past. More recent supplementation is unknown.

Current Passability: N/A

Threats to Passability: Unknown

Conservation Benefit: Decreased sedimentation in the S.F. Garcia River, which could serve as potential coho habitat.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Little substance in the final report.

Site Visit? Yes, Wait and Glasgow on 5-30-03.

1999-017-013 Coquille River Watershed Restoration-V

Sponsor: BLM- Coos Bay

Project Manager: Bill Hudson - (541) 756-0100

Justification: The present condition of the Coquille Watershed and resultant impacts to fish stocks necessitate recovery efforts. Analysis and restoration are needed to assist in the recovery of coho salmon and winter steelhead, and other stocks including cutthroat and spring chinook. Species of concern include coho salmon and winter steelhead, (Proposed Threatened / Endangered), cutthroat trout (Bureau Assessment), spring chinook salmon (State Listed), and Pacific lamprey (State listed).

Goals: Replace culverts on China Creek, Steele Creek, and Wood Creek, as well as enhancing a tidegate on Hatchet Creek.

%Success: N/A

Relative Success: Projects that have been accomplished are relevant to project goals,

Match: \$ 300,000.	Total: \$ 450,000.
Cost - NFWF P/A \$ 150,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace culverts on China, Steel, and Wood Creek.

Actual Scope: Replaced a culvert on China Creek, purchased a con-span bridge for Hantz Creek, replaced a culvert on Little Creek, and replaced a culvert on Getty's Creek. Additionally a "fish friendly" tide gate was installed on Hatchet Creek.

Monitoring: CWA has created a monitoring committee that has created a monitoring protocol for all CWA projects. The final report states that the tide gate is passing fish at all tides, no mention of how culverts are doing.

Supplementation: Yes

Current Passability: Completed. Project sites were passable upon site visit.

Threats to Passability: Undermining of the arch culvert footings. Structural failure over time. Low flow barrier.

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and White on 7-13-03.

1999-0017-019 Paola Creek Fish Passage

Sponsor: USFS Flathead National Forest

Project Manager: Pat Van Eimeren - (406) 387-3863

Justification: The Paola Creek culvert underneath FS Road 1638 is a barrier to fish migration. Bull trout and west slope cutthroat trout were extirpated from this drainage, and it is believed that the placement of a passable culvert will lead to recolonization.

Goals: Restore fish passage to 4 miles of spawning habitat in Paola Creek, a tributary to the Middle Fork of the Flathead River.

%Success: 100%

Relative Success: N/A

Match: \$ 25,000.0	Total: \$ 40,000.0
Cost - NFWF P/A \$ 15,000.00	Federal Match \$ 0.00

Cost Analysis: \$3750 in NFWF funds were spent for each river mile of restored access, a total of \$10,000 dollars were spent for each river mile of restored access.

Proposed Scope: Remove a perched culvert on Paola Creek and reconfigure the channel of Paola Creek in the project area.

Actual Scope: Removed a six foot culvert and reconfigured the stream channel around the former culvert site.

Monitoring: Electrofishing and redd counts above the culvert removal area.

Supplementation: No

Current Passability: Passable for adult fish. Likely a partial barrier for juveniles.

Threats to Passability: The creek bed upstream from a second rock weir was completely dry, but there was good flow in the project reach. It is possible that the subsurface flow is a result of excessive gravels deposited on the upstream side of the second weir.

Conservation Benefit: Opens up habitat in the Paola Ck watershed for westslope cutthroat and bull trout. Watershed was unoccupied before the project, but it is hoped that recolonization from the Middle Fortk Flathead will occur.

CB Values: Opened 4 miles of habitat w/ a BFW of 22 ft. Opened habitat for ESA bull trout and SOC westslope cutthroat trout.

CB Score ESA Weighted: 37.2

CB Score Non-ESA Weighted: 9.3

Notes: No fish US of the project.

Site Visit? Yes, Wait and Glasgow on 8-26-03.

1999-0198-000 Upper Puyallup Culvert Project

Sponsor: South Puget Sound Salmon Enhancement Group

Project Manager: (253) 984-0431 current contact is Lance Winecka - lancewin@hotmail.com

Justification: Loss of natural spawning and rearing habitat is a key factor limiting the survival of salmon and steelhead in the Puyallup River watershed. The White River spring chinook is the last remaining spring chinook stock in south Puget Sound. The proposed culvert projects will provide direct benefit to stocks that are in trouble.

Goals: To provide salmon and steelhead unrestricted access to habitats historically occupied prior to development in the watershed.

%Success: 33%

Relative Success: N/A

Match: \$ 50,490.0	Total: \$ 61,179.0
Cost - NFWF P/A \$ 10,689.00	Federal Match \$ 0.00

Cost Analysis: \$2672 in NFWF funds were spent for each river mile of restored access, a total of \$15,295 dollars were spent for each mile of restored access.

Proposed Scope: At least six designs for culvert replacement projects identified in the prioritization process.

Actual Scope: Replaced a culvert on the South Fork of Ohop Ck, while two oxbow connection projects have been stalled due to Pierce Counties concern for potential flooding.

Monitoring: SPSSEG and PCCD will monitor all culvert projects on an annual basis to ensure that they are functioning properly. The Puyallup tribe has a survey crew that monitors spawning fish and can help determine project success. Project success will be defined by the implementation of at least six culvert projects. Success will be measured by the migration of salmon above formerly impassable culverts.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: Fish have access to 4 miles of habitat above the project on the South Fork of Ohop Ck.

CB Values: 4 miles of habitat w/a BFW of 8', for SOC coho and cutthroat.

CB Score ESA Weighted: 10.1

CB Score Non-ESA Weighted: 3.4

Notes:

Site Visit? No, project sponsors did not follow through on directions to the sites until after scheduled site visit.

1999-0203-008 San Pedro Creek (CA) Restoration

Sponsor: City of Pacifica

Project Manager: Scott Holmes - (650) 738-4665

Justification: Water quality in the creek and adjacent beaches is poor, also San Pedro Creek is the northern-most steelhead stream along California's central coast. Therefore, this project will directly benefit the central coast ESU through the removal of an antiquated fish ladder and the restoration of longitudinal connectivity in the main stem of San Pedro Ck. The restored habitat will also benefit the federally threatened California red-legged frog.

Goals: Replacement of a fish ladder/bridge. There is a concrete bridge and box culvert that impedes fish passage by creating a 2-3 ft gradient barrier, a part of this proposal is to replace this structure with a bridge structure that spans the entire creek.

%Success: N/A

Relative Success: N/A

Match: \$ 114,000.	Total: \$ 171,000.
Cost - NFWF P/A \$ 57,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Remove a bridge/box culvert complex at a county park and replace with a bridge.

Actual Scope: As of April 2001, the city was still awaiting plans from the engineering firm on the bridge footings; it says that NFWF has extended the deadline through December 2001, however, there is no other documentation.

Monitoring: The application states that no specific monitoring program was developed, but does say that watershed evaluation will be monitored using criteria collected in the assessment phase of the project.

Supplementation: No

Current Passability: Not passable

Threats to Passability: N/A

Conservation Benefit: This project was looked at in conjunction with the other San Pedro Ck project, as the success of either project is dependant upon the other.

CB Values: Project is not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: There seems to be some missing documentation. Very regular reporting early in the project that halts at April 2001. Where is the final report?

Site Visit? Yes, Wait and Glasgow on 5-28-03

1999-0203-010 North Coast Coho Project (CA)- II or Trout Unlimited North Coast Coho Project: Phase II

Sponsor: Trout Unlimited

Project Manager: David Katz (707)543-5877

Justification: California's once thriving coho salmon population has been reduced to a few thousand fish in a handful of remnant populations. Several streams have populations that are large enough to render them extremely important to the overall health of California's coho resource. These streams include the Albion River, Hollow Tree Creek, and the Garcia, Navarro, and Noyo Rivers. A comprehensive program of restoration which encompasses these five populations will have a profound positive impact along the length of California's North Coast.

Goals: Implementation of the restoration prescriptions developed for the S.F. Garcia, including road obliteration to reduce sedimentation and the installation of a flatcar bridge.

%Success: N/A

Relative Success: N/A

Match: \$ 188,140.	Total: \$ 248,140.
Cost - NFWF P/A \$ 60,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: Reduced sedimentation to the Garcia river, a major component of the remaining coho habitat in California.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: It appears that culvert replacements occurred as a part of a road decommissioning process in order to reduce sedimentation in the S.F. Garcia.

Site Visit? Yes, Wait and Glasgow on 7-30-03.

1999-0355-041 Sawmill Creek (AK) Restoration and Monitoring

Sponsor: City of Haines

Project Manager: Robert Venebles (907) 766-3179

Justification: Sawmill Ck has suffered from degradation due to urban issues in the city of Haines. The creek supports runs of coho, cutthroat, and char. Restoration activities would include the removal of derelict culverts and restoration of approximately 300' of stream bed and banks.

Goals: Not clearly outlined in project proposal; the removal of derelict culverts and restoration of 300' of stream bed are the most clearly stated goals.

%Success: N/A

Relative Success: Project is in process. Expected to be completed by next spring.

Match: \$ 8,127.00	Total: \$ 58,127.0
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: No details as to the specific scope of the project, the restoration was to occur on one lot, and included the removal of derelict culverts.

Actual Scope: As of May 2002 no funds had been expended.

Monitoring: Post-construction monitoring of this project, using protocols accepted by ADF&G, will be conducted by ADF&G personnel with assistance from City of Haines staff.

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: Project is not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No

2000-0001-018 Wendover West slope Cutthroat Passage

Sponsor: USFS Clearwater National Forest

Project Manager: Karen A. Smith (208) 935-4252

Justification: Former culvert of Highway 12 over Wendover Creek was undersized. Upstream passage for WSC and bull trout was made more difficult due to high velocities in the culvert.

Goals: Replace the undersized culvert with a new culvert designed for a 100 year event (stream simulation design).

%Success: 100%

Relative Success: N/A

Match: \$ 23,000.0	Total: \$ 40,000.0
Cost - NFWF P/A \$ 10,000.00	Federal Match \$ 0.00

Cost Analysis: \$3333 NFWF dollars were spent for each mile of restored access. \$13,000 total dollars were spent for each mile of restored access.

Proposed Scope: Replace a barrier culvert on Wendover Creek.

Actual Scope: A barrier culvert was replaced on Wendover Creek.

Monitoring: Spawning surveys in the spring and visual observations of culvert gravels.

Supplementation: No

Current Passability: Unknown

Threats to Passability: Standard threats

Conservation Benefit: Potentially opened up access to 3 miles of habitat for westslope cutthroat trout, bull trout, and steelhead.

CB Values: Opened 3 miles of habitat w/ a BFW of 21'. Opened habitat for ESA bull trout, SOC westslope cutthroat trout, and ESA steelhead.

CB Score ESA Weighted: 43.2

CB Score Non-ESA Weighted: 10

Notes:

Site Visit? Yes, Wait and Beardslee on 8-24-03.

2000-0001-026 White River (WA) Floodplain Restoration

Sponsor: Chelan-Douglas Land Trust/Lake Wenatchee Ranger District USFS

Project Manager: Gordon Congdon (509)667-9708 (CDLT) Heather Murphy (509) 763-3103

Justification: Fish use of a floodplain oxbow is limited by passage problems at a set of culverts. Also culverts will be removed from an area where another road decommissioning is occurring. The White River, a major tributary to lake Wenatchee, provides critical spawning habitat for chinook, sockeye, steelhead, bull trout, and West-slope cutthroat trout as well as several other aquatic and terrestrial species. Because of its salmon resource, high quality wetlands, and rapid development, restoration and protection of this watershed is a high priority in Washington State.

Goals: Obliterate roads, remove the culverts underneath them.

%Success: Unknown

Relative Success: N/A

Match: \$ 136,500.	Total: \$ 161,500.
Cost - NFWF P/A \$ 25,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Road obliteration with the removal of the culverts underneath the obliterated roads.

Actual Scope: 12 culverts have been removed as part of the White River Oxbow restoration, which has led to the decommissioning of several miles of Forest Service road in the White River floodplain.

Monitoring: Continuing monitoring protocols that have been in place (including spawning surveys, habitat surveys, and photo pts). No mention of monitoring of fish use in the oxbow.

Supplementation: No

Current Passability: Unknown

Threats to Passability: Stream channel may not have been returned to grade.

Conservation Benefit: Restoration of historic floodplain processes.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and Beardslee on 9-8-03

2000-0231-000 Chester Creek Fish Passage

Sponsor: USFWS

Project Manager: Anita Goetz (907) 271-1798 Steve Klosiewski (907) 786-3523

Justification: Fish passage is the single most restrictive impediment to fish migration in Chester Creek and is the major reason for the decline of anadromous fish in the creek. Chester Creek is considered one of the highest restoration projects on the Anchorage Municipality's list. It currently supports a small native coho run and resident Dolly Varden and rainbow trout; anecdotal evidence suggests that chinook, chum, and pink salmon also return to the creek to spawn. This project will provide unrestricted access to approximately 7.7 kilometers of spawning habitat. Chester Cr. and its associated riparian and wetland habitats provide not only fish habitat, but an urban habitat corridor allowing a diversity of wildlife including: moose, red fox, coyote, short-tailed weasel, mink, shorebirds, waterfowl, songbirds, eagle and other birds.

Goals: Improve fish passage of anadromous fish to Chester Creek by replacing the existing fish ladder with a functioning one. Enhance fish habitat and passage by replacing existing culverts with an open channel.

%Success: N/A

Relative Success: N/A

Match: \$ 300,000.	Total: \$ 1,100,00
Cost - NFWF P/A \$ 300,000.00	Federal Match

Cost Analysis: N/A

Proposed Scope: The scope of this project has changed several times since the original proposal to include much more dramatic alterations of the Chester Creek floodplain.

Actual Scope: Project is not yet complete.

Monitoring: Foot surveys by USFWS and ADFG to monitor the status and trends of coho salmon.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: This project will provide unrestricted access to 7.7 km of spawning habitat.

CB Values: Project is not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Due to changes in the scope of this project it will be necessary to interview the project manager in order to determine conservation benefits.

Site Visit? No

2000-0245-002 Jordan Creek / Parkway Drive Salmonid Passage Project

Sponsor: Del Norte Community Development

Project Manager: Earnest Perry / director (707) 464-7254

Justification: Coastal cutthroat trout are listed by CDFG as a fish species of special concern and is currently being reviewed by the USFWS as a candidate for listing under the ESA. Steelhead are listed by CDFG as a fish species of special concern. Coho salmon are listed in Northern California as threatened under the ESA. The Parkway Drive project will serve as a template (or model) of what to do within the other four-counties within the Five-County Salmon Group and be used as an educational tool.

Goals: Restore access to 2.3 miles of habitat in Jordan creek through the removal of a 92 ft long perched (~4ft) box culvert and replacement w/ a 55ft long 8 x 16ft bottomless arch culvert, and the removal of two 60in corrugated metal pipes to be replaced w/a 62ft long X 10ft 4in flat car crossing .

%Success: 100%

Relative Success: N/A

Match: \$ 235,100.	Total: \$ 378,123.
Cost - NFWF P/A \$ 23,300.00	Federal Match \$ 0.00

Cost Analysis: \$9,130 NFWF dollars spent for each mile of habitat opened. \$112,347 for each mile of habitat opened.

Proposed Scope: Restore access to 2.3 miles of habitat in Jordan creek through the removal of a 92 ft long perched (~4ft) box culvert and replacement w/ a 55ft long 8ft x 16ft bottomless arch culvert, and the removal of two 60in corrugated metal pipes to be replaced w/

Actual Scope: Installation of a bottomless arch culvert underneath Parkway Drive and the installation of a flatcar bridge on a privately owned frontage road parallel to Parkway Drive.

Monitoring: Resurveying of the longitudinal profile, as well as walking the stream channel to observe migrating and spawning salmonids (Nov. - March). In addition, water depth and flow velocities within the bottomless arch culvert will be taken during periods of suspected fish migration.

Supplementation: None

Current Passability: Passable

Threats to Passability: Standard Threats

Conservation Benefit: Improved access to high quality habitat for coho steelhead and cutthroat in the major tributary to one of Northern California's healthiest lagoon systems, Lake Earl. Additionally the pool at the base of this stream crossing has served as a significant access point for poachers, which have had a considerable impact on fish populations.

CB Values: Opened 2.3 miles of habitat w/ a BFW of 18ft. Opened habitat for steelhead and cutthroat. These habitat #'s are inclusive of habitat opened by the other Jordan Ck project. CB score should reflect the net benefit of all projects.

CB Score ESA Weighted: 17.5

CB Score Non-ESA Weighted: 4.4

Notes: Final project report is lacking most pertinent information. Apparently there was a snafu with the purchase of the flat car, but the report states that another one was on the way. No real conclusions can be drawn.

Site Visit? Yes, Wait and Glasgow on 6-2-03.

2000-0245-016 Oregon Salmon Restoration Projects

Sponsor: Oregon Watershed Enhancement Board

Project Manager: Kenneth Bierly (503) 986-0182

Justification: This grant application includes 25 projects selected for inclusion based on their long term benefit to listed coho and chinook salmon, steelhead, and cutthroat trout. Of these projects, 10 were fish passage improvement projects designed to benefit coho, steelhead, cutthroat, chinook and bull trout.

Goals:

%Success: Unknown

Relative Success: Unknown

Match: \$ 3,478,50	Total: \$ 4,152,12
Cost - NFWF P/A \$ 573,626.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace culverts on China Creek, Steele Creek, and Getty's Creek (Coquille Watershed Association, opens 9.25 miles). Replace culverts on Wood Creek, Elk Creek (Umpqua Basin Watershed Council opens 4 miles).

Actual Scope: Replaced a culvert on Wood Creek (coho, steelhead, cutthroat access to 3 miles), replaced a culvert on China Creek (coho and steelhead access to 3.75 miles), Replaced a culvert on Getty's Ck (possibly chinook, steelhead and coho, ask for monitoring reports, opened up 1 mile), replaced a culvert on Little Ck (nothing on species, opened 0.8 miles) replaced a culvert on Elk Ck (coho, steelhead and cutthroat access to 1 mile).

Monitoring: Unknown

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: Opened up between 9-10 miles of habitat for threatened coho, threatened steelhead, and cutthroat (anadromous form threatened in the Umpqua Drainage).

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: The CWA applied for NFWF funds under both this OWEB grant and a separate NFWF grant (99-017-013), there is a possibility that NFWF funds were used to match NFWF funds. Both the China and Getty's Ck projects look like possible problems. NFWF costs: \$573,626, but \$234,488 went to fish passage proposal.

Site Visit? No, project sponsors did not follow through with directions and contacts for individual sites.

2000-0274-000 North Fork Newaukum Ck Restoration Project/King County (WA) Salmon Restoration

Sponsor: Mid-Puget Sound Fisheries Enhancement Group

Project Manager: Troy Fields (206) 529-9467

Justification: Three culverts on the North Fork of Newaukum Creek are contributing to the sedimentation of the creek because they do not pass high flows and debris. These culverts are not an impediment to adult salmonid migration. This project will benefit coho, cutthroat, and steelhead.

Goals: Remove culverts at three that are contributing to stream bank erosion, resulting in a decrease in fine sediment load and deposition downstream of the project site.

%Success: 66%

Relative Success: Two of three planned culvert removals were implemented.

Match: \$ 79,200.0	Total: \$ 125,900.
Cost - NFWF P/A \$ 46,700.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Remove the Sackwar Culvert, remove the Savitsky Culvert and replace it with a 3-sided box culvert, and remove the Ernaga Culvert and replace it with a 3-sided box culvert.

Actual Scope: Replaced the Savitsky culvert with a 3-sided box culvert, and replaced the Ernaga culvert with a bridge.

Monitoring: Spawning activity, juvenile use, and riparian enhancement success will be monitored by MPSFEG, but no specifics are given.

Supplementation: Unknown

Current Passability: All sites were determined to be passable on 8-10-03

Threats to Passability: N/A

Conservation Benefit: Improved passage of fish, flows, and debris at the two project sites. Both culverts already passed fish but were undersized and potential sediment sources.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Final programmatic report is with the info for 2000-0369.

Site Visit? Yes, Wait and Yacker on 8-11-03

2000-0297-000 Longview Fibre Culvert Replacement

Sponsor: Lower Columbia Fish Enhancement Group

Project Manager: Jim Stolarzyk (360) 921-2343

Justification: Barriers to fish passage and sedimentation of spawning gravels have been identified as limiting factors for anadromous salmonids in WRIAs 25 and 26. This project attempts to address these issues for the benefit of listed fall chinook, chum and winter steelhead, as well as proposed coho and cutthroat.

Goals: Remove a culvert and associated fill at the Rock Creek road failure site. Replace a 60" diameter undersized CMPR culvert on West Valley Creek with a 12'x 60' bottomless arch opening .5 miles of habitat. Replace an undersized CMPR culvert on Goble Creek with a 60ft concrete bridge opening 2.5 miles of habitat.

%Success: 100%

Relative Success: N/A

Match: \$ 126,200.	Total: \$ 252,200.
Cost - NFWF P/A \$ 126,000.00	Federal Match \$ 0.00

Cost Analysis: \$36,000 NFWF dollars were spent for every mile of habitat opened up. \$72,000 total dollars were spent for every mile of habitat opened up.

Proposed Scope: Remove a culvert and associated fill, replace one culvert w/ a bridge and one culvert with a bottomless arch.

Actual Scope: Removed a culvert and associated fill, replaced one culvert w/ a bridge and one culvert with a bottomless arch.

Monitoring: For culvert replacements: no monitoring of West Valley Creek planned, the Goble creek site will either be monitored by WDFW, LCFEG, and/or Longview Fibre.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Standard issues for the bottomless arch culvert (footings, wood, structure life).

Conservation Benefit: Opened up 3.5 miles of spawning and rearing habitat for fall chinook, winter steelhead, coho, and cutthroat.

CB Values: Opened 2.5 miles on Goble (BFW of 25'), opened 1 mile of habitat on West Valley Ck w/ a BFW of 15'. Both projects opened habitat for ESA listed steelhead and coho, and SOC coastal cutthroat.

CB Score ESA Weighted: 45

CB Score Non-ESA Weighted: 12.3

Notes:

Site Visit? NO, tried to contact project sponsor numerous times, but never hear back from them.

2000-0362-000 Skagit County Fish Passage Improvement

Sponsor: Skagit Fisheries Enhancement Group

Project Manager: Alison Studley (360) 336-0172

Justification: Anthropogenic barriers to fish passage have contributed to the loss of significant amounts of habitat in the Skagit watershed. Isolated habitat due to these barriers has been identified as a limiting factor to salmon protection in the watershed. Removing these barriers will benefit coho, chum, pink, steelhead, and cutthroat. In 1999 the federal government listed Puget Sound chinook salmon as a "threatened species" under the Endangered Species Act and Coho are a candidate species for listing. The final product of this grant will be 12 miles (5 acres) of stream habitat opened for spawning and rearing.

Goals: Improve fish passage to spawning and rearing habitat through the correction of five fish passage problems on four creeks (Red, Klahowya, Alder and Colony).

%Success: 100%

Relative Success: N/A

Match: \$ 71,350.0	Total: \$ 133,200.
Cost - NFWF P/A \$ 61,850.00	Federal Match \$ 0.00

Cost Analysis: \$6,034 NFWF dollars spent for each mile of habitat opened. \$12,995 total dollars spent for each mile of habitat opened.

Proposed Scope: Replace two road crossing structures on Klahowya Ck, remove a culvert and close its associated road on Alder Creek, remove and replace a culvert on the West Fork of Colony Ck, and install a bridge on Red Ck, which will replace an undersized perched culvert.

Actual Scope: Replaced two road crossing structures on Klahowya Creek, removed a culvert and closed its associated road on Alder Creek. Removed and replaced a culvert on the West Fork of Colony Creek, and installed a bridge on Red Creek, which replaced an undersized perched culvert.

Monitoring: Weekly spawning surveys for four years using state protocol. Counts will include live and carcass counts by species, as well as redd counts.

Supplementation: No

Current Passability: Over 3000 live salmon observed upstream of Red Creek project in 01-02, 17 coho carcasses observed above Colony Creek project in 01-02, 41 coho redds observed above Red Creek project site in 01-02, and 262 live coho observed in Klahowya Creek project reach.

Threats to Passability: Rip rap and log control weirs on West Fork Colony Creek.

Conservation Benefit: Opened up 9 miles of spawning and rearing habitat for chinook, coho, pink, chum, steelhead, and cutthroat on Alder Creek, opened up 3,000 ft of spawning habitat and provided access to a large wetlands complex for coho cutthroat, and steelhead on Colony Creek, opened up 3,500 ft of habitat for coho, chum, pink, steelhead, and cutthroat on Red Creek, and opened up 3,100 ft of habitat for salmon on Klahowya Creek.

CB Values: Alder Creek: 9 miles of habitat w/a BFW of 22' for ESA chinook and bull trout, and SOC coho, chum, pink, steelhead, and cutthroat. Klahoya Ck: 0.59 mi of habitat BFW = 10.5 ft for SOC coho, cutthroat, chum, and steelhead. Red Ck: 0.66 mi of habitat BFW = 14.6' for coho steelhead, and coastal cutthroat. Colony Ck: 0.57 mi w/a BFW = 8.7' for coho, but Colony Ck doesn't count for CB due to a blow out.

CB Score ESA Weighted: 269.9

CB Score Non-ESA Weighted: 76

Notes: Very good app and final report, it was easy to get necessary info

Site Visit? Yes, Wait and White on 8-18-03.

2000-0368-000 Squalicum Creek (WA) Restoration Project

Sponsor: Nooksack Salmon Enhancement Association

Project Manager: Wendy Scherrer - (360) 715-0283

Justification: Habitat degradation, paired with the introduction of non-native warmwater fish species, has caused the decline of once thriving salmon stocks in Squalicum Ck. Yet, out migration studies have shown that viable native stocks still exist and have the potential for restoration. The proposed fish passage improvements, coupled with other restoration activities, will build a strong foundation under the NSEA's projected long-term restoration efforts.

Goals: Improve instream fish passage opportunities for salmonids in Squalicum Ck.

%Success: 33% as of 2003

Relative Success: N/A

Match: \$ 75,000.0	Total: \$ 150,000.
Cost - NFWF P/A \$ 75,000.00	Federal Match \$ 0.00

Cost Analysis: \$15,000 NFWF dollars spent for each mile of habitat opened. \$30,000 total dollars spent for each mile of habitat opened.

Proposed Scope: Three fish passage barriers on Squalicum Ck will be removed.

Actual Scope: Removed a culvert on the Deets property and replaced it with a bridge. All other culvert projects are either in design or permitting phase when the final report was turned in.

Monitoring: Fish passage will be monitored for two seasons from mid-October through December. Passage will be monitored weekly using NSEA salmon spawning protocols. Live and dead salmon will be counted and recorded by species, with notes on sex and scale samples. Outmigrating smolts will be monitored for passage using smolt traps. Success will be defined by determining if fish are successfully migrating and utilizing habitat within and upstream of the project in their different life cycles.

Supplementation: None mentioned

Current Passability: Site was visited on 8-18-03 and determined to be passable.

Threats to Passability: no major threats

Conservation Benefit: There is no discussion of the amount of habitat opened up by the removal of the culvert on the Deets property.

CB Values: Over 5 miles of habitat was opened, however the culvert was only a partial barrier. BFW = 5', project benefited coho, chum, coastal cutthroat, steelhead, and ESA chinook.

CB Score ESA Weighted: 24.2

CB Score Non-ESA Weighted: 6.6

Notes: The proposed monitoring program is very thorough, however there are no monitoring data in the final report.

Site Visit? Yes, Wait and White on 8-18-03.

2000-0370-000 Upper Puyallup Culvert Project II

Sponsor: South Puget Sound Salmon Enhancement Group

Project Manager: Todd Alsbury (253) 984-0431 Also: Florian Leischner with the Puyallup Tribe (360)438-8687, fleischner@nwifc.wa.

Justification: Loss of spawning and rearing habitat is a key limiting factor for the survival of salmon and steelhead in the Puyallup River watershed. It is not known how many miles of habitat impassable culverts block. Puyallup stocks include the White River spring chinook, which is the last remaining spring chinook in the South Sound.

Goals: To provide salmon and steelhead unrestricted access to habitats historically occupied prior to development in the watershed. More recent proposals give the following goals: the engineering and construction of 3-6 culverts in the Puyallup basin, removal of fish passage blockages in the Lacamas sub-basin of the Nisqually, and the removal of a salmon passage barrier in Puget Creek.

%Success: N/A

Relative Success: N/A

Match: \$ 101,000.	Total: \$ 141,000.
Cost - NFWF P/A \$ 40,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: The scope of work includes the following three sub-projects: the engineering and construction of 3-6 culverts in the Puyallup basin, removal of fish passage blockages in the Lacamas sub-basin of the Nisqually, and the removal of a salmon passage barrier.

Actual Scope: As of July 2002 the following has been done: the identification of three definite projects and two potential projects in the Puyallup River; the completion of the final design for the replacement of a barrier culvert on Lacamas Creek, with some permits (HPA and local) acquired, and others not (Corps, ecology); completion of the design for the replacement of a fishway on Puget Creek, where all permits have been acquired, it was expected that the project would be completed last summer.

Monitoring: All culvert projects will be monitored on an annual basis to ensure proper functioning, additional spawning monitoring will be conducted by the Puyallup tribe.

Supplementation: None

Current Passability: The Lacamas Creek site is currently (10-1-03) passable according to Florian Leischner of the Nisqually tribe, a project partner.

Threats to Passability: Unknown

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No, project sponsors did not follow through on directions to the sites until after scheduled site visit.

2001-0005-009 McKenzie River (OR) Habitat Restoration

Sponsor: Trout Unlimited

Project Manager: David A. Nolte (978) 692-1016

Justification: The McKenzie River provides the majority of the remaining bull trout and spring chinook spawning and rearing habitat in the Willamette Basin. Habitat fragmentation is limiting the productivity of these species, and the reestablishment of migration corridors through the removal of blocking culverts is seen as essential for the recovery of these listed species.

Goals: Improve habitat connectivity through the removal of or replacement of barrier culverts with passable structures. Approximately 15.5 miles of habitat will be reconnected upon completion.

%Success: 100%

Relative Success: N/A

Match: \$ 492,000.	Total: \$ 642,000.
Cost - NFWF P/A \$ 150,000.00	Federal Match \$ 0.00

Cost Analysis: 9677 NFWF dollars were spent for every mile of habitat gained. \$41,419 total dollars were spent for every mile of habitat gained

Proposed Scope: Restore connectivity through the removal and replacement of barrier culverts. It is anticipated that 15.5 miles of tributary habitat will be reconnected to mainstem habitat through this project. Culvert replacements will occur in the following basins:

Actual Scope: Replaced 2 culverts on Finn Ck, there were also barrier replacements of Gate Ck (2), Mill Ck (2), and Mohawk River.

Monitoring: Native fish distribution will be tracked by state fisheries agencies (ODFW) and state forestry agencies (ODF) on private land. Periodic sampling by state agencies will occur using electrofishing gear in order to determine recolonization. Recolonization of habitat on Federal land will be completed under the monitoring effort of BLM and Forest Service personnel. Biological surveys including spawning surveys and snorkel counts will also be used to monitor effectiveness in restoration reaches.

Supplementation: Yes

Current Passability: Gate Creek and Finn Ck sites were visited on 7-9-03 and were determined to be passable.

Threats to Passability: Landslides in the upper watershed. LWD clogging, also there may be a low flow depth barrier or a velocity due to a lack of substrate in the replaced pipes.

Conservation Benefit: Enormous project with the potential to benefit spring chinook and bull trout, both threatened species limited by habitat fragmentation.

CB Values: 15.5 miles of habitat opened w/ estimated (from visited sites) average BFW of 14.2 feet benefiting ESA chinook, bull trout and SOC steelhead and coastal cutthroat.

CB Score ESA Weighted: 185.9

CB Score Non-ESA Weighted: 46.5

Notes:

Site Visit? Yes, Wait and White on 7-9-03

2001-0202-006 Lagunitas Watershed Salmonid Protection (CA) Lagunitas Watershed Coho & Steelhead Project

Sponsor: The Salmon Protection and Watershed Network of Turtle Island Restoration Netw

Project Manager: Todd Steiner (415) 488-0370

Justification: Scores of culverts are present in the San Geronimo sub-watershed a tributary to Lagunitas Creek, the most important wild coho stream in California. The Central California population of coho was listed as threatened in 1996, and steelhead was listed as threatened in 1997. Some culverts have already been determined to be barriers to fish migration.

Goals: Survey all San Geronimo sub-watershed culverts, and prioritize them according to need of repair and upstream habitat, and then replace at least one of them.

%Success: N/A

Relative Success: SPAWN has developed a ranking structure for blocking culverts in the region. Culvert surveys were conducted as planned and culvert replacements were ranked, although there is no mention of the replacement of any culverts.

Match: \$ 162,300.	Total: \$ 240,800.
Cost - NFWF P/A \$ 78,500.00	Federal Match \$ 0.00

Cost Analysis: 34 culverts were surveyed at a cost of \$2308 NFWF dollars per culvert, and \$7082 total dollars per culvert.

Proposed Scope: Survey and prioritize all San Geronimo culverts, replace at least one.

Actual Scope: 34 culverts & 13 dams & 10 miscellaneous structures were examined in San Geronimo subwatershed, key barriers were identified and prioritized.

Monitoring: Extensive spawning surveys were conducted as a part of the greater project. Proposal states that flows through the culverts in 2001 would be videoed.

Supplementation: No

Current Passability: No fish passage barriers fixed as of 5/03

Threats to Passability: N/A

Conservation Benefit: This project has resulted in the assessment and prioritization of 34 culverts in the San Geronimo sub watershed.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and Glasgow on 5-28-03.

2001-0202-009 San Pedro Creek (CA) Fish Barrier Removal

Sponsor: City of Pacifica CA

Project Manager: Scott Holmes - (650) 738-4665

Justification: San Pedro Creek is the northern most steelhead stream along California's central coast. Therefore, this project will directly benefit the central coast ESU through the removal of an antiquated fish ladder and the restoration of longitudinal connectivity in the main stem of San Pedro Ck.

Goals: Re-establish longitudinal connectivity within the mainstem of San Pedro Ck to allow the passage of steelhead. Secondary objectives include the design of natural looking step-pool/run complexes that allow steelhead to reach spawning gravels upstream, and to further advance the City's commitment to restore the watershed of San Pedro Ck.

%Success: N/A

Relative Success: N/A

Match: \$ 500,000.	Total: \$ 700,000.
Cost - NFWF P/A \$ 40,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Remove the failing, out-of-date fish ladder which is a potential velocity impediment and a barrier (the ladder is perched 12ft) at the Capistrano Bridge site and replace it with a functioning step pool/run complex which allows for fish passage. A

Actual Scope: Currently the design, drawings, and plans for the Capistrano Bridge Fish Passage Project are at 75% completion. These plans include the following: 1) structural reinforcement of the Capistrano Bridge (includes addressing footing undercutting, concrete condition & age, bridge abutments, ect. 2) the existing concrete fish ladder structure will be removed and then replaced with a natural appearing fish-passage system 3) existing bank slopes at the site will be regraded.

Monitoring: To determine the success of the installation of new fish passage structures, Pacifica will implement a five year monitoring program during the winter run of steelhead to determine the estimated numbers of steelhead returning to spawn. Sex, age class, and size will be determined for each fish when possible.

Supplementation: No

Current Passability: Not currently passable, as the project has not yet been implemented.

Threats to Passability: Urbanization in the watershed is a concern.

Conservation Benefit: This project has a high potential for conservation benefit, as San Pedro Creek is only 1 of 4 creeks that support a viable population of Steelhead in the central coast ESU (from project app), but the current situation is probably quite stressful for returning fish.

CB Values: Not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: The project has not yet occurred, but the report that was given to us is considered a final report. This is probably not a good thing and could be related to pressures for closing grant cycles in a given time period.

Site Visit? Yes, Wait and Glasgow on 5-28-03.

2001-0202-011 North Coast Coho Project (CA)- III Trout Unlimited North Coast Coho Project: Phase III

Sponsor: Trout Unlimited

Project Manager: David Katz (707)543-5877

Justification:

Goals:

%Success: N/A

Relative Success: N/A

Match: \$ 272,631.	Total: \$ 372,631.
Cost - NFWF P/A \$ 100,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Didn't fully review this project, it is a road decommissioning and sediment reduction project, and there is no final report.

Site Visit? Yes, Wait and Glasgow on 5-30-03.

2001-0202-014 Jordan Creek Culvert Replacement Project Jordan Creek Culvert Fish Passage Barrier Removal/Bridge Placement Project

Sponsor: Rural Human Services Inc

Project Manager: Dan Burgess (707)464-7441

Justification: Currently, access to historically anadromous habitats is blocked for coho, steelhead, and cutthroat trout in Jordan Creek. Jordan Creek is the major tributary to Lake Earl, the largest undisturbed lagoon system in northern California.

Goals: Replace an undersized culvert that is impeding fish migration with a flatcar that will restore access to an unknown amount of upstream habitat.

%Success: 100%

Relative Success: N/A

Match: \$ 44,282.0	Total: \$ 65,282.0
Cost - NFWF P/A \$ 21,000.00	Federal Match \$ 0.00

Cost Analysis: \$9,130 NFWF dollars spent for each mile of habitat opened. \$112,347 for each mile of habitat opened.

Proposed Scope: Replace two 42" cement culvert pipes that are impeding fish migration with a flatcar (which will be cut in half and retrofitted to form two side by side crossings). The new crossing will restore access to upstream habitat.

Actual Scope: Replaced two 42" undersized culverts with one 50' x 14' fabricated bridge.

Monitoring: Coastal Watershed Coordinator will ensure a monitoring program that includes spawning surveys above and below the project, fish passage surveys during spawning season, and pre-and post-project photo documentation.

Supplementation: No

Current Passability: Site was visited on 6-1-03 and determined to be passable.

Threats to Passability: no major threats

Conservation Benefit: Restored access to 1 mi of upstream habitat for coho, steelhead, and cutthroat in Jordan Creek

CB Values: Open 1 mile of habitat w/a 14' BFW for cutthroat, steelhead, and coho. But CB score will be combined and the preprojects assessed as one since they are tied.

CB Score ESA Weighted: 17.5

CB Score Non-ESA Weighted: 17.58

Notes: A culvert replacement was slated to occur 1000 ft upstream of this project, did this occur, or did the project only open up 1000 ft of habitat. Also how much habitat is upstream?

Site Visit? Yes, Wait and Glasgow on 6-2-03.

2001-0267-000 Hood Canal (WA) Salmon Restoration

Sponsor: Hood Canal Salmon Enhancement Group

Project Manager: Neil Werner - (360) -275-0373

Justification: The Hood Canal is some of the best wild salmon habitat in the state of Washington. It supplies excellent habitat for five salmon species and cutthroat trout and is home to two species of wild salmon on the endangered species list summer chum and chinook salmon. Hood Canal summer chum and Puget Sound chinook are now threatened for extinction. Although the Hood Canal has good habitat there are issues that limit the productivity of this watershed. The HCSEG needs continued funding to address these issues.

Goals: Metal pipe replacement on Purdy and Grata Creeks and a bridge installation on Skobob Creek replacing the existing concrete box culvert.

%Success: 100%

Relative Success: N/A

Match: \$ 1,141,50	Total: \$ 1,541,50
Cost - NFWF P/A \$ 400,000.00	Federal Match \$ 0.00

Cost Analysis: All four Hood Canal projects were examined in conjunction. It should be noted that some of these funds were spent on LWD and supplementation, but a majority of the HCSEG projects were fish passage related, and since nearly one quarter of all NFWF funds were

Proposed Scope: Metal pipe replacement on Purdy and Grata Creeks and a bridge installation on Skobob Creek replacing the existing concrete box culvert.

Actual Scope: HCSEG has replaced 39 barriers over two years through four NFWF grants.

Monitoring: HCSEG uses standard protocols for monitoring as well as protocols developed by the DNR for stream gridding and on their restoration projects. Fish passage barriers will be monitored before and after for adult spawners to get a quick picture of the projects effectiveness. Long term evaluation will include live smolt and adult traps, continued spawner surveys, and potential electronic instream counting. Each of the projects will be entered into the GIS data base for analysis. This will include a description & pictures of the physical project and revised design including as-built drawings and pictures of the final configuration and information from the evaluations and surveys.

Supplementation: Note: during interviews w/ HCSEG folks make sure to ask about all past, current, and future supplementation projects in habitats newly opened by their projects.

Current Passability: unknown

Threats to Passability: Standard

Conservation Benefit: Opens up 2.8 miles of spawning habitat, and 1980 acres of habitat.

CB Values: CB Values given are a sum total for all HCSEG projects. A total of 71.2 miles of stream habitat were made accessible in the 4 separate HCSEG projects. A reasonable estimate for average BFW (determined by photos and site visits) is 10ft. Projects will result in benefits for coho, chum, pink, and cutthroat.

CB Score ESA Weighted: 451.1

CB Score Non-ESA Weighted: 150.4

Notes:

Site Visit? Yes, Wait and Glasgow on 8-12-03

2001-0270-000 Monahan Creek (WA) Fish Passage Enhancement Project

Sponsor: Cowlitz County

Project Manager: Initial project manager was Jeff Schmidt (360) 577-3030. Current contact is Ryan Lopossa, Engineering Manager with

Justification: This project will open up 4.8 miles of habitat. Cowlitz Conservation District identified this project as a high priority blockage removal in the Arkansas Creek Watershed Management plan. Salmon recovery in this watershed would benefit the overall Lower Columbia River salmon population.

Goals: Remove an existing perched box culvert and replace it with a new culvert with a natural channel bottom.

%Success: 100%

Relative Success: N/A

Match: \$ 771,200.	Total: \$ 917,800.
Cost - NFWF P/A \$ 146,600.00	Federal Match \$ 0.00

Cost Analysis: \$30,541 NFWF dollars spent for each mile of habitat opened. \$191,208 total dollars spent for each mile of habitat opened.

Proposed Scope: Remove two existing 10ft wide box culverts which are perched 5ft. and replace them with one 32ft wide structural steel plate arch culvert. Rock grade control structures and roughed channel will be installed through the project reach to control velocity.

Actual Scope: Installation of a massive pipe arch culvert was underway in early September of 2003. See photos.

Monitoring: The creek will be monitored during the peak spawning period for species in the area. Redd counts will be taken weekly for a six week period annually. The creek channel will be monitored for stability as well. Any area requiring maintenance will be attended to.

Supplementation: Unknown

Current Passability: Project was under construction during the site visit.

Threats to Passability: Standard threats

Conservation Benefit: 4.8 miles of habitat have been opened up for lower columbia coho, steelhead (ESA) and coastal cutthroat.

CB Values: 4.8 miles of stream w/a BFW of 32'. Species include steelhead, coho, and coastal cutthroat

CB Score ESA Weighted: 89.2

CB Score Non-ESA Weighted: 24.3

Notes: Scheduled to be complete this week (9-28-03). This was a pilot for the Corps' programmatic culvert permitting. This sets forth specific design criteria, if you meet these criteria, you don't need a BA. Supposed to expedite review, problem is criteria are fairly stringent, in this case it made the project non-eligible. Project was delayed a year due to the Corps' permitting issue.

Site Visit? Yes, Wait and Russell on 9-3-03.

2001-0347-000 Oregon Coast Watershed Restoration

Sponsor: Oregon Watershed Enhancement Board

Project Manager: Kenneth Bierly (503) 986-0182

Justification: This project addresses local limitations to the viability of listed coho and will improve habitat for other anadromous and resident aquatic species.

Goals: The removal of fish passage barriers on Wildcat Creek, Feagle Creek, Middle Cow Creek, and Fate Creek, opening up more than 10 miles of spawning and rearing habitat. There also appears to be culvert replacement projects on Hittle Creek, Deets Creek, and an unnamed trib of Wood Creek, possibly part of the Cow Creek project.

%Success: No final reports given

Relative Success: N/A

Match: \$ 1,061,79	Total: \$ 1,330,27
Cost - NFWF P/A \$ 268,484.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Remove barriers on four creeks and open up 10 miles of spawning habitat.

Actual Scope: Unknown

Monitoring: 3-5 year monitoring plans for each project. OWEB maintains monitoring reports on all projects.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: Unknown

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Project files are jumbled and confusing. Since there are multiple applications in this one application it will require more interview work and less document analysis.

Site Visit? No, project sponsors did not follow through with directions and contacts for individual sites.

2001-0350-000 Curry (OR) Agricultural Restoration Package

Sponsor: Curry County Soil and Water Conservation

Project Manager: Harry Hoogesteger (541) 247-2755

Justification: The south coast of Oregon is a critical, high priority area for salmon recovery. Coho salmon are listed as threatened under the Endangered Species Act. These fish are estimated to be at less than 10% of their historic abundance, and are continuing to decline. Fish passage barriers have been identified as one of three principle limiting factors for the production of salmonids in Curry County. This project targets limiting factors for salmon that have already been identified through watershed analysis and assessments.

Goals: 3-5 demonstration sites for culvert replacement, fish passage, and sediment reduction. The objective is to open up 3-5 miles of spawning habitat through the culvert replacements.

%Success: N/A

Relative Success: Opened 1 mile of stream habitat and provided passage to a large wetlands complex.

Match: \$ 200,000.	Total: \$ 300,000.
Cost - NFWF P/A \$ 100,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: No specifics on any of the culvert restoration projects given in proposal

Actual Scope: Repalced a culvert on the L.A. Merryman property to enhance flow and restore fish passage to rearing habitat above the new culvert. Four fish passage barrier culverts on Swanson and Turner Cks (2 each) were removed and replaced with bridges.

Monitoring: The proposal states that project evaluation will include the determination of whether project objectives were met, and recommendations for the future. No mention of specific monitoring for fish passage in proposal, but the final report states that snorkel counts will be done in previously blocked streams to determine fish presence.

Supplementation: None

Current Passability: Turner Ck- and Swanson Ck passable on 7-10-03. Merriman passable for adults, not passable for juveniles.

Threats to Passability: Standard threats

Conservation Benefit: Removal of fish passage barriers has probably opened up habitat for coho and steelhead, but there are no specifics in the final report.

CB Values: 0.6 miles of habitat in Turner Ck (BFW = 10ft) for steelhead and cutthroat trout. Swanson Ck project opened 0.4 miles of habitat (BFW =13) for coho steelhead and cutthroat. No habitat data for the Merriman project, but it did open access for a large wetland for coastal cutthroat, steelhead and possibly coho.

CB Score ESA Weighted: 5.6

CB Score Non-ESA Weighted: 1.5

Notes:

Site Visit? Yes, Wait and White on 7-10-03.

2001-0363-000 Gray's River (WA) Salmon Conservation

Sponsor: Columbia Land Trust

Project Manager: Ian Sinks (360) 696-0131

Justification: Runs of coho, chinook, chum, steelhead and cutthroat are supported in the Gray's River, with the chum population being the strongest in the Columbia River ESU. This project addresses limiting factors including floodplain connectivity and side channel access.

Goals: Restore estuarine habitat access to the Devil's Elbow and Kandoll Road properties through the replacement of undersized culverts.

%Success: 100%

Relative Success: N/A

Match: \$ 167,000.	Total: \$ 242,000.
Cost - NFWF P/A \$ 75,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace undersized culverts that are limiting access to 220 acres of river delta-estuarine habitat in the Gray's River.

Actual Scope: Ongoing property acquisition negotiations.

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: Provides fish access to crucial estuarine rearing and overwintering habitat for both natal and non-natal stocks.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and Russell on 9-3-03

2001-0402-002 Clark Lake Outflow restoration

Sponsor: City of Kent Parks, Recreation, and Human Services

Project Manager: Perry Brooks (253) 856-5114

Justification: Clark Lake, in Kent Wa, once held a population of salmon which farming; development and invasive plants have eliminated. Kent Parks and recreation, through cooperation with King County, local neighbors, and volunteer groups, will remove barriers to salmon migration, rehabilitate the outflow streambed, enhance surrounding property values, and make it possible for salmon to return to Clark Lake. At least one nesting pair of Bald Eagles resides in the lake Meridian area, one mile south east of Clark Lake.

Goals: Make culverts on the outlet creek passable to salmon by removing debris racks on culverts.

%Success: Unknown

Relative Success: N/A

Match: \$ 17,000.0	Total: \$ 47,000.0
Cost - NFWF P/A \$ 30,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Assess culverts by measuring diameter and slope and remove trash racks on the culverts.

Actual Scope: Unknown

Monitoring: Loose plan for observing fish and redds and marking where the observations occurred.

Supplementation: Unknown

Current Passability: Unknown

Threats to Passability: Unknown

Conservation Benefit: Could open up a nice amount of rearing habitat for coho salmon in the lake, but considering how urbanized Kent is, water quality might limit any gains made through the re-establishment of fish passage.

CB Values: Unknown at this time. Having trouble getting a hold of anyone at Kent Parks and Recreation.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Unable to contact grantee.

Site Visit? No

2002-0002-005 Scappoose Bay (OR) Fish Habitat Restoration

Sponsor: BLM Salem District

Project Manager: Matthew Walker (503) 815-114 6

Justification: Many culvert and small dams in the Scappoose Bay watershed now partially or completely block access to miles of potential spawning and rearing habitat for chinook, coho, steelhead, and cutthroat. Thirty percent of the stream crossings surveyed had complete barriers.

Goals: Increase the amount of potential stream habitat available to anadromous and resident fish by the removal of high priority fish passage barriers. This project will result in the opening of 12 miles of stream above existing barriers to migration. This will be accomplished through the replacement of culverts, removal of 3 culverts, and the removal of a small dam.

%Success: 100%

Relative Success: N/A

Match: \$ 429,000.	Total: \$ 629,000.
Cost - NFWF P/A \$ 200,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: This project will result in the opening of 12 miles of stream above existing barriers to migration. This will be accomplished through the replacement of 7 culverts, removal of 3 culverts, and the removal of a small dam. Also the removal of 3 BLM culverts.

Actual Scope: As implemented this project entailed a watershed-wide assessment of fish passage barriers in tributaries to Scappoose Bay.

Monitoring: Road crossing structures will be monitored by SBWC, BLM, and ODFW. Structures will be deemed successful if they continue to meet fish passage criteria set forth by ODFW.

Supplementation: Unknown

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: Opens up spawning and rearing habitat for three federally listed threatened species, and one proposed species.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and White on 7-15-03

2002-0002-006 Nestucca River (OR) Fish Habitat Restoration

Sponsor: BLM Salem District

Project Manager: Matthew Walker (503) 815-1146

Justification: Many road culverts now partially or completely block access to potential habitat for salmon and steelhead in the Nestucca watershed, which in recent decades, has seen a dramatic decline in populations of all species of salmonids, including chinook, chum, coho, steelhead, and cutthroat. An accurate assessment and prioritization of fish passage barriers within the watershed, together with estimates of the cost to replace them, is needed so that work on replacing or repairing the structures may begin.

Goals: Determine the number and locations of road crossing culverts, or dams, that now constitute fish passage barriers within the Nestucca River watershed, the additional miles of potential stream habitat that would be available to benefit several species of anadromous and resident fish if these barriers were replaced or corrected, and the estimated cost of this work.

%Success: 100%

Relative Success: N/A

Match: \$ 100,000.	Total: \$ 140,000.
Cost - NFWF P/A \$ 40,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Through population surveys and barrier inventories, this project will result in the location, status determination, cost of replacement estimation, and prioritization of fish passage barriers in the Nestucca River watershed.

Actual Scope: Project resulted in a watershed-wide inventory of fish-passage barriers, including a prioritization and cost replacement estimations.

Monitoring: The NWC with the BLM and the ODFW, will provide annual checks of the fish passage structures that are installed to ensure that they continue to function as intended, and to perform necessary maintenance. Detailed examinations of structures will occur at ten year intervals. The structures will be considered successful if they continue to meet fish passage criteria set forth by the ODFW.

Supplementation: Unknown

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: 100+ barriers were assessed over the course of the two Tillamook BLM projects.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and White on 7-15-03

2002-0002-010 Muddy Creek (WY) Fish Passage

Sponsor: BLM Rawlins Field Office

Project Manager: Mike Bower (307) 328 -4272

Justification: The native fish assemblage of the Muddy Creek watershed of Carbon County, WY, which includes Colorado River cutthroat trout, flannelmouth sucker, bluehead sucker, and roundtail chub, has witnessed dramatic declines and several extirpations. An improperly installed culvert located on upper Muddy Creek has created a large plunge pool that blocks the movement of fish to 16 miles of stream.

Goals: Create an unobstructed route to areas critical for fulfilling the life history requirements of the species of concern. To demonstrate that fish friendly culvert fishway designs can meet the needs of transportation planners and native fish within the Muddy Creek watershed.

%Success: N/A

Relative Success: N/A

Match: \$ 10,000.0	Total: \$ 20,000.0
Cost - NFWF P/A \$ 10,000.00	Federal Match \$ 0.00

Cost Analysis: Project is not yet complete.

Proposed Scope: Create an unobstructed route to areas critical for fulfilling the life history requirements of the species of concern. Replace existing perched 6ft culvert with corrugated culvert of appropriate size & retrofit to stream channel with four head dams (weirs)

Actual Scope: Project is not yet complete.

Monitoring: Includes fish population sampling in order to determine if the species of concern were successfully passing the proposed culvert fishway. Long term evaluation would include visual observations to identify any maintenance needs that may arise.

Supplementation: Ongoing reintroduction efforts. 11 miles chemically treated & scheduled to be restocked in 2001. Chemical treatment for another 19 miles is planned in 2002.

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: Project is not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No

2002-0176-000 Hood Canal Salmon Restoration Project 2001(II)

Sponsor: Hood Canal Salmon Enhancement Group

Project Manager: Neil Werner - (360) -275-0373

Justification: Hood Canal Summer Chum and Puget Sound Chinook Salmon are now threatened for extinction. The Hood Canal is some of the best wild salmon habitat in the state of Washington, but there are issues that limit the productivity of this watershed. The HCSEG needs continued funding to address these issues which includes but is not limited to determining limiting factors for endangered chinook and providing access for endangered summer chum. These projects will open up over 1100 acres of undeveloped watershed including 500 acres of wetlands, 3.8 miles of spawning stream and over 8 acres of restored estuary for wild salmon in the hood canal.

Goals: Replace five culverts which create a blockage for fish passage. Two in partnership with Mason County on Cady & JOLK Creek and two in partnership with Jefferson County on Upper and Lower Tarboo Creek. One culvert replacement is on private property in a small system that has great potential for endangered summer chum.

%Success:

Relative Success: N/A

Match: \$ 900,000.	Total:
Cost - NFWF P/A \$ 675,000.00	Federal Match \$ 0.00

Cost Analysis: All four Hood Canal projects were examined in conjunction. It should be noted that some of these funds were spent on LWD and supplementation, but a majority of the HCSEG projects were fish passage related. \$20,070 NFWF dollars were spent for each mile of

Proposed Scope: Replace culverts on Cady and JOLK Creeks, two on Tarboo Creek, and one on Alderbrook Creek.

Actual Scope: Same as Proposed

Monitoring: HCSEG uses standard protocols for monitoring as well as protocols developed by the DNR for stream gridding and on their restoration projects. Fish passage barriers will be monitored before and after for adult spawners to get a quick picture of the projects effectiveness. Long term evaluation will include live smolt and adult traps, continued spawner surveys, and potential electronic instream counting. Each of the projects will be entered into the GIS data base for analysis.

Supplementation: Yes

Current Passability: Sites visited in August 2003 were all passable.

Threats to Passability: Standard

Conservation Benefit: These projects will open up over 1100 acres of undeveloped watershed including 500 acres of wetlands, 3.8 miles of spawning stream.

CB Values: See first HCSEG grant.

CB Score ESA Weighted: 451.1

CB Score Non-ESA Weighted: 150.4

Notes: No final report is given.

Site Visit? Yes, Wait and Glasgow on 8-12-03

2002-0310-004 Mid-Puget Sound Fisheries Enhancement Group Support and Habitat Restoration Project

Sponsor: Mid Puget Sound Fisheries Enhancement Group

Project Manager: Troy Fields (206) 529-9467

Justification: Appropriations have been cut for the MSFEG as with other RFEGs, in order to maintain staff and infrastructure the group needs funds to support them. The funds will enable MSFEG to implement several small habitat and monitoring project. MSFEG partners with a wide variety of organizations bringing unique expertise to the project.

Goals: To identify potential projects.

%Success: N/A

Relative Success: N/A

Match: \$ 50,000.0	Total: \$ 100,000.
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replacement of culverts was not in the initial project proposal.

Actual Scope: Replaced 2 culverts on Newaukum Ck.

Monitoring: Unknown, culverts were not replaced for fish passage but rather to alleviate flooding and sedimentation concerns.

Supplementation: Unknown

Current Passability: Passable

Threats to Passability: Standard

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? Yes, Wait and Yacker on 8-11-03

2002-0310-006 Hood Canal Salmon Enhancement Group Community-based Salmon Recovery Projects in Hood Canal, WA

Sponsor: Hood Canal Salmon Enhancement Group

Project Manager: Neil Werner - (360) -275-0373

Justification: The HCSEG needs financial capacity to meet their habitat restoration, education, and monitoring strategic work plan and support administrative capacity to accomplish our 2003-objectives for community based salmon recovery in Kitsap, Jefferson, and Mason Counties.

Goals: Accomplish habitat restoration projects in Mason, Kitsap, and Jefferson Counties using volunteers and crews.

%Success: N/A

Relative Success: N/A

Match: \$ 50,000.0	Total: \$ 100,000.
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 0.00

Cost Analysis: All four Hood Canal projects were examined in conjunction. It should be noted that some of these funds were spent on LWD and supplementation, but a majority of the HCSEG projects were fish passage related, and since nearly one quarter of all NFWF funds we

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: HCSEG uses standard protocols for monitoring as well as protocols developed by the DNR for stream gridding and on their restoration projects. Monitor fish passage on fish barrier removal projects.

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: See first HCSEG grant

CB Score ESA Weighted: 451.1

CB Score Non-ESA Weighted: 150.4

Notes: So far none of these funds have been used for culvert replacement projects.

Site Visit? Yes, Wait and Glasgow on 8-12-03

2002- 0310-010 Regional Fisheries Enhancement Group Support (WBFEG)

Sponsor: Willapa Bay Fisheries Enhancement Group

Project Manager: Ronald Craig (360)875- 5802 or 875-6402

Justification: These projects will directly benefit salmon and are cost effective. Fish passage barriers are blocking access to 11.55 miles of habitat for chinook, coho, chum, steelhead, and cutthroat. The Stringer, Honey, and Green Creek projects were identified in the "limiting factors" and strategic plan, and were recommended by WDFW and DNR. All had high index ratings.

Goals: Remove a blocking culvert/fish ladder on Stringer Creek, correct two blocking culverts on Green Creek, and replace a 70" wooden culvert on Honey Creek. In addition, the storm damage on the rock weirs in Bear Creek will be repaired.

%Success: 80%

Relative Success: N/A

Match: \$ 50,000.0	Total: \$ 100,000.
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 0.00

Cost Analysis: \$6024 NFWF dollars spent for every mile of habitat opened. \$12,048 total dollars were spent for each mile of habitat opened.

Proposed Scope: Fix four fish passage barriers, one on Stringer Ck, two on Green Ck and one on Honey Ck .

Actual Scope: Green, Honey, and Mid-Trap Creeks all had culvert replacements done.

Monitoring: Standard three year monitoring is contracted out.

Supplementation: No

Current Passability: All sites visited were determined to be passable.

Threats to Passability: Standard threats

Conservation Benefit: Opened over 8 miles of habitat in the Willapa Bay water shed for coho, chum, steelhead, and cutthroat.

CB Values: Green/BPA - 4.3 miles w/11 ft BFW for coho, chum, steelhead, and cutthroat. Honey Ck - 4.1 w/18ft BFW for chinook, coho, chum, steelhead, and cutthroat.

CB Score ESA Weighted: 88.4

CB Score Non-ESA Weighted: 29.5

Notes: Opened up at least 4.1 miles of spawning habitat in Green Creek.

Site Visit? Yes, Wait and Russell on 9-2-03.

2002-0310-012 Klickitat River Mill Restoration

Sponsor: Mid-Columbia Regional Fisheries Enhancement Group

Project Manager: Glenn Miller - (509) 697-3468 / Liz Kinne at lizkinne@gorge.net responded to NFWF's email.

Justification: Snyder Creek is a top priority for restoration due to four miles of quality habitat existing above the current barrier to fish passage. WRIA 30 limiting factor analysis deemed restoration of lower Snyder Creek a key limiting factor in terms of access.

Goals: Restore steelhead and salmon passage through Snyder Creek by removing a check dam and a small fish barrier bridge. Objectives include: Removing the dam, dewatering the pond, and temporarily re-routing the stream around the pond. Creating a new channel with large pools. Additionally, habitat structures, plantings, streambed gravel, and a rock toe will be incorporated into this reach.

%Success: N/A

Relative Success: N/A

Match: \$ 130,000.	Total: \$ 170,000.
Cost - NFWF P/A \$ 40,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: To remove a barrier culvert in Snyder Creek at the top of a former mill site

Actual Scope: Project is not yet complete.

Monitoring: Yakama Nation biologists will monitor passage through the mill site and upstream of the project site.

Supplementation: None

Current Passability: N/A

Threats to Passability: Sedimentation of culverts due to US landuses, which include timber harvest and cattle grazing.

Conservation Benefit: N/A

CB Values: Will open four miles of habitat with a BFW of 16'. Project will improve passage for ESA listed steelhead. Project not yet complete.

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: It states in a recent email that NFWF funds will be used to remove 2 culverts and replace 1 culvert. None of this is mentioned in the application, must discuss w/ sponsor.

Site Visit? Yes, Wait and Russell on 9-3-03.

2002-0368-009 Upper Russian River Restoration Program (CA)

Sponsor: Mendocino County Resource Conservation District

Project Manager: Tim Walls - (707)468- 5278

Justification: Coho, chinook, and steelhead in the Russian River have been listed as threatened under the ESA. This decline has been attributed to a number of reasons including loss of habitat.

Goals: Ensure effective implementation of current restoration projects in the Feliz Creek and McNabb Creek watersheds.

%Success: N/A

Relative Success: N/A

Match: \$ 144,285.	Total: \$ 197,534.
Cost - NFWF P/A \$ 53,249.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Implementation of Watershed Associates techniques for sediment reduction in the Feliz and McNabb Creek watersheds.

Actual Scope: Project is not yet complete.

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: Enormous project with the potential to benefit spring chinook and bull trout, both threatened species limited by habitat fragmentation.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Very well written proposal, but no information on culverts in the application.

Site Visit? Yes, Wait and Glasgow on 5-29-03

2002-0368-013 McCready Gulch Barrier Removal Project

Sponsor: Humboldt Fish Action Council

Project Manager: Curtis Ihle (707) 839-8238

Justification: Steelhead trout and coho salmon, both federally listed species within the Freshwater Creek watershed, will directly benefit from this project. This project will also benefit coastal cutthroat. Fish passage will be improved for both adult and juvenile fish by removing a concrete box culvert and lowering two upstream diversion weirs which are currently an impediment to fish passage. Restoration of these structures will allow unimpeded access to approximately 9,000 ft (1.7 miles) of habitat. Additionally, these modifications will likely improve habitat in the 1,100 ft reach of stream between the culvert and the weirs by increasing the overall channel slope, resulting in reduced siltation and increased substrate size.

Goals: To provide unimpeded access to 9,000 ft of habitat on McCready Gulch through the removal and replacement of the existing 64ft concrete box culvert (which is perched 2.5-3.0ft) and lowering the height of two existing upstream weirs each of which has a 2.5 ft drop above the DS channel. Opening the habitat is predicted to increase the overall productivity of the stream.

%Success: 100%

Relative Success: N/A

Match:	Total: \$ 174,700.
Cost - NFWF P/A \$ 48,800.00	Federal Match \$ 0.00

Cost Analysis: \$28,705 NFWF dollars were spent for every mile of habitat gained. \$102,764 total dollars were spent for every mile of habitat gained.

Proposed Scope: Remove and replace the existing baffled 64ft concrete box culvert (which is perched 2.5-3.0ft) and decrease the height of two existing upstream weirs each of which has a 2.5 ft drop above the DS channel. Note - the existing culvert will be replaced with a

Actual Scope: The culvert barrier has been removed and replaced with the flatcar bridge, and the weirs have been lowered. No mention of the monitoring results.

Monitoring: Implementation monitoring (consisting of a post-project channel profile, x-sections, permanent bench marks, and photo pts) is to be conducted after construction by HFAC. Effectiveness monitoring will occur during the first year following construction through downstream migrant trapping conducted by CDFG, in conjunction with habitat and spring spawner surveys conducted by HFAC.

Supplementation: Apparently HFAC maintains a small chinook facility upstream of the project reach

Current Passability: Unknown

Threats to Passability: Headcutting. Water depth and velocity through the flatcar bridge.

Conservation Benefit: Project resulted in the opening of 1.7 miles of habitat for ESA listed coho and steelhead and one of the southern-most populations of sea-run cutthroat trout.

CB Values: Project has opened up 1.7 miles of habitat with a BFW of 15'. Project benefits ESA coho and steelhead, and SOC coastal cutthroat.

CB Score ESA Weighted: 17.5

CB Score Non-ESA Weighted: 4

Notes:

Site Visit? Yes, Wait and Glasgow on 5-31-03.

2002-0368-014 Oregon Gulch Migration Barrier Removal Project(CA)

Sponsor: Trinity County Planning Department, Natural Resources Division

Project Manager: Janet Clements (530) 628- 5949

Justification: Oregon Gulch has historically been an anadromous stream supporting both coho and steelhead. Spawner numbers have decreased in recent decades for a number of reasons including upstream barriers. Species directly benefited as a result of this project include Coho salmon, Steelhead, Chinook salmon, Pacific Lamprey, and aquatic vertebrates including foothill yellow legged frog & western pond turtle (state and/or federal sensitive/candidate species). Coho are listed as threatened under the Federal ESA within the Trinity River basin. Steelhead are a candidate species in the Klamath ESU.

Goals: Replace an existing 30ft. concrete box culvert (which has a 60" pipe diameter and a .03% grade) at Sky Ranch Road and Oregon Gulch with a 48' x 28' bridge structure that will allow passage of all life stages of anadromous fish species. Provide access to approximately 1.5 miles of anadromous habitat upstream of the confluence of Oregon Gulch and the Trinity River. Allow 100 year flood flows and debris to pass safely through the stream crossing, preventing future culvert failures and blockages.

%Success: N/A

Relative Success: N/A

Match:	Total: \$ 188,700.
Cost - NFWF P/A \$ 49,700.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace an existing 30ft. concrete box culvert (which has a 60in pipe diameter and a .03% grade) at Sky Ranch Road and Oregon Gulch with a 48ft x 28ft bridge structure that will allow passage of all life stages of anadromous fish species.

Actual Scope: This project will not happen. A landowner with a gravel mine opposed the project and was able to sway county officials against the project.

Monitoring: N/A

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes:

Site Visit? No, project will not occur.

2002-0370-000 Hood Canal (WA) Salmon Restoration II

Sponsor: Hood Canal Salmon Enhancement Group

Project Manager: Neil Werner - (360) -275-0373

Justification: The HCSEG needs financial capacity to meet their habitat restoration, education, and monitoring strategic work plan and support administrative capacity to accomplish our 2003-objectives for community based salmon recovery in Kitsap, Jefferson, and Mason Counties.

Goals: Accomplish habitat restoration projects in Mason, Kitsap, and Jefferson Counties using volunteers and crews.

%Success: N/A

Relative Success: N/A

Match: \$ 900,000.	Total: \$ 1,200,00
Cost - NFWF P/A \$ 300,000.00	Federal Match \$ 0.00

Cost Analysis: All four Hood Canal projects were examined in conjunction. It should be noted that some of these funds were spent on LWD and supplementation, but a majority of the HCSEG projects were fish passage related, and since nearly one quarter of all NFWF funds we

Proposed Scope: N/A

Actual Scope: N/A

Monitoring: HCSEG uses standard protocols for monitoring as well as protocols developed by the DNR for stream gridding and on their restoration projects. Monitor fish passage on fish barrier removal projects.

Supplementation: N/A

Current Passability: N/A

Threats to Passability: N/A

Conservation Benefit: N/A

CB Values: See first HCSEG grant

CB Score ESA Weighted: 451.1

CB Score Non-ESA Weighted: 150.4

Notes: So far none of these funds have been used for culvert replacement projects.

Site Visit? Yes, Wait and Glasgow on 8-12-03

2003-0044 Salmon Passage Improvement

Sponsor: Skagit Fisheries Enhancement Group

Project Manager: Alison Studley - (360) 336-0172

Justification: Proposed projects have gone through a review process and have been prioritized by the Skagit Watershed Council (lead entity) as high priority projects. Both projects address key goals in the Skagit Watershed Habitat Restoration Strategy, matching funds from NFWF were needed. The proposed projects will reconnect isolated habitat and reestablish floodplain processes to key habitat within the Skagit Basin for chinook and coho salmon. In 1999 the federal government listed Puget Sound chinook salmon as a "threatened species" under the Endangered Species Act and coho are a candidate species for listing. The loss of side channel habitat for both spawning and rearing of coho and chinook is considered a limiting factor in the Skagit Basin. The Wollard Creek project will also provide access to chum, steelhead, and cutthroat trout.

Goals: Replace culverts on Wollard Creek and Marblegate Slough to restore fish access. The Wollard Creek project (replacing a perched barrier culvert with a large arched culvert) will open up .5 miles of habitat for spawning and rearing. The Marblegate project (replacing two collapsed culverts with a bridge) will enhance fish passage for juvenile coho rearing, and spawning for adult coho. The proposed projects will open approximately 1 mile of habitat for salmonid spawning & rearing.

%Success: N/A

Relative Success: N/A

Match: \$ 132,000.	Total: \$ 182,000.
Cost - NFWF P/A \$ 50,000.00	Federal Match \$ 0.00

Cost Analysis: N/A

Proposed Scope: Replace the existing 30in perched culvert on Wollard Creek with a 12ft diameter arch culvert and replace two undersized collapsed culverts on Marblegate Slough with a 30-40ft flatcar bridge.

Actual Scope: This project has not yet been completed.

Monitoring: Fish use surveys will be conducted, with weekly spawning surveys to be conducted at both replacements for 5 years following the projects. Yearly reference point photos will be taken according to standard protocols. Landowners will conduct periodic monitoring of the site during high water events to document conditions and crossing integrity. Other monitoring may be added to the plan depending on what the results of planned monitoring indicate.

Supplementation: No

Current Passability: N/A

Threats to Passability: Standard

Conservation Benefit: If implemented this project will provide access to approx. 1 mile of spawning and rearing habitat (0.5 miles of habitat primarily for coho and cutthroat spawning and 0.5 miles of habitat for coho and chinook) and restore much needed off channel habitat.

CB Values: N/A

CB Score ESA Weighted: N/A

CB Score Non-ESA Weighted: N/A

Notes: Project was in progress during site visit.

Site Visit? Yes, Wait and White on 8-18-03.

Appendix D Conservation Benefit Equation

The initial equation developed by Washington Trout to quantify the conservation benefit derived from a fish passage project. Was as follows:

$$\sum_{all_species} (SV * (\sum_{all_HT} (HL * HW * HQ))) = CB$$

Where:

The initial summation is done for all species affected by the culvert replacement project.

SV = Species value, a number between –1 and 5, with 5 representing federally listed endangered species or a federally listed threatened species, 3 a federal candidate species or a state high concern species, 1 a state low concern species or a non-listed species, and -1 represents a non-native species. For a species that is both state and federally listed, the federal value is to be assigned.

HT = Habitat types. This summation is done for each of the three potential habitat types, spawning, rearing, and migration corridor.

HL = Habitat length, the number of linear ft of habitat made available for the species through the culvert replacement.

HW = Habitat width, for streams with an average bank full width between 1-5 ft the value used will be 3, for streams with an average bankfull width between 5-10 ft the value used will be 7.5, for streams with an average bankfull width between 10-15 ft the value used will be 12.5, for streams with an average bankfull width between 15-20 ft the value used will be 17.5 ft, for streams with an average bankfull width greater than 20 the value used will be 22.5.

HQ = Habitat quality, a number between 1-3. If the habitat type is non-limiting the value is 1, if it is unknown then the value is 2, if the habitat is limiting the value is 3.

CB = conservation benefit, a theoretical number that gives the relative conservation benefit of a culvert replacement project.

The initial equation was modified due to information constraints discussed in the *Issues in the Evaluative Process* section of the body of the report. The final version of the equation did not use the habitat quality multiplier or the habitat type summation. Additionally, the discreet HW variable was converted to a continuous variable based on the actual average bankfull width of fish accessible habitats

above the culvert project. The final version of the conservation benefit as used in the evaluation process was:

$$\left(\sum_{\text{all projects}} \left(\sum_{\text{all species}} (SV * HL * HW) \right) \right) / 10^5 = CB$$

There were two analyses conducted in this evaluation. In the first analysis the SV variable was used as described above, weighting for the species listing status, in the other analysis, the SV variable was calculated as 1 for all native species, and -1 for non-native species. The final score was then divided by 100,000 in order to scale down the relative score.

Appendix E: Questionnaire and Received Responses

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire – Blank Form

Project Name:

Project Sponsor:

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

Length of stream habitat opened by each culvert project:

Average bankfull width of stream in fish accessible habitats above each culvert project:

Target fish species for each culvert project:

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

Other species affected by each culvert project:

State and Federal Status of species affected by project:

Factors limiting the production of target species in the project/s watershed:

Please describe the major land uses upstream of the project site/s:

What flood return interval was/were the culvert/s sized to accommodate?

How was this return interval determined to be appropriate?

Has any fish stocking occurred above your project site?

Do you have monitoring data available? (If yes, please return with the questionnaire.)

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)?

Were NFWF funds critical to the completion of your project?

Was the scope of your project limited by available funds?

What is the current condition of the replaced culvert/s?

Was culvert maintenance a part of the project scope?

What were the unanticipated aspects of this project?

Do you feel that the goals of this culvert replacement project were met?

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Green Creek & BPA Culvert

Project Sponsor: Willapa Bay Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc? Recommended by Washington State Fish & Wildlife Department and is part of our Strategic Plan. We also had a Habitat Assessment completed which included a Priority Assessment, which shows a high Priority.

Length of stream habitat opened by each culvert project: 4.3 miles

Average bankfull width of stream in fish accessible habitats above each culvert project: 11 ft

Target fish species for each culvert project: Chum, Silvers, Cutthroat, and Steelhead

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? All

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed: The major factor in this Watershed (Willapa River) is passage and LWD.

Please describe the major land uses upstream of the project site/s: Forest Lands

What flood return interval was/were the culvert/s sized to accommodate? 100 and 500yr

How was this return interval determined to be appropriate? Hydraulics Analysis and stream simulation

Has any fish stocking occurred above your project site? Yes, Coho

Do you have monitoring data available? (If yes, what parameters were monitored?) Yes, the baseline report and the just completed 1st year report

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? Yes, part of the match for other funds.

Was the scope of your project limited by available funds? No

What is the current condition of the replaced culvert/s? Very good, last fall after we completed the project we observed Coho and Chum, using the streams above the blocked culverts. This spring we observed many juvenile salmon using the streams.

Was culvert maintenance a part of the project scope? No, the County will maintain the Green Creek culvert and the Bonneville Power Authority will maintain the BPA culvert.

What were the unanticipated aspects of this project? No

Do you feel that the goals of this culvert replacement project were met? Yes, results have been very good; report of baseline and 1st year monitoring report is available.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Honey Creek

Project Sponsor: Willapa Bay Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

We had a Priority Index, Habitat Assessment made. This project was recommended to us by the Washington State Fish & Wildlife Dept. We then had an independent Habitat Assessment completed which showed this was a high priority project.

Length of stream habitat opened by each culvert project: About 4.1 miles.

Average bankfull width of stream in fish accessible habitats above each culvert project: 18 ft

Target fish species for each culvert project: Chum, Chinook, Coho, Steelhead, and Cutthroat Trout

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? All

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed: The Naselle watershed major limiting factor is the lack of LWD.

Please describe the major land uses upstream of the project site/s: Forests Land

What flood return interval was/were the culvert/s sized to accommodate? 100 Yr

How was this return interval determined to be appropriate? By a hydraulics' analysis of the watershed, and a stream simulation method.

Has any fish stocking occurred above your project site? Not yet, we plan on doing that this coming year.

Do you have monitoring data available? (If yes, what parameters were monitored?) Yes, we have completed a baseline monitoring, and have completed post project monitoring.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No, the post-monitoring was a part of our matching fund grant.

Were NFWF funds critical to the completion of your project? Yes, they provided some of the match.

Was the scope of your project limited by available funds? No.

What is the current condition of the replaced culvert/s? Excellent, the stream is now open for all salmon, fry salmon have been observed above the culvert, which was a total blockage.

Was culvert maintenance a part of the project scope? No, the County will be responsible for on going maintenance.

What were the unanticipated aspects of this project? No.

Do you feel that the goals of this culvert replacement project were met? Yes. The culvert was completely blocking 4.1 miles of the stream, it is now open for all salmon.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Stringer Creek

Project Sponsor: Willapa Bay Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc? Project was recommended by Washington State Fish and Wildlife Department, it's also in our strategic Plan. We had a Habitat Assessment completed which showed a very high Priority Index for the culvert replacement. We also have a Strategic Plan that identifies this project.

Length of stream habitat opened by each culvert project: about 5.0 miles

Average bankfull width of stream in fish accessible habitats above each culvert project: 23 ft

Target fish species for each culvert project: Chum, Coho, Steelhead, Chinook, Cutthroat, and Steelhead.

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? All

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed: Willapa River watershed limited by passage and LWD factors.

Please describe the major land uses upstream of the project site/s: Forest Lands, some large lot residential use.

What flood return interval was/were the culvert/s sized to accommodate? 100 and 500yr

How was this return interval determined to be appropriate? Hydraulics and stream simulation

Has any fish stocking occurred above your project site? No, was planned for this year

Do you have monitoring data available? (If yes, what parameters were monitored?) No

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? Yes, design only

Was the scope of your project limited by available funds? No

What is the current condition of the replaced culvert/s? Still blocking, design only completed

Was culvert maintenance a part of the project scope? No

What were the unanticipated aspects of this project? Many, many, many. All landuse issues.

Do you feel that the goals of this culvert replacement project were met? No. We completed the project design, obtained all the permits, County, State, and Army Corps. When we were ready to start construction, the landowner withdrew his permission to us his property. Although we had a written agreement at no charge, he decided he wanted to be paid for its us, and demanded \$30,000. We said, we would have it appraised and would pay the appraised price or pay for a construction easement. The appraisal came in at \$6,000, which we offered, he rejected that. Then we offered \$5,000 for construction easement, he rejected that. After discussion with our partners, Pacific County, SRFB, and NFWF, we decided to not take legal action. The landowner has stated he has a better design, but has not offered that to us. We are going to try again this summer to make another agreement that he might approve. But I really believe its all about money, he believes after we have all the time and money invested in this design, we will pay him the \$30,000. We can't do that. I'm not optimistic that we will be able to save the project.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Squaw Creek

Project Sponsor: Shoshone National Forest

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

Forest watershed survey identified three problem road culverts on a county road within the Forest.

Length of stream habitat opened by each culvert project: one-half mile, one-half mile, two miles

Average bankfull width of stream in fish accessible habitats above each culvert project: 20 feet

Target fish species for each culvert project: Yellowstone cutthroat trout and brook trout.

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? All aquatic organisms & life stages.

Other species affected by each culvert project: amphibians, reptiles, aquatic mammals

Factors limiting the production of target species in the project/s watershed: access to habitat and poor habitat quality.

Please describe the major land uses upstream of the project site/s: The area was burned during the 1988 Yellowstone Fires and salvage logged. The area is also within a commercial livestock allotment.

What flood return interval was/were the culvert/s sized to accommodate? The new road was put on the hill out of the stream zone, two culverts were removed and the third replaces with a bottomless arch designed to pass the 100 year event unobstructed.

How was this return interval determined to be appropriate? Natural channel dimensions

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?) Yes including cross sections, profiles and photo points.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No. The Forest conducts annual monitoring.

Were NFWF funds critical to the completion of your project? Absolutely

Was the scope of your project limited by available funds? No.

What is the current condition of the replaced culvert/s? Two were removed. The stream has headcut making anticipated adjustments. The bottomless arch is working well.

Was culvert maintenance a part of the project scope? No

What were the unanticipated aspects of this project? None so far

Do you feel that the goals of this culvert replacement project were met? Absolutely

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Alder Creek Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

A systematic inventory of the Skagit and Samish watersheds for fish blocking problems at road crossings was completed by Skagit System Cooperative. The Alder Creek culvert under the Forest Service 800 Road was prioritized as the number one fish passage problem through this inventory and assessment.

Length of stream habitat opened by each culvert project: Approximately 9 miles

Average bankfull width of stream in fish accessible habitats above each culvert project:

22 feet or 6.9 meters

Target fish species for each culvert project:

coho, pink, chum, chinook, steelhead, cutthroat

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

Both

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed:

Different for different species. Coho, lack of rearing habitat, chinook lack of spawning habitat.

Please describe the major land uses upstream of the project site/s: Forestry, timber lands

What flood return interval was/were the culvert/s sized to accommodate?

A bridge replaced the culvert designed for a one hundred year event

How was this return interval determined to be appropriate?

Designed to meet WDFW engineering standards

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?)

Yes, adult fish use, physical measurements and macroinvertebrate data

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? YES!

Was the scope of your project limited by available funds? No

What is the current condition of the replaced culvert/s? Excellent

Was culvert maintenance a part of the project scope?

No, the landowner is responsible for that

What were the unanticipated aspects of this project?

Some confusion with landownership and easements.

Do you feel that the goals of this culvert replacement project were met? Yes

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Klahowya Creek Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

SFEG has worked on this stream since 1998. After replacing a culvert downstream of these project sites and doing instream habitat work it was determined that these locations also need improvement.

Length of stream habitat opened by each culvert project: 3100 feet

Average bankfull width of stream in fish accessible habitats above each culvert project:
3.14 meters

Target fish species for each culvert project: Coho

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?
both

Other species affected by each culvert project: cutthroat, steelhead, chum

Factors limiting the production of target species in the project/s watershed:
temperature, rearing habitat

Please describe the major land uses upstream of the project site/s: forestry/timber

What flood return interval was/were the culvert/s sized to accommodate?

One culvert was replaced with a bridge, the other with a squashed, sunk culvert 25% larger than bankfull width designed to withstand 100 year event

How was this return interval determined to be appropriate?

Both were designed to meet WDFW fish passage standards by professional engineer

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?)

Yes, adult fish use, physical parameters, photos, macroinvertebrate data

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? Yes

Was the scope of your project limited by available funds? no

What is the current condition of the replaced culvert/s? good

Was culvert maintenance a part of the project scope? no, the landowner is responsible for this

What were the unanticipated aspects of this project? no

Do you feel that the goals of this culvert replacement project were met? Yes

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Red Creek Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

A systematic inventory of the Skagit and Samish watersheds for fish blocking problems at road crossings was completed by Skagit System Cooperative.

Length of stream habitat opened by each culvert project: 3500 ft

Average bankfull width of stream in fish accessible habitats above each culvert project:
4.45 meters

Target fish species for each culvert project: Coho, steelhead, cutthroat

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?
both

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed:

Please describe the major land uses upstream of the project site/s: rural, agricultural, tribal

What flood return interval was/were the culvert/s sized to accommodate?

Culvert was replaced with a bridge designed to meet 100 year event

How was this return interval determined to be appropriate?

The project meets WDFW fish passage design standards determined by Engineer

Has any fish stocking occurred above your project site? no

Do you have monitoring data available? (If yes, what parameters were monitored?)

adult fish use, physical parameters, macroinvertebrate data

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? no

Were NFWF funds critical to the completion of your project? yes

Was the scope of your project limited by available funds? yes

What is the current condition of the replaced culvert/s? good

Was culvert maintenance a part of the project scope ?

No, the landowner's association is responsible for this

What were the unanticipated aspects of this project?

Landowners donated a bridge that was salvaged from another location. There was some difficulty designing the project around the length of the bridge, rather than designing the project and purchasing a bridge of a particular size.

Do you feel that the goals of this culvert replacement project were met? yes

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: West Fork Colony Creek Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

A systematic inventory of the Skagit and Samish watersheds for fish blocking problems at road crossings was completed by Skagit System Cooperative.

Length of stream habitat opened by each culvert project: 3000 ft

Average bankfull width of stream in fish accessible habitats above each culvert project:
2.65 meters

Target fish species for each culvert project: coho

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?
both

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed:

Please describe the major land uses upstream of the project site/s: forestry, timber

What flood return interval was/were the culvert/s sized to accommodate? 100 year event

How was this return interval determined to be appropriate?

Culvert was designed to meet WDFW fish passage design standards

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?)

adult fish use, physical parameters

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? no

Were NFWF funds critical to the completion of your project? yes

Was the scope of your project limited by available funds? no

What is the current condition of the replaced culvert/s?

Poor, this culvert was blown out during a natural catastrophic event in the spring of 2003. Large beaver dams above the culvert crossing naturally blew out during a storm event, causing a massive flow of water and debris to go rushing down the stream channel for miles, flooding homes, cars, property and washing out several stream crossings.

Was culvert maintenance a part of the project scope?

No, the landowner is responsible for this. The Trillium Corporation however has sold their holdings in this area and the new landowner is responsible for repair. The culvert is still in place, but it has been washed out around it.

What were the unanticipated aspects of this project? See above

Do you feel that the goals of this culvert replacement project were met?

At first, but the goals have been wiped out by a natural event.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Lorenzan Creek Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

The project was identified in a 1997 survey by Washington Department of Fish and Wildlife (WDFW). Twenty-five culverts were identified and prioritized for replacement in this survey. Four of the 25 culverts inventoried were given high priority for replacement, this culvert was one of those four. Skagit County and WDFW partnered in 1999 to replace another high priority culvert 100 meters directly downstream of this private culvert at the mouth of the creek.

Length of stream habitat opened by each culvert project:

Fish passage was improved for coho and cutthroat trout to 9,725 square meters of habitat above the project site. 1,725 meters of this habitat is suitable for spawning and 8,000 meters is a wetlands complex providing excellent juvenile rearing habitat.

Average bankfull width of stream in fish accessible habitats above each culvert project:

2.13 meters

Target fish species for each culvert project: coho

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? Both

Other species affected by each culvert project: cutthroat

Factors limiting the production of target species in the project/s watershed: rearing habitat

Please describe the major land uses upstream of the project site/s: rural residential

What flood return interval was/were the culvert/s sized to accommodate?

A bridge was used to replace the culvert and designed for 100 year event

How was this return interval determined to be appropriate?

Fish passage design standards of WDFW and expertise of professional engineer

Has any fish stocking occurred above your project site? no

Do you have monitoring data available? (If yes, what parameters were monitored?)

adult fish use, macroinvertebrates, physical data

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)?

no, Salmon Recovery Funding Board is covering these costs.

Were NFWF funds critical to the completion of your project? yes

Was the scope of your project limited by available funds? No

What is the current condition of the replaced culvert/s? excellent

Was culvert maintenance a part of the project scope?

no the landowner is responsible for this

What were the unanticipated aspects of this project?

That other neighboring landowners would see the project and want similar projects on their property.

Do you feel that the goals of this culvert replacement project were met? yes

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Shoeshell Road Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

A systematic inventory of the Skagit and Samish watersheds for fish blocking problems at road crossings was completed by Skagit System Cooperative. Prioritization was done by the Skagit Watershed Council.

Length of stream habitat opened by each culvert project: 0.4 miles

Average bankfull width of stream in fish accessible habitats above each culvert project:
4.39 meters

Target fish species for each culvert project: Coho

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?
Both

Other species affected by each culvert project: cutthroat

Factors limiting the production of target species in the project/s watershed:

Please describe the major land uses upstream of the project site/s: rural

What flood return interval was/were the culvert/s sized to accommodate?

WDFW requires that fish passage projects be designed for the structural integrity to withstand a 100 year.

How was this return interval determined to be appropriate?

Professional engineer was hired. WDFW fish passage design standards.

Has any fish stocking occurred above your project site?

no

Do you have monitoring data available? (If yes, what parameters were monitored?)

yes, pre project adult fish use data

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? no, Salmon Recovery Funding Board is funding

Were NFWF funds critical to the completion of your project? yes

Was the scope of your project limited by available funds? somewhat

What is the current condition of the replaced culvert/s? N/A

Was culvert maintenance a part of the project scope? landowner's responsibility

What were the unanticipated aspects of this project?

Two houses are accessed over the creek. One landowner owns the crossing, a second landowner does not. The one who does not own the crossing, has not been very cooperative, while she really has little say in the project, since she does not own the crossing. However, she owns a nursing home with 6 patients, so it has been an interesting challenge to figure out how to accommodate her needs and those of her patients during construction.

Do you feel that the goals of this culvert replacement project were met? Not yet

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Marblegate Slough Fish Passage Improvement

Project Sponsor: Skagit Fisheries Enhancement Group

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

A systematic inventory of the Skagit and Samish watersheds for fish blocking problems at road crossings was completed by Skagit System Cooperative.

Length of stream habitat opened by each culvert project:

Notes from a 5/21/99, WDFW Field Survey indicate presence of 750m² of available spawning habitat located above the crossing. SFEG field survey indicates repair of the passage impediment would provide access to an additional 575 linear meters of spawning and off channel winter habitat.

Average bankfull width of stream in fish accessible habitats above each culvert project:

8 meters

Target fish species for each culvert project: chinook and coho

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

both

Other species affected by each culvert project: chum, pink, steelhead, cutthroat

Factors limiting the production of target species in the project/s watershed:

access to off channel habitat

Please describe the major land uses upstream of the project site/s:

very low density rural and open space

What flood return interval was/were the culvert/s sized to accommodate?

Because this project is within the 100 year floodplain of the Skagit River, the bridge will be constructed to accommodate a 2-year event. Larger flows will go over the bridge.

How was this return interval determined to be appropriate?

Professional engineer was hired. WDFW fish passage design standards.

Has any fish stocking occurred above your project site? no

Do you have monitoring data available? (If yes, what parameters were monitored?)

not yet, project is being constructed this summer

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)?

no, Salmon Recovery Funding Board is covering these costs

Were NFWF funds critical to the completion of your project? Yes

Was the scope of your project limited by available funds? no

What is the current condition of the replaced culvert/s? N/A

Was culvert maintenance a part of the project scope?

no, landowner is responsible for this

What were the unanticipated aspects of this project? none so far

Do you feel that the goals of this culvert replacement project were met? not yet

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Snyder Creek/Klickitat Mill Fish Passage Project

Project Sponsor: Salmon Recovery Funding Board, Washington Department of Fish and Wildlife, Mid-Columbia Fisheries Enhancement Group and Yakama Nation.

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

Local knowledge influenced government agencies.

Length of stream habitat opened by each culvert project: 2 miles.

Average bank full width of stream in fish accessible habitats above each culvert project: 6 miles.

Target fish species for each culvert project: Summer steelhead and fall/spring chinook.

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

Both.

Other species affected by each culvert project: Hawks, eagles, bear and cougar.

Factors limiting the production of target species in the project/s watershed: Livestock grazing and logging roads contribute to erosion and sedimentation.

Please describe the major land uses upstream of the project site/s: A majority of the land use upstream include cattle grazing and timber harvest.

What flood return interval was/were the culvert/s sized to accommodate? 500 year event.

How was this return interval determined to be appropriate? Refer to WDFW engineers; Greg Johnson.

Has any fish stocking occurred above your project site? No.

Do you have monitoring data available? (If yes, what parameters were monitored?) Not yet.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No.

Were NFWF funds critical to the completion of your project? Yes. Without NFWF funding this project couldn't have happened.

Was the scope of your project limited by available funds? Somewhat.

What is the current condition of the replaced culvert/s? Fair.

Was culvert maintenance a part of the project scope? No. Bridges will be constructed in replacement of the culverts.

What were the unanticipated aspects of this project? Engineering and administration delays and lack of full community support.

Do you feel that the goals of this culvert replacement project were met? YES!

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Chena-Badger Slough Fish Habitat Restoration

Project Sponsor: NFWF

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc? Alaska Department of Fish and Game conducted a culvert survey along Chena-Badger Slough in summer, 2000. I chose the project site at Airway Road in North Pole, AK because 3-36" culverts were blocking fish passage, the road was in a Service Area and the Service Area wanted to be a partner (lent financial support).

Length of stream habitat opened by each culvert project: 2 miles

Average bankfull width of stream in fish accessible habitats above each culvert project: 60 feet

Target fish species for each culvert project: Arctic Grayling

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? Both

Other species affected by each culvert project: Chinook Salmon

Factors limiting the production of target species in the project/s watershed: 27 culverts and 12 road crossings

Please describe the major land uses upstream of the project site/s: Residential and commercial

What flood return interval was/were the culvert/s sized to accommodate? "Temporary" culverts took the place of washed out bridges and roads in the 1967 Great Flood. The slough is primarily spring fed. Flood return interval is approximately 1.5 years.

How was this return interval determined to be appropriate? USGS Gauge data

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?) Some monitoring by University of Alaska, Fairbanks, USFWS and ADF&G.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? Yes. The original \$75,000 grant set the stage for a \$200,000 grant by the State of Alaska.

Was the scope of your project limited by available funds? Yes

What is the current condition of the replaced culvert/s? The 40' Airway Bridge has opened fish passage & is functioning well.

Was culvert maintenance a part of the project scope? No

What were the unanticipated aspects of this project? Bridge design approvals and cost overruns.

Do you feel that the goals of this culvert replacement project were met? Yes.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Squalicum Creek Fish Passage Project-Deets Property

Project Sponsor: Nooksack Salmon Enhancement Association

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?
Habitat Assessment of Squalicum Creek was performed by NSEA crew, identifying fish passage problems. Downstream problems were fixed first, with the Deets project prioritized as the next problem. Internal NSEA prioritization was accomplished when NFWF grant application became available.

Length of stream habitat opened by each culvert project: This was not a complete blockage, but over 5 miles was opened up.

Average bankfull width of stream in fish accessible habitats above each culvert project: 5 feet

Target fish species for each culvert project: Coho, chum, cutthroat, steelhead, fall chinook.

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?
BOTH

Other species affected by each culvert project: N/A

Factors limiting the production of target species in the project/s watershed: fish habitat blockages, riprap/bank hardening, limited floodplain habitat, lack of LWD, pool quality, poor riparian conditions, loss of wetlands, nonnative fish, invasive plants, water quality, water quantity

Please describe the major land uses upstream of the project site/s: Hospital, housing, retail development, urban and rural housing and agriculture.

What flood return interval was/were the culvert/s sized to accommodate? N/A

How was this return interval determined to be appropriate? N/A

Has any fish stocking occurred above your project site? NO

Do you have monitoring data available? (If yes, what parameters were monitored?)
NSEA has collected data including smolt traps, spawning surveys, habitat assessments, water quality, and flow measurements since 1997.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No, our volunteers are doing this.

Were NFWF funds critical to the completion of your project? YES

Was the scope of your project limited by available funds? YES

What is the current condition of the replaced culvert/s? Culvert has been completely removed. Bridge has replaced culvert. Bridge in excellent condition

Was culvert maintenance a part of the project scope? NO.

What were the unanticipated aspects of this project?

- Community, including Bellingham Rotary Club and local engineer, donated considerable time and resources to build bridge.
- School children are easily able to take field trips and work on restoration on both sides of stream now.
- This project has prompted the City of Bellingham Public Works Dept to fix 3 more fish passage problems on Squalicum Creek!

Do you feel that the goals of this culvert replacement project were met? YES

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Jordan Creek Culvert Replacement Project

Project Sponsor: California Department of Fish & Game/National Fish & Wildlife Foundation

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

The project was prioritized by both the California Department of Fish & Game the Del Norte County's Development Department because it limited salmonid passage and was located between two separate County culvert stream crossing locations scheduled for removal. The two County culvert locations were found to limit salmonid migration and prioritized as high following California Department of Fish & Game protocol and review by the Five-County Salmon Group (Humboldt, Del Norte, Trinity, Mendocino, and Siskiyou).

Length of stream habitat opened by each culvert project: Approximately one mile of habitat opened above project site.

Average bank full width of stream in fish accessible habitats above each culvert project:
14 feet bank full width

Target fish species for each culvert project:

Coho Salmon. Steelhead and Cutthroat Trout

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

Both juvenile and adult fish passage were targeted for this project.

Other species affected by each culvert project:

Cattle exclusion fencing was placed above and below site to protect riparian habitat and associated wildlife species.

Factors limiting the production of target species in the project/s watershed:

Limited factors include access to spawning grounds, over winter refuge from high flows, and narrow riparian corridors.

Please describe the major land uses upstream of the project site/s:

Land uses above the site include live stock grazing in the lower 0.5 miles and intact old growth redwood forest in the remaining .5 miles of Blue Line creek.

What flood return interval was/were the culvert/s sized to accommodate? 100 yr.

How was this return interval determined to be appropriate?

Effective flood flow design was taken from a County culvert removal site located approximately .5 mile below this project.

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?)

Yes, before construction and after construction photos.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No.

Were NFWF funds critical to the completion of your project?

Yes, very much so. The NFWF funds were critical to purchasing a bridge to replace the undersized culverts.

Was the scope of your project limited by available funds?

Yes, the bridge purchased by NFWF suited the needs of both fish passage requirements and bridge load and width requirements for farm and dairy equipment.

What is the current condition of the replaced culvert/s?

The new bridge stream crossing passed a significant 2003 winter flow event with out damage and no fish were stranded below the new crossing.

Was culvert maintenance a part of the project scope?

No. A bridge was installed to relieve the potential of culvert pipes clogging with debris.

What were the unanticipated aspects of this project?

No unanticipated aspects of this project so far.

Do you feel that the goals of this culvert replacement project were met?

Yes. Fish passage was improved. Positive landowner relationship at the site has resulted in additional habitat improvement projects. Del Norte County removed a fish limiting stream crossing above and below this project demonstrating a coordinated effort to eliminate fish passage barriers on both private (this project) and public road access.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Muck Lake /Lacamas Creek Salmon Habitat Enhancement Project

Project Sponsor: Nisqually Indian Tribe /South Puget Sound Salmon Enhancement

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?
Local knowledge.

Length of stream habitat opened by each culvert project: 7 miles

Average bankfull width of stream in fish accessible habitats above each culvert project: 4 meters

Target fish species for each culvert project: Chum Salmon, Steelhead Trout, Cutthroat Trout

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? Both

Other species affected by each culvert project:

Factors limiting the production of target species in the project/s watershed: Lack of Riparian cover, fine sediments, high summer water temperature, lack of large –woody-debris, invasive reed canary grass.

Please describe the major land uses upstream of the project site/s: Rural residential, Military Installation

What flood return interval was/were the culvert/s sized to accommodate? –NA-

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?) Yes.
Spot checks on Fish Passage.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No

Were NFWF funds critical to the completion of your project? Yes.

Was the scope of your project limited by available funds? Yes.

What is the current condition of the replaced culvert/s? The new bridge works great which has already undergone a bankfull flow event in March 2003.

Was culvert maintenance a part of the project scope? No.

What were the unanticipated aspects of this project? The long wait to gain all the necessary environmental permits was unanticipated.

Do you feel that the goals of this culvert replacement project were met? Yes.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire

Project Name: Sawmill Creek Restoration, Monitoring and Environmental Education Project

Project Sponsor: Haines Borough

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

There was definitely a prioritization process based on local knowledge, watershed analysis and an evaluation of cost and benefit.

Length of stream habitat opened by each culvert project: 400' of new stream channel constructed about primary culvert removal. Another culvert was bypassed by realigning the stream.

Average bankfull width of stream in fish accessible habitats above each culvert project: 4'

Target fish species for each culvert project: Cutthroat

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither?

Both

Other species affected by each culvert project: Coho, Dolly Varden

Factors limiting the production of target species in the project/s watershed: Changes in water regime due to urban development. Other fish passage blockages. Possible pollution. continued filling of wetlands and rerouting of streams.

Please describe the major land uses upstream of the project site/s: transportation corridor and housing development.

What flood return interval was/were the culvert/s sized to accommodate? The new stream was designed for the 100 year flood.

How was this return interval determined to be appropriate? We want the stream to last and be productive.

Has any fish stocking occurred above your project site? No

Do you have monitoring data available? (If yes, what parameters were monitored?) Need funding for this. Will actively seek.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? \$0.00

Were NFWF funds critical to the completion of your project? Absolutely without question

Was the scope of your project limited by available funds? We worked on a very small segment of a stream that branches for miles through-out our community. We have many more projects yet to accomplish on this system.

What is the current condition of the replaced culvert/s? Haven't yet taken out the pipe

Was culvert maintenance a part of the project scope? No, just culvert destruction

What were the unanticipated aspects of this project? Opportunity to involve the newly formed Takshanuk Watershed Council in a restoration project. Development of an elementary school long term educational project focused on the project site.

Do you feel that the goals of this culvert replacement project were met? We will see. Project is not yet completed. Water has yet to be diverted into the new channel.

National Fish and Wildlife Foundation Culvert Replacement Project Questionnaire –

Project Name: Restoration of Longitudinal Connectivity in San Pedro Creek, a Steelhead Stream in Central Coastal California

Project Sponsor: City of Pacifica, San Mateo County, California

How were project sites chosen, i.e. was there a prioritization process, local knowledge, etc?

Project site, Capistrano Bridge, was chosen because San Pedro Creek had entrenched significantly at the bridge, representing a barrier to fish passage through this reach of creek.

Length of stream habitat opened by each culvert project: The project has not been implemented at the time of this writing. However, as currently designed, the project reach is approximately 2000 ft. (please refer to 75% Basis of Design Document attached).

Average bankfull width of stream in fish accessible habitats above each culvert project: Average bankfull width upgradient of the Capistrano Bridge is 26 ft. ; Average bankfull width downgradient of the Capistrano Bridge varies from 20 to 30 ft.

Target fish species for each culvert project: Steelhead (*Onchorynchus mykiss*) (please refer to 75% Basis of Design Document attached).

Was this project targeted at adult fish passage, juvenile fish passage, both, or neither? The project was targeted at both juvenile and adult fish passage (please refer to 75% Basis of Design Document attached).

Other species affected by each culvert project: Other vertebrate species primarily affected by this project include (1) Pacific lamprey (*Lampetra tridentate*), (3) Stickleback (*Gasterosteus aculeatus*), (3) Prickly sculpin (*Cottus asper*), and (4) California red-legged frog (*Rana aurora draytonii*) (please refer to 75% Basis of Design Document attached).

State and Federal Status of species affected by project:

Factors limiting the production of target species in the project/s watershed: The factors that limit the production of the target species (i.e., Steelhead and California red-legged frog) are few, but severe. They are primarily declining water quality due to (1) leaky sewer pipes, (2) release of pet feces and litter into the creek ecosystem, (3) naturally occurring urban animal feces, and (4) household wastewater (with optical brighteners) contaminating the creek ecosystem.

Please describe the major land uses upstream of the project site/s: The major land uses upstream of the project are residential housing built during the 1950's, and further upgradient the remaining portion of the watershed is encompassed in San Pedro County Park and the Golden

Gate National Recreational Area. Therefore, the headwaters of San Pedro Creek are held in public ownership (please refer to 75% Basis of Design Document attached).

What flood return interval was/were the culvert/s sized to accommodate? The flood return interval is designed for the 100 year flood event.

How was this return interval determined to be appropriate? At the present time, hydrologic calculations are being conducted by an independent fisheries biologist, and the Hydrology & Hydraulics Division staff of the U.S. Army Corps of Engineers, San Francisco District.

Has any fish stocking occurred above your project site? No fish stocking has occurred above (upgradient) of the project site, to the knowledge of the project proponent.

Do you have monitoring data available? (If yes, please return with the questionnaire.) No. Not applicable.

Were post-project monitoring funds included in the original project grant (NFWF or challenge funds)? No post-project monitoring funds have been identified at the time of this writing, although a ten year monitoring effort will be a part of this project.

Were NFWF funds critical to the completion of your project? As mentioned previously, the project has not been completed. However, yes, the funds provided by NFWF have been instrumental in the design and permitting of the project.

Was the scope of your project limited by available funds? Yes, the scope of the project has been limited by available funds.

What is the current condition of the replaced culvert/s? At the time of this writing, the project has not been implemented. Therefore the Capistrano Bridge culvert has not been replaced (please refer to 75% Basis of Design Document attached).

Was culvert maintenance a part of the project scope? No, culvert maintenance was not part of the project scope.

What were the unanticipated aspects of this project? The primary unanticipated aspects of this project were the extraordinary time delays as a result of the partnership with the San Francisco District of the U.S. Army Corps of Engineers, under the 206 Stream Restoration Program. Specifically, the Corps' project formulation and project planning phases have allowed unanticipated delays from the City of Pacifica's perspective.

Do you feel that the goals of this culvert replacement project were met? The project team cannot answer this question at this time, because the project has not been implemented yet.