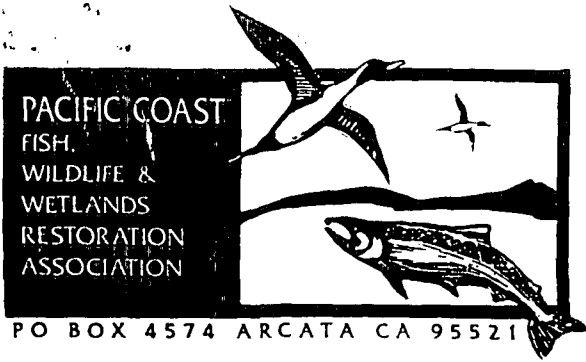


1997



REDWOOD CREEK COVER STRUCTURE PROJECT

1996-1997

FINAL REPORT

Contract # FG 5046 IF

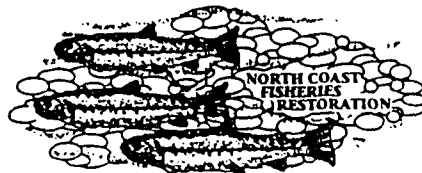
***California Department of Fish and Game
Inland Fisheries Division
1995/1996 Fishery Restoration Grant Program***

***In Memory of Mike Massey
1976 -1997***

Contract Administered By

***Pacific Coast
Fish , Wildlife, and Wetlands
Restoration Association***

Sub-contract Performed By



REDWOOD CREEK COVER STRUCTURE PROJECT

Final Report

1996-1997

Contractor: Pacific Coast Fish, Wildlife, and Wetlands Restoration Association (Non-Profit # 68-0259824). Contract Representative Mitch Farro.

Sub-Contractor: North Coast Fisheries Restoration (Contractor's License Number 699976). NCFR Representative Matt Smith

Contract Number: FG-5046-IF

Budget Amount: \$30,141.00

Project Location: Eleven sites, on two separate reaches of Redwood Creek, located 10, and 13 miles upstream from Highway 299, in eastern Humboldt County, in Section 7, 17, 20, and 29, Township 5 North, Range 4 East. The project reach can be located on the Maple Creek 7-1/2 minute Quadrangle.

Acknowledgments: The contractor would like to thank Simpson Timber Company for their cooperation in this project. Simpson Timber Company allowed access to their property where the cover structures were constructed and donated an in-kind contribution of \$7,500 for helicopter and high lead yarding, and donated 33 on-site logs or rootwads with a value of \$7,500. Simpson spent a considerable amount of coordination time in the office and during field visits insuring that their commitment was fulfilled. The contractor also thanks Joe Massei, an adjacent land owner downstream of the lower site, for allowing access across his property.

Time Frame: The contractor started the project on July 18th, 1996 and it was completed on October 1st, 1997. The hours necessary to implement the project were as follows:

Project Administrator	91	Hours
Project Supervisor	216	Hours
Supervisor Assistant	171	Hours
Laborers (2)	379.3	Hours
JD 310C Backhoe	80.5	Hours
Cat IT28F Loader	40	Hours
2 ton winch Truck	24	Days

Background: Redwood Creek is a fourth order stream with peak discharges of 45,000 cfs recorded at the mouth during flood events. Peak discharges forty miles upstream at the project reach are 6,000 cfs. The effects of the 1964 flood were devastating on Redwood Creek. The channel aggraded over the entire length of the creek so severely that local citizens were able to drive jeeps from Redwood Valley to Orick, a distance of almost 30 miles through a gorge. The period since 1964 has seen a slow recovery in Redwood Creek's channel. Pool depths have increased but they are still prone to deposition during even moderate flows. Pools and runs lacking roughness scour less, allowing sediment to deposit. Where structure providing roughness such as large woody debris (LWD) is present in the channel, scour associated with it improves sediment transport.

In upper Redwood Creek, surveys by Department of Fish and Game, and North Coast Fisheries Restoration, and pre-project habitat typing surveys of the project reach by PCFWWRA, have determined that virtually all the larger pools (4 feet or deeper) were lacking in cover, consisting mostly of bedrock with few undercut shelves. On upper Redwood Creek, NCFR, has completed two

previous projects constructing LWD cover structures under contract to CDF&G. These past projects have been very successful both biologically and physically. Volunteered pre and post-project monitoring has shown increased usage of the LWD improved pools by juvenile steelhead trout and adult summer steelhead trout. Salmonid preference is greatest for the structures placed in pools that have cold water inputs from tributaries or springs. Most of the improved pools have shown dramatic increases in depth and in their ability to transport bedload. The sandy pool tailouts which were prevalent before restoration, now have more gravel.

The majority of the targeted deep pools from the previous projects have been modified by NCFR. With Pacific Coast Fish, Wildlife, and Wetlands Restoration Association (PCFWWRA) as the prime contractor, and NCFR as the sub-contractor, a new management strategy was developed. This strategy is to improve the depth of shallow pools. Because of the lack of LWD and associated roughness necessary to influence bed scour and deepen the shallow pools, reintroducing LWD to the channel will provide for this critical limiting factor.

The completed project has:

1. Improved the degraded fisheries habitat of upper Redwood Creek.
2. Increased populations of steelhead trout, coho salmon, and chinook salmon.
3. Helped to offset the possible effects of the decreased LWD recruitment to the creek from the adjacent THP.

The private property where the site is located is owned by Simpson Timber Company. Simpson's involvement in Redwood Creek restoration projects in the past demonstrates their commitment to restoring the stream. A Timber Harvest Plan adjacent to the project reaches utilized a high lead yarder, therefor, Simpson offered to yard LWD in to the channel during their timber operation. Additionally, the THP also included helicopter yarding. Simpson donated one hour of helicopter time to yard logs to drop sites along the creek at a cost of \$7,500.

The originally proposed project site location was for the reach upstream of Ayres Cabin. The structure sites changed to also include the area up and downstream of Minon Creek. This change increased the scope of the contract because of the remote nature of the Minon Creek reach, and the increased logistics required for mobilizing to two separate project areas. Due to the late date in which the helicopter yarding occurred in 1996, the contract was extended to a second year. Mobilizing two separate years further increased budget costs.

A total of \$1,710.66 in labor wages and \$120.00 in travel compensation was paid to persons displaced by commercial salmon fishing. Additionally, \$1,401.00 was paid for project supervision and administration to individuals displaced from commercial salmon fishing. Due to the hard physical work involved in this remotely located project, the age of the commercial salmon fishers, and the narrow time window for field work to occur in, we had difficulty finding able bodied fishers with the skills needed to work on this project.

Objectives: Eleven LWD cover structures consisting of two to three fifty foot long logs with a minimum diameter of 28 inches, were constructed on two reaches of the creek. The logs were left with their limbs and stubs in tact to provide the greatest possible complexity to the cover structures. Small woody debris were attached to the completed structure to further increase roughness and facilitate future woody debris recruitment. The completed structures have increased carrying capacity for salmonids by providing multiple habitat niches. By re-introducing LWD structures, salmonids can better utilize the project reach instead of being limited to other less desirable habitat types.

By re-introducing LWD, a natural component of streams, many benefits are provided; such as:

1. Summer rearing habitat provides juveniles with cover from predators.
2. Summer cover habitat for adult summer steelhead.
3. Winter velocity cover habitat provides salmonids with a resting refuge.
4. Introducing roughness to the stream causes hydraulic influences to scour the channel bed, deepening pools, and increasing habitat complexity.
5. Introducing roughness flushes out fine sediment and sorts gravels creating spawning areas. Salmonids prefer spawning areas associated with cover habitat.
6. LWD introduce aquatic invertebrates to the stream, and act as a "drift" net providing salmonids with a good food source.
7. Future small and large woody debris recruitment occurs at the structures.
8. Bank and thalweg stability are increased with anchored LWD preventing bank erosion and help "lock" the thalweg in to a consistent meander pattern.
9. Increased wildlife habitat is provided by increasing stream-side cover.

Procedure: All appropriate access approvals and construction permits necessary to implement this project were secured prior to commencement of work. Prior to construction, data was collected to determine present bankful elevations, proposed elevations, sheer stress, and channel profiles. From this data, exact material requirements, placement, elevations, and anchoring requirements for the structures were documented and laid out in the field.

Physical and biological baseline data collection was donated by NCFR. A year after project completion, NCFR will perform post-project monitoring to determine the effectiveness of the project. There has been continuing concern about the cost-benefit of in-stream structures. Monitoring in-stream structures is extremely beneficial in determining appropriate future restoration prescriptions.

Simpson Timber yarded logs and rootwads with a high lead yarder and helicopter and stockpiled them at different locations close to the targeted sites. Depending on access to each site and the size of the LWD, either one piece of equipment or a combination of four wheel drive backhoe, loader, or winch truck moved the LWD to each site. Yarding techniques utilizing cable, blocks, and rigging pulled with the backhoe or the winch truck was used to place the logs in position at each site. The LWD was placed at a downstream 30 to 40 degree angle with the in-stream end extending one third to half way across the wetted channel. One inch threaded rebar, and Hilti anchored 3/4 inch cables was used to anchor the structures together and to bedrock, boulders, or trees on the banks. Some of the logs were anchored in trenches excavated with the backhoe and back filled with boulders and gravel. Willow was planted in the trenches before placing the logs in them, providing increased long term bank and structure stability, and increased shade.

One of the structures constructed in 1996 helped to armor the leading edge of a large slide face. Two 20 foot diameter rootwads placed with the high lead yarder and 6 thirty to fifty foot long logs were used in this revetment/LWD cover structure. This completed structure, combined with excavation of a bedrock outcrop which narrowed the channel width was beneficial in preventing unwanted undercutting of the toe of the slide. The cost of this structure was determined to equal that of two LWD structures, therefore, one less structure was to be constructed for this contract. However, due to the necessity of utilizing the logs stockpiled by Simpson Timber, the full number of proposed structures was still constructed. This added to the cost over run of this contract.

Project Costs: The project went \$1,400 over budget due to the change in site locations, increased costs from mobilizing two separate years, and the additional cost of the slide revetment/LWD cover structure site. Due to changes in the project, several adjustments were made to the contract

budget. More time than originally estimated was required from the project supervisor to complete the project. Savings from estimated staff benefits primarily covered this expense. A loader and a winch truck was rented to help move the woody debris. The cost for this equipment was covered from administrative overhead reductions. The actual projected cost of the project was as follows:

PERSONNEL COSTS

<i>Level of Staff</i>	<i>No. of hours</i>	<i>Hourly Rate</i>	<i>Total</i>
Proj. Supervisor	216	\$20.00	\$4,320.00
Supervisor Assistant	171	\$16.00	\$2,736.00
2 Laborers	379.3	\$14.50	\$5,499.75
Staff Benefits at 30.3%			<u>\$3,828.25</u>
	<i>TOTAL PERSONNEL COST</i>		<i>\$16,384.00</i>

MATERIALS AND SUPPLIES:

Construction Materials		\$3,124.00
Construction Supplies		\$719.00
Safety Items		<u>\$200.00</u>
	<i>TOTAL MATERIALS AND SUPPLIES</i>	<i>\$4,043.00</i>

OPERATING EXPENSES:

Equipment Lease/Rental		\$6,540.00
Transportation Costs		<u>\$796.00</u>
	<i>TOTAL OPERATING EXPENSES</i>	<i>\$7,336.00</i>

Administrative overhead at 10%: \$2,347.00

TOTAL ACTUAL BUDGET \$30,110.00

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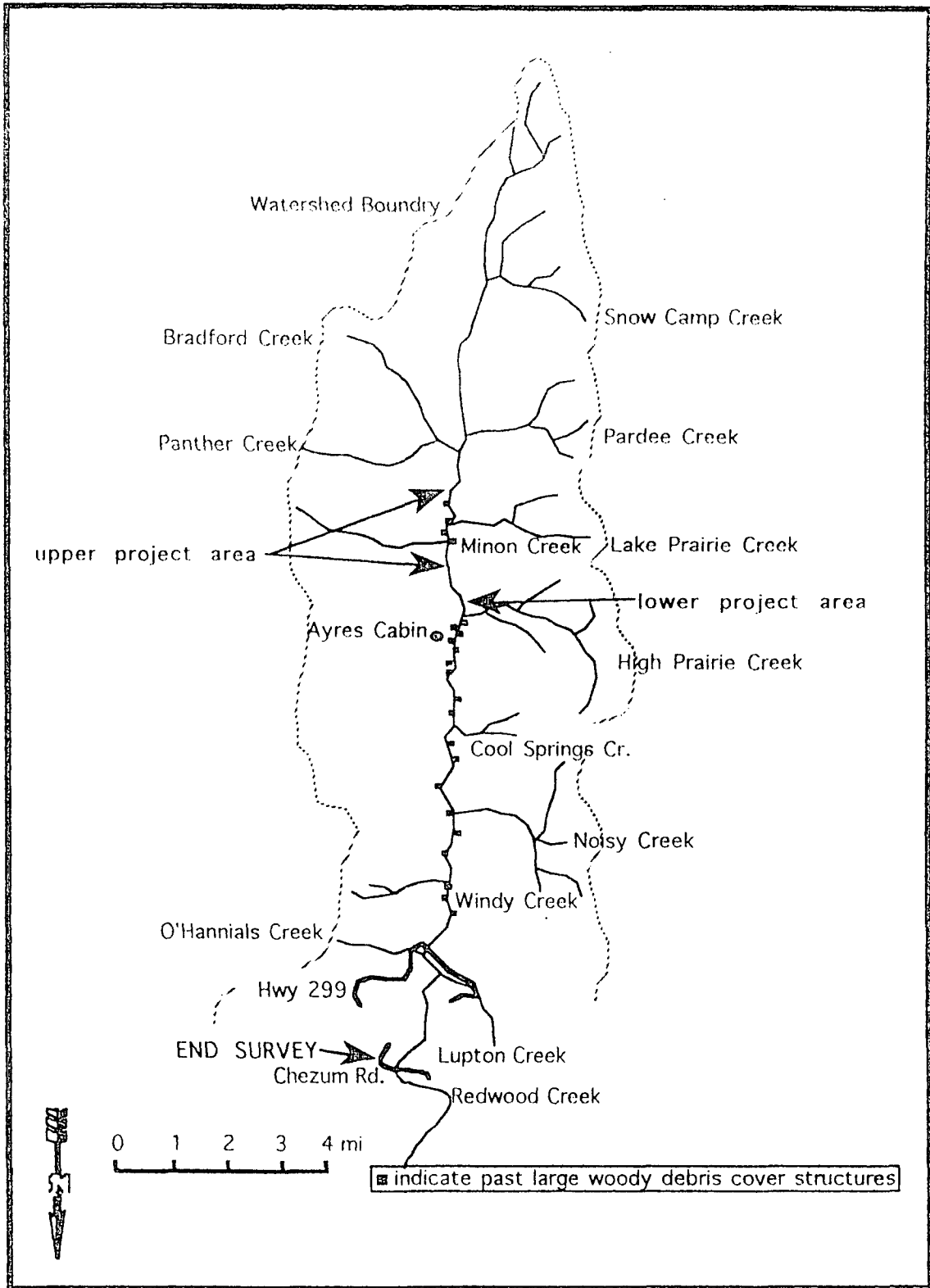
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1996-1997 Redwood Creek Cover Structure Project Area Map

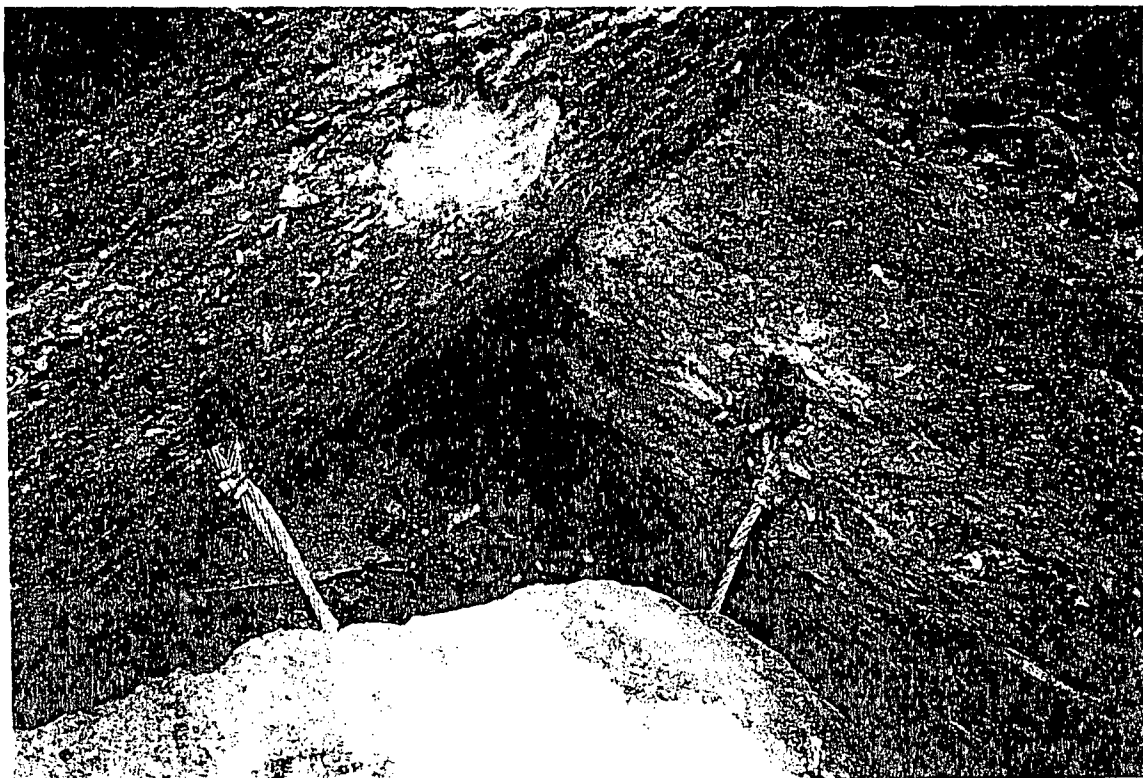


1996-1997 Redwood Creek Cover Structure Project Photographs



Completed LWD
Cover Structure

Cable eye to threaded
rebar anchors securing
LWD to boulder



1996-1997 Redwood Creek Cover Structure Project Photographs



1996 completed
LWD Cover Structure



1997 completed LWD
cover structure