Little Browns Creek Migration Barrier Removal Project

Roundy Road – Little Browns Creek - February 2008

FINAL REPORT

Partners

Coastal Conservancy Grant Nos. 03-051, 05-114

United States Fish & Wildlife Service Grant No. 813315J194

NOAA Open Rivers Grant No. NA07NMF4630162

Trinity River Basin Fish & Wildlife Restoration Program

California Department of Fish & Game

Trinity County Department of Transportation

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Summary
The purpose of this project was to provide for full passage of all life stages of coho salmon and steelhead to the natural limits of anadromy in Little Browns Creek by removing the three culverts at the Roundy Road Crossing of the creek that were a complete barrier. Additional objectives included eliminating the potential for 1,400 cubic yards of accumulated sediment to deliver to the downstream reaches of the creek and connected downstream watersheds, including the Trinity River; decreasing the potential for upstream headcutting; improving the flow capacity of crossing at Roundy Road; and, restoring natural stream function upstream of the crossing.

Project phases include: 1) Engineering; 2) Permitting; 3) Construction; and, 4) Monitoring. The geotechnical investigation was completed in 2004. The remainder of the engineering and permitting tasks was completed from August 2006 through May 2007. Project construction started July 30, 2007 and was completed October 15, 2007. Project monitoring began in February 2006 with photo, physical and biological monitoring components. The physical and biological monitoring, including an extensive out-migrant trapping plan, will continue through August 2010. The USFS also plans to extend the annual spawning survey effort upstream of Roundy Road.

A full stream simulation design of a 30-foot long, 2-lane cast in place concrete bridge set on pile supported footings was determined the most appropriate based on the hydraulic and engineering analysis of conveying the 100-year flow (743 cfs), the biological review for allowing salmonid access to the upstream reaches of Little Browns Creek, and the geotechnical investigation. A 300-foot long roughened channel was also designed and constructed. The roughened channel description is included as Attachment 1, but the primary function of the channel is to provide for improved passage in an over-steepened channel during migration flows. In addition to the channel modifications, riparian planting and streambank stabilization techniques were utilized. Attachment 2 includes the project plans and Attachment 3 is a detailed photo-log. Pre, during and post-project monitoring consists of photo-points; spawning surveys/redd counts; a pre and post-project longitudinal profile with additional post-winter longitudinal profiles in 2008, 2009 and 2010; and, an out-migrant trapping program (scheduled to begin in March 2009).

The design for the project was completed through consultation with Michael Love and Associates (roughened channel) and the Engineering staff at the Trinity County Department of Transportation (TCDOT). The permitting was completed by 5C Program staff, with assistance from State and Federal agencies. The bridge and channel construction was contracted out by the TCDOT and completed by Dunton Construction (bridge) of Anderson and Clint Robison (roughened channel & rock work) of Weaverville, California. The Trinity County RCD was contracted to complete the bioengineering/streambank stabilization and revegetation components. 5C staff has been, and will continue, to complete the monitoring program with assistance from Americorps members, a 5C contract fisheries biologist, and other local, State and Federal Agency staff as needed.

This project was funded by numerous partners in addition to the United States Fish and Wildlife Service including the California Department of Fish and Game's Fisheries Restoration Grant Program (geotechnical investigation); the Coastal Conservancy (design, permitting, construction); NOAA Open Rivers Initiative (construction and monitoring); the Trinity River Basin Fish and Wildlife Restoration Program (construction); and, the Trinity County Department of Transportation. For detailed budget information refer to Table 1. Attachment 4 includes the original budget that was submitted for this project with the actual budget changes to specific line items notated and described.

Little Browns Creek is a tributary to Weaver Creek, a major tributary to the Trinity River below Lewiston Dam. The project is located in Section 28 of T34N R9W MDBM and is accessible by taking Highway 3 north out of Weaverville from Highway 299 for approximately 6 miles and turning left at Roundy Road (Trinity County Road #232). The project site is located just before the intersection of Roundy Road and North Roundy Road. Refer to Attachment 5 for a detailed map of the Project area, showing Weaverville for reference. This project was conducted with the full support of the direct upstream and downstream landowners: Theodore Laag and Paula and Loren Wenzel. The landowner agreements, including address and phone numbers, are included as Attachment 6.

Partners	**Little Browns Creek Migration Barrier Removal Project Expense By Project Phase**			
	Engineering / Permitting	**Construction**	**Monitoring**	**Total**
State Coastal Conservancy (Design Grant)	$35,645	$0	$0	**$35,645**
California Department of Fish and Game Grants	$25,960	$0	$0	**$25,960**
Trinity County Department of Transportation	$5,971	$0	$0	**$5,971**
State Coastal Conservancy (Implementation Grant)	$0	$197,934	$0	**$197,934**
Unites States Fish & Wildlife Service	$0	$35,000	$0	**$35,000**
NOAA Open Rivers Initiative	$0	$186,532	$3,962	**$190,494**
Trinity River Basin Fish & Wildlife Restoration Program	$0	$16,000	$0	**$16,000**
Total	**$67,575**	**$435,466**	**$3,962**	**$507,003**

Table 1: Grant Funding Allocation by Project Phase

Purpose and Need

This project was part of a larger effort known as the Five Counties Salmonid Conservation Program (5C). 5C is a conservation strategy formed by the counties of Del Norte, Humboldt, Mendocino, Siskiyou and Trinity to develop land use conservation standards and implement changes in practices to reduce erosion and restore anadromous salmonid fisheries habitat within the Southern Oregon-Northern California Coast coho ESU. Developed in 1997 as a result of the listing of coho salmon as Threatened under the federal Endangered Species Act, the Program's implementation of the migration barrier component has been, and continues to be, an essential step toward the delisting of the SONCC coho salmon as a Federal and State listed Threatened species. This project also continued a series of many 5C projects, both barrier removal and sediment reduction, aimed at maintaining and restoring steelhead habitat to avoid the listing of this species as Threatened or Endangered within the Little Browns Creek watershed and the larger upper Trinity River watershed. This project was the highest priority barrier removal project not completed to date in Trinity County.

The three culverts on Little Browns Creek blocked access to approximately 3 miles of anadromous fishery habitat, including mainstem Little Browns Creek and several tributaries, upstream of Roundy Road with critical habitat for SONCC coho only be designated to the County road due to the barrier. The three culverts were removed and replaced with a 30-foot long concrete cast-in-place bridge, implementing a full stream simulation design through the road crossing. The old culvert structures did not allow for the passage of bedload and debris associated with the high flows in Little Browns Creek and flooding at the site, as well as upstream sediment accumulation, was a common occurrence during winter storm events. The full stream simulation design complies with the *NMFS Guidelines for Salmonid Passage at Stream Crossings* (September 2001), allowing for the100-year flood flows and associated bedload and debris to pass safely through the replacement structures. This treatment has prevented future culvert failures, reduced maintenance costs associated with storm flows and culvert plugging, and eliminated the potential for delivery of approximately 2,000 cubic yards of sediment into the downstream reaches of Little Browns and Weaver Creeks as well as the Trinity River.

As-Built Project Description

Permitting

This project was subject to CEQA and NEPA (due to federal funding sources) and 5C staff completed the environmental review process in cooperation with the USFS, USFWS and NMFS staff. Extensive environmental data was collected for the general project area as part of the Shasta-Trinity National Forest's fuels reduction and restoration project known as the 'Browns Project'. The project was filed as a CEQA Categorical Exemption under Section 15333 – Small Habitat Restoration Projects (2004 Amendment to CEQA Guidelines, Title 14, California Code of Regulations). The USFS had completed the NEPA on the 'Browns Project' and the biological resource surveys and determinations of their project's effects were concluded prior to the Little Browns Creek project analysis. Effects of the LBC barrier removal were not addressed in the 'Browns Project' EIS however, given that it is located within County right-of-way and bordered by private land. Biological survey information collected for the 'Browns Project' was utilized in conjunction with subsequent County surveys. The County obtained a stream alteration agreement (1602 permit) from CDFG, a non-reporting Nationwide 27 Permit from ACOE, and a 401 Water Quality Certification from the North Coast Regional Water Quality Control Board prior to project construction. A NOAA Biological Opinion to address the project's effect on SONCC coho salmon was also issued to the USFWS on May 10, 2007.

Aquatic Species Relocation

Fish Relocation was conducted on June 11, 2007 by Ross Taylor (5C fisheries biologist), Tristan Behm (5C staff member) and Jim Thompson (CDFG Habitat Specialist). The pre-project longitudinal profile was completed on June 12. At the time of relocation, there was no surface flow upstream of the crossing and few pools were located between the crossing and the downstream project limit, including the outlet pool. Fish were visible within the stream reach immediately downstream of the crossing with none observed upstream of or within the project area. There was continuous flow downstream of Roundy Road and two isolated pools upstream of Roundy Road within the project area. Several pools were located downstream of the project area that were suitable for releasing captured fish and amphibians. Flowing, fine-meshed block nets were set across the stream channel 25 feet above and 50 feet below the project area's construction limits to prevent aquatic dependent species entering the worksite during construction. 5C staff also added a fish screen to Finley Gulch (confluence with Little Browns Creek is within the downstream project construction limit, ~25 feet downstream of the bridge, and there were documented steelhead in the outlet pool of the Finley Gulch crossing of Roundy Road upstream. The block net was added to prevent access to the construction site for any aquatic species from the outlet pool in the event of a large flow/rain event during construction.

Relocation was conducted with a Smith-Root, model 12-B POW, provided by CDFG. Two passes were made through both of the isolated pools upstream of Roundy Road with no fish or amphibians captured and no mortalities. Three passes were made on the four pools (and connecting riffles) within the project reach downstream of Roundy road. Table 3 below shows the results of the relocation effort.

Pass Number	Coastal Rainbow Trout - Young-of-Year	Coastal Rainbow Trout – 1+ Age Class	Coastal Rainbow Trout – 2+ Age Class	Newt – Genus *Taricha*	Yellow-legged Frog	Pacific Giant Salamander
Pass #1	0	7	1	4	0	0
Pass #2	0	2	1	0	0	1
Pass #3	0	1	0	1	1	0
TOTALS	**0**	**10**	**2**	**5**	**1**	**1**

Table 2. Fish Relocation Results, Little Browns Creek Migration Barrier Removal Project, 6-11-2008

Construction Activity Summary

On July 30 the temporary upstream detour was installed consisting of an 18" smooth bore plastic culvert and rocked road. Landowners that reside on Roundy Road and the USFS/Calfire were notified of the project's detour on June 30. All water quality measures described in the project plans and permits were installed to protect water quality against any accidental sediment, oil or petroleum discharge into the stream. On July 31, the three 48" culverts were excavated along with the 600 cubic yards (cyds) of roadfill material and pavement; the pavement material was end-hauled to a permanent spoils disposal site and the fill material was stored on site for use in either the roughened channel or on North Roundy Road. From August 1 through August 31, the bridge abutments were formed and the upstream portion of the roughened channel (from the detour to upstream project limit) was excavated and partially constructed. From September 1 through October 15, the bridge abutments were placed and the bridge deck formed and placed and guardrail installed. The detour was pulled allowing for the remainder of the roughened channel construction between the detour to below the bridge. The streambank stabilization, riparian planting and seeding of the detour, all other disturbed areas and portions of North Roundy Road was completed between September 27 and November 1.

Bridge Construction

The stream was not dewatered prior to detour installation and culvert excavation due to the fact that there was no surface flow at the time of construction. Minor subsurface flows were encountered during culvert excavation and a sump with an electric pump was installed downstream of the project construction area, above the downstream fish screen, to pump water out of the construction area. The downstream landowner provided electricity for the pump throughout project construction. The discharge pipe for the sump was in a large bowl shaped, vegetated depression located downstream and to the left of the creek. The depression was approximately 20 feet in depth and discharge was monitored daily to assure no delivery to the creek. In addition to the pumping, straw bales, silt fence and an oil-absorbing boom were installed prior to culvert excavation to prevent excessive sediment delivery to the downstream portion of the creek. Plastic sheeting was placed over the exposed banks upstream and downstream of the bridge construction area to prevent bank delivery in the event of summer rain storms and the detour road had an 18" HDPE culvert installed to direct any upstream flows

through the project area. The first stream flows were not recorded until December 4. The 48-inch wide by 50-foot long corrugated steel pipes were excavated in sections after the detour was installed.

Based on the geotechnical investigation (Blackburn Consulting), depth to competent bedrock is ~28 feet below the road surface, so a steel pile footing foundation was utilized. A total of eight steel piles were driven, four per abutment. Abutment #1 was formed on a HP 10 x 57 pile type with design loading of 45 tons and design tip of 73 feet. Abutment # 2 was formed on a HP 10 x 57 pile type with design loading of 45 tons and design tip of 78 feet. The pilings assure structural stability for the concrete abutments. After each abutment was formed, a concrete pump truck with boom was used to pump directly into the forms in order to prevent concrete spills into the channel below the bridge. Each abutment cured for a week. Two-inch diameter rock and Class II road base was utilized to fill in the voids behind the abutments. The two-inch rock was utilized as it is self-compacting and the road base was placed over the top of the backfill and compacted with a manual whacker prior to paving. The bridge deck falsework was installed and the deck was formed and placed within a week. The deck cured for 14 days after which the guardrail was installed to allow for safe passage over the bridge. The detour fill and culvert was removed and the roughened channel construction from the detour down through the bridge and below was completed. ½-ton rock-slope protection (RSP) was installed upstream and downstream of the bridge abutments, as well as under the bridge, to prevent scour and undercutting. Larger size rock (1.5 to 1-ton, ½ and ¼-ton RSP) was also installed upstream as part of the roughened channel and streambank stabilization components. The bridge approach paving was not completed until October 12. The oil-absorbing boom, and fine-meshed block nets were removed on October 15 after the final bioengineering treatments were installed.

Roughened Channel Construction

The description of the roughened channel is included as Attachment 1. Approximately 4,500 square feet (0.11 acres) of riparian/mixed chaparral vegetation was removed from the upstream 250 feet of channel in order to excavate the 1,400 cyds of aggraded sediment and construct the channel. The total length of stream channel treated was 300 feet (0.57 miles), including the 50-foot long section under and downstream of the bridge. Construction of the channel occurred in two phases. The upstream section (project limit at 13+00 to detour at 11+20, ~190 feet) was constructed prior to the bridge being fully constructed. The remainder of the roughened channel was constructed after the bridge was installed and deemed safe for public use. The upstream channel was excavated to a 10-foot width with slopes at 5:1 and ~5% grade. The banks were over-steepened during initial excavation and shaped as the channel was constructed at 1.5:1 slope. Approximately 2,000 cyds of material was excavated from the upstream channel area (~1,400) and roadfill (~600 cyds) in order to construct the channel. This sediment has accumulated upstream as a direct result of the undersized culvert. The excavated material was utilized to build up and outslope North Roundy Road (described below), as part of the engineered streambed mix, and was also end-hauled to the downstream private property owner's parcel for permanent disposal.

The 300 feet of constructed roughened channel consists of ten rock ribbon grade-control structures (1 and 1.5-ton RSP, buried 2 layers deep and keyed into the banks) and six sets of constriction rocks. The constriction rocks were installed approximately ten feet below each rock ribbon with the exception of Stations 10+80 and 11+20 where large wood (36" diameter, 12-foot long cedar sections) were installed in place of constriction rocks. Engineered streambed material designed to be stable up to the 100-year flows was placed in the channel (refer to Attachment 1 for the calculated streambed mix) and jetted to compaction. The engineering inspection for the roughened channel construction was provided by Antonio Llanos and Mike Love of Michael Love & Associates at critical points; the beginning and mid-construction of the

channel, to inspect the engineered streambed and installation method of the rock ribbons. Andrew Pence, the Trinity County Department of Transportation engineer assigned to this project conducted the majority of construction engineering and contract inspection throughout the project. 5C staff assisted with the channel engineering construction and inspection as needed, and conducted the water quality and photo monitoring.

Road Surface Improvement
North Roundy Road runs parallel to the upstream section of Little Browns Creek and is used to access Forest Service lands as well as the undeveloped private parcel upstream (refer to Plan View for aerial view of North Roundy Road). The road was a through-cut with no drainage structures installed with deep 6" to 8" ruts in places that would deliver sediment to the creek during the large storm events. A portion of the unused excavated upstream aggraded material was used to build up and outslope ~0.25 miles of the road. The outsloped surface was rocked and a rolling dip was installed at the end of the treated section where the road steepens to approximately 35% grade on to Forest Service land. The dip will divert the steep road runoff from the road surface into a flat vegetated area, preventing runoff from delivering down the road, causing rutting and sediment delivery to the creek. This treatment was not initially proposed as part of the project, but improves the project effectiveness of reducing fine sediments to the creek and provided a permanent storage area for the excess excavated channel material.

Streambank Stabilization & Revegetation
Bioengineering utilizing willow brushmattress and fascine construction was installed on approximately 150 feet of streambank. The treatments were broken into two sections: Section 1 (upstream right bank), and Section 2 (upstream left bank). The willow was harvested and stored in ponds prior to installation. Section 2 was installed on September 27 and Section 1 installed on October 15 as it was within the detour and could not be installed until the bridge was safe for travel. Section 1 measured approximately 70-feet (accounting for stream meander) long by 6-feet tall by 6-inches thick (420 square feet covered) and Section 2 measured approximately 80-feet long by 8-feet tall by 6-inches thick (640 square feet covered). The bioengineering treatment sections are shown on the Plan view included in Attachment 2.

Thirty-four pounds of native grass (California fescue, California brome, and Blue wildrye mix) was planted and mulched with certified weed-free straw in October and November. Seed was donated by the Shasta-Trinity National Forest and was a locality mix. Seeded portions included sections of North Roundy Road as well as the detour and staging areas at the barrier site. Rooted cuttings of 34 Arroyo willow, 100 Red willow, 50 Shiny-leaf willow, and 90 Black cottonwood were planted on the upstream and downstream banks that were not treated with bioengineering. Twenty-five Douglas-fir will be planted in the detour area (trees per acre ~ 0.06 acre area) in late March 2008. The Trinity County Resource Conservation District (RCD) was contracted to do the willow harvesting and installation as well as the revegetation. 5C staff assisted with the bioengineering construction and inspection on September 27 and October 15.

Project Monitoring
Photo Monitoring: A photo-monitoring program to determine the project's effectiveness was developed and is being continually implemented. Photo documentation of pre-project conditions including water turbidity downstream before, during, and after late fall and early winter rains was performed. Photo monitoring during construction and post-project monitoring activities has also occurred (Attachment 3).

Longitudinal Profile/Thalweg Monitoring: The pre-project longitudinal and thalweg surveys utilized for designing the bridge and channel were completed in 2004 and entered into

AutoCAD. Another pre-project longitudinal profile was taken starting from approximately 920 feet upstream of the project to 141 feet below the project (total length of 1,061 feet) was taken on June 12. Four cross-sections were also measured. A post-project profile was taken again immediately following project construction on October 22. The third profile will be taken in April/May 2008, and again after the second and third winters (April/May 2009 and 2010). Post project surveys of the same areas will be done immediately following construction and again at a future date in response to storm flows and channel adjustments.

Biological Monitoring:
Spawning and presence/absence surveys will be conducted at the project site. The initial survey data consists of USFS and 5C Migration Barrier Inventory data collected prior to the project. The culverts were assessed as complete barriers to both adult coho and steelhead and juveniles of all age classes during the Trinity County barrier inventory. There is no available presence/absence data for this system upstream of Roundy Road and neither juveniles nor adults have ever been recorded since the culverts were installed. The first post-project spawning survey is planned for March 19, 2008 and will be conducted approximately five miles of stream system. The start of the survey will be at the end of Little Browns Creek Road (approximately 4 miles upstream of the LBC confluence with Weaver Creek). The 4-mile section is half BLM property and half private property and will not be surveyed initially. Surveys will continue in the fall and winter through 2010 and results will be reported in subsequent NOAA Open Rivers Grant (project partner) reports. Due to the fact that first flows did not occur in the creek until December 4, 2007, spawning surveys for coho salmon were not conducted.

The Trinity County Department of Transportation will maintain the new crossing. During high rainfall/storm events, the new structure will be inspected in a timely manner and debris will be removed if necessary. This project will provide both short and long-term objectives by reducing culvert maintenance costs and emergency time for the Trinity County Department of Transportation maintenance crews and engineers.

Quantitative Results

A. Stream length treated/assessed/made more accessible (distance in feet): **~15,840 feet**
B. Instream habitat structures to be installed (number): **3 sections of 36-inch diameter, 12-foot long Incense cedar logs (not in original proposal)**
C. Fencing length to be installed/repaired (distance in feet): **0**
D. Road length treated/assessed (distance in miles): **0.25 miles (North Roundy Road)**
E. Stream crossings treated (number): **1**
F. Sediment prevented from entering the stream (volume in cubic yards): **2,000 cubic yards**
G. Trees planted (number): **25 Douglas-for trees & 274 rooted willow/cottonwood cuttings for a total of 299 trees planted**
H. Area planted/preserved/assessed (area in acres): **0.32 acres total (area planted along the riparian zone, the detour and North Roundy Road)**
I. Public meetings (number): **0 as a Public meeting was not required. One press release was issued on September 26, 2007 by the Trinity Journal. The CEQA Categorical Exemption was posted for 31 days in the Trinity County Courthouse, with no comments received.**
J. Public meeting attendees (number): **Not applicable**
K. Students trained (number): **0**
L. Juvenile fish produced: **0** released: **0**

List of Attachments

Attachment 1 – Roughened Channel Description and Design

Attachment 2 – Project Plans

Attachment 3 – Project Photo-log

Attachment 4 – Original Detailed Budget with Changes per Construction

Attachment 5 – Detailed Map of the Project Area

Attachment 6 – Landowner agreements