Conner Creek Migration Barrier Removal Project

Conner Creek Road – Conner Creek - November 2011

CA DEPARTMENT OF FISH AND GAME
AGREEMENT P0710308
FINAL REPORT

Partners

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Trinity River Basin Fish & Wildlife Restoration Program
Trinity County Department of Transportation

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Summary

Conner Creek is a tributary to the Trinity River below Lewiston Dam. The project is located in Section 2, T 33N, R 11W MDBM and is accessible by taking Highway 299 west out of Weaverville 8 miles, turn left at Dutch Creek Road and cross the Trinity River, turn right on Red Hill Rd, turn right onto Conner Creek Road after approximately 2.2 miles. The project site is located 350 feet down Conner Creek Rd and the staging area is located at the intersection of Conner Creek Rd and Red Hill Rd. Refer to Attachment 5 for a detailed map of the Project area.

The purpose of the Conner Creek project is to provide full passage for all life stages of coho salmon and steelhead to the natural limits of anadromy by removing two County road culverts that were migration barriers to salmonids. The project was accomplished using California Department of Fish and Game Fisheries Restoration Grant Program, CA Coastal Conservancy grant funds, NOAA/National Association of Counties (NACO) grant funds and US Forest Service National Fish and Wildlife Foundation grant funds. Objectives included:

- Provide full fish and flood/debris passage at Conner Creek Road consistent with NOAA/NFMS Fish Passage Criteria;
- Improve stream conveyance in response to the upslope wildfires of 2008;
- Eliminate the potential for 250 cubic yards of road prism fill from delivering to Conner Creek;
- Reconnect downstream watersheds areas consistent with the Trinity River Total Maximum Daily Load Allocation Plan for Sediment (EPA, 2000);
- Decrease the potential for upstream headcutting if the road should fail;
- Improve the flow capacity at Conner Creek Road at road crossings
- Reintroduce large wood routing in the stream;
- Complete non-construction tasks to facilitate Red Hill Road construction in early summer 2012.

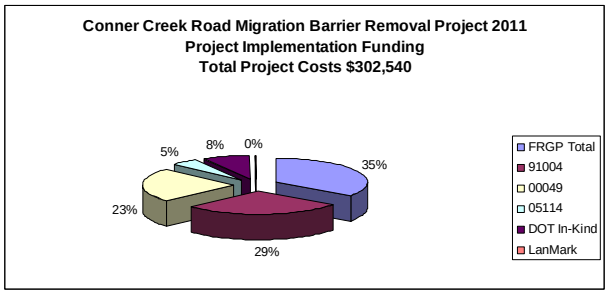
The Red Hill Road Project could not be built in 2011 because NEPA compliance was not assured until August 2011. With NEPA completed there was not sufficient time to order crossing structures and build both crossings in the remaining 2011 construction season. In August the pre-cast arch bridge structures were ordered and an aggressive construction schedule was developed to complete the highest priority site, Conner Creek Road, by October 15th (subsequently extended to October 31st). The Red Hill site has been scheduled for construction in the summer of 2012.

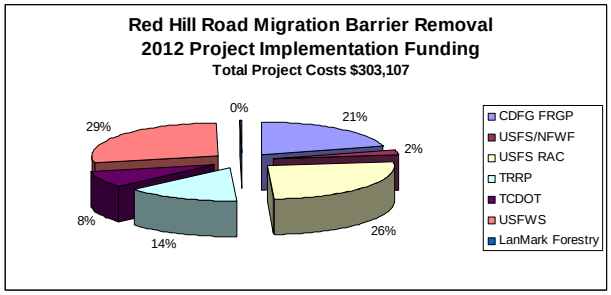
This project encompassed all of the preparatory work to replace two migration barriers, completion of supplemental NEPA and design analysis for both sites, obtaining final permitting for both sites, purchasing both crossing structures (precast ConSpan arch bridge and multi-plate metal arch culvert), developing the staging area for both projects, and completion of the downstream project. The upstream Red Hill project crossing will be constructed in 2012. The figures and costs presented in this report are for all work and expenses incurred through December 28th, 2011 for both sites.

The completion of the Conner Creek Road site opens 2.5 miles of habitat to adult salmonids and 1,000' to juveniles. It also established the staging and storage areas to begin and complete the Red Hill Road project early in the construction season.

This project, including the 2012 Red Hill Road replacement, is funded by numerous partners including the California Coastal Conservancy (geotechnical investigation, design, permitting, construction); California Department of Fish and Game's Fisheries Restoration Grant Program (CDFG FRG); United States Forest Service Resource Advisory Committee (RAC), US Forest Service/National Fish and Wildlife Foundation; the United States Fish and Wildlife Service

(USFWS); a joint National Oceanographic and Atmospheric Administration (NOAA) and National Association of Counties (NACo) grant (construction and monitoring); the US Bureau of Reclamation-Trinity River Restoration Program Watershed Restoration Program (construction); the Trinity County Department of Transportation (TCDOT) and LanMark Forestry (construction). For detailed budget information refer to Table 1.





Implemented project phases completed include: 1) Design/Engineering; 2) Environmental Analysis; 3) Permitting; 4) Structural Purchases; 5) Construction; and 6) Monitoring.

Conner Creek Road Project Before with 10' concrete box culvert looking upstream (left) and restored channel with 24' wide bridge (right).

Project Location Map

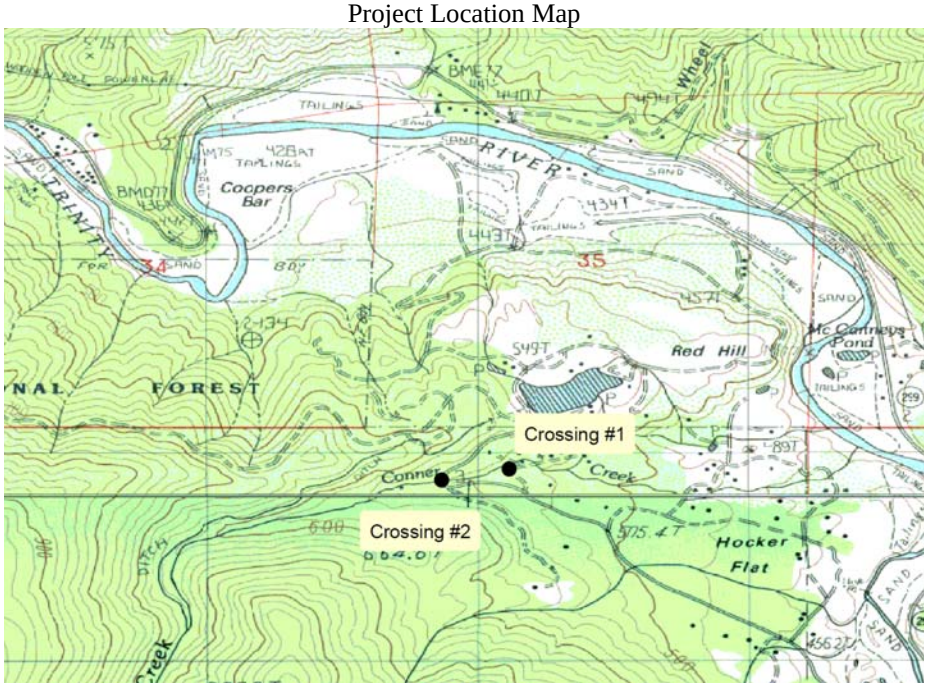


Table 1: Grant Funding Allocation by Project Phase

PERSONNEL SERVICES				FRGP Total	91004*	00049*	05114*	DOT In-Kind	LanMark	Amount of Cost Share	Total Project Cost
Level of Staff	**# Hours**	**Hourly Rate**									
TCDOT Road Crew Asst Supervisor	36	27.17		$981		$4,100	$800	$3,126		$8,026	**$9,007**
Benefits @ 120%		74%		$726		$3,034	$592	$2,313		$5,939	**$6,665**
TCDOT Maintenance Worker 4	286	$18.45		$5,277	$939	$18,215	$980	$5,120		$25,254	**$30,531**
Benefits at		73.15%		$3,860	$687	$13,231	$717	$3,745		$18,380	**$22,240**
TCDOT Maintenance Worker 3	274	$17.53		$4,803		$10,227	$989	$8,490		$19,706	**$24,509**
Benefits at		69.95%		$3,360		$7,153	$692	$5,939		$13,784	**$17,144**
TOTAL PERSONAL SERVICES				**$19,006**	**$1,626**	**$55,960**	**$4,770**	**$28,733**	**$0**	**$91,089**	**$110,095**
OPERATING EXPENSES											
Subcontractors	**# Units**	**Units**	**Unit Cost**								
NW CA RC&DC Staff	Hrs	259.66	$42.44	$11,019	$9,574		$4,759			$14,333	**$25,352**
Ross Taylor Fisheries Biologist						$1,100				$1,100	**$1,100**
Dura Crane					$17,618					$17,618	**$17,618**
Taber Geo-Technical						$2,028				$2,028	**$2,028**
TOTAL SUBCONTRACTORS				**$11,019**	**$27,192**	**$3,128**	**$4,759**	**$0**	**$0**	**$35,079**	**$46,098**
Materials & Supplies - Both Crossings											
Mobilization			$5,000	$5,000		$1,500	$745			$2,245	**$7,245**
Clearing & Grubbing			$4,100	$2,000		$0				$0	**$2,000**
Develop Water Supply			$2,800	$1,500	$733	$500			$750	$1,983	**$3,483**
Construct Temporary Diversions			$4,600	$2,300	$2,665					$2,665	**$4,965**
Roadway Excavation	CY	175	$40.00	$3,500		$4,446				$4,446	**$7,946**
Structural Excavation	CY	100	$35	$1,750		$6,660	$3,733			$10,393	**$12,143**
Remove Existing Crossing Structure	LS	1	$2,500	$500		$2,361	$3,733			$6,094	**$6,594**
Install New Crossing Structure						$5,000				$5,000	**$5,000**
Erosion Control/Revegetation						$1,000	$220			$1,220	**$1,220**
Furnish New Crossing Structures (18' width x 80' length and Conspan 24' Arch Structure)	LF	2	$64,854	$62,578	$67,130					$67,130	**$129,708**
TOTAL OPERATING EXPENSES				**$90,147**	**$97,719**	**$24,595**	**$13,189**	**$0**	**$750**	**$136,253**	**$226,400**
SUBTOTAL				$109,153	$99,345	$80,555	$17,958	$28,733	$750	$227,342	**$336,495**
ADMIN. OVERHEAD AT 10%				$10,915	$1,000	$50	$0	$0	$0	$1,050	**$11,965**
GRAND TOTAL				**$120,068**	**$100,345**	**$80,605**	**$17,958**	**$28,733**	**$750**	**$228,392**	**$348,460**

*- Other Grant Sources: 91004- NACO/NOAA; 00049- USFS/NFWF; 05114 Coastal Conservancy

Purpose and Need

This project is part of a larger effort by the Five Counties Salmonid Conservation Program (5C). The 5C Program is a non-profit organization formed by the counties of Del Norte, Humboldt, Mendocino, Siskiyou and Trinity. Their goal is to formulate strategic land use conservation standards and implement practices to restore fisheries habitat within the Southern Oregon-Northern California Coast Coho (SONCC) ESU. Developed in 1997 as a result of the listing of coho salmon as Threatened under the federal Endangered Species Act, the 5C Program's migration barrier removal strategy is an essential step toward delisting the SONCC coho salmon. The Conner Creek project continues 5C efforts, 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 Conner Creek watershed and the larger upper Trinity River watershed.

This two-year project funded from eight partnerships and ten funding sources, removes a complete fish barrier downstream at Conner Creek Road and a partial barrier upstream on Red Hill Road[1]. The size, complexity, and permitting timelines for the project necessitated that it be completed in two consecutive construction seasons as discussed below.

Before removal, the box culvert on Conner Creek blocked access to approximately 2.5 miles of anadromous fishery habitat, including main stem Conner Creek and several tributaries upstream of Red Hill Road, including designated coho critical habitat. The box culvert was removed and replaced with a 24-foot span concrete pre-cast bridge, implementing a full stream simulation design through the road crossing. The old box culvert with a 2' jump at the outlet did not allow for nearly all fish passage. Also the undersized crossing reduced passage of bedload and debris associated with the high flows. The full stream simulation design complies with the *NMFS Guidelines for Salmonid Passage at Stream Crossings* (September 2001 as amended), allowing for the100-year flood flows and associated bedload and debris to pass safely through replacement structures. This treatment minimized the potential for future culvert failures in larger storms (<100 year storms). The pre-existing culvert at Conner Creek Road and the existing structure on Red Hill Road overtopped on relatively small storms and the roads overtopped on 18 year and 43 year storm flows. The new crossings reduce maintenance costs associated with storm flows and culvert plugging and/or weir clearing, and eliminate the potential for delivery of approximately 2,189 cubic yards of road fill material into the downstream reaches of Conner Creek and the Trinity River.

Objectives for the project include: provide full fish and flood/debris passage within the crossing consistent with NFMS Fish Passage Criteria; eliminate the potential for 2,189 cubic yards of road prism fill from delivering to the downstream reaches of the creek and connected downstream watersheds, including the Trinity River; decrease the potential for upstream headcutting; improve the flow capacity of crossing at Conner Creek Road; reintroduce large wood routing in the stream, restore natural stream function upstream of the crossing, and have all non-construction tasks completed to facilitate Red Hill Road construction in early summer 2012. All objectives were met.

This project on Conner Creek was originally designed and funded in 2007-2008 to retrofit an existing 10' box culvert at Conner Creek Road and to install jump and pool structures, baffles and an overflow pipe at the Red Hill Road crossing. These designs were never considered optimal. Additionally, in the summer of 2008 the Eagle Wild Fire significantly burned the upper 42% of the watershed and in late 2009 a post-fire watershed assessment found a significant increase in the risk of large flows and bedload transport in Conner Creek in the next 10-20 years

[1] Based on a migration barrier inventory utilizing Fish Xing analysis (Ross Taylor, 2001).

(refer to Hydrology Report). Based on this and other factors, it was determined that the project should be upgraded to convey flood and debris flow and meet full fish passage design criteria.

Project Redesign and Supplemental Environmental Analysis

Project monitoring began in November 2005 with photo, physical and biological monitoring components. The initial engineering designs for both crossings and permitting tasks were completed from January 2006 through August 2007. The 90% design for the sites was completed in 2007 by SHN Consulting. This engineering phase included two design options for the Red Hill Road Site (retrofit and full replacement) and to remove approximately 60% of the bottom of the concrete box culvert on Conner Creek Road. At that time the Red Hill Road retrofit design was chosen and funding for construction of these projects was secured.

As noted above in 2008 a large wildland fire burned the upper 42% of the watershed and in late 2009 a post-fire watershed assessment found a significant increase in the risk of increased flows and bedload transport in Conner Creek in the next 10-20 years because of hydrophytic watershed conditions. Based on this and other factors, it was determined that the project should be upgraded to convey flood and debris flow and meet full fish passage design criteria. Beginning in 2010, supplemental engineering to convey the 100-year flow and debris began. At that same time supplemental funding sources were pursued and the project implementation was delayed pending redesign and funding.

Because the Red Hill Road design included a full stream simulation option as well as a retrofit option, the decision was made to drop the retrofit design and pursue the full stream simulation option. Only minor supplemental design details were needed to address this crossing.

The Conner Creek Road design, however, required scrapping the original plan. The new design was completed by Trinity County Department of Transportation (TCDOT) Engineer Wes Scribner, with assistance from Randy Cessna and Director Rick Tippett, and in consultation with 5C Staff and NOAA Fisheries Engineer Margaret Tauzer. The crossing was designed with full stream simulation with a 24-foot span, 16’ wide precast concrete ConSpan bridge set on poured-in-place footings and abutments. The project included the removal of the concrete box, the reconstruction of the channel at a gradient of 6% or less with jumps of less than 6” in height to support juvenile migration, and grade control rock ribbons set below the channel grade.

The redesign necessitated a geotechnical investigation of the Conner Creek Road site and Taber Geo-Technical completed that work in January 2011. The geo-technical investigation did not result in changes in the project footprint but did result in modifications in the footing design. This design was determined the most appropriate based on the hydraulic and engineering analysis of the 100-year flow (743 cfs), the biological review for allowing salmonid access to the upstream reaches of Conner Creek, the geotechnical investigation, and efforts to minimize riparian vegetation disturbance at the site.

Concurrent with the redesign efforts, the FRGP grant scope of work and budget was amended to allow for the replacement of both crossings.

In July 2010, the Forest Service determined that the existing NOAA Programmatic Environmental Assessment used for projects funded under the Fisheries Restoration Grant Program would not meet their NEPA requirements for this site. The Forest Service indicated that an Environmental Assessment (EA) would be needed for the project to go forward and they could not program NEPA for the project until 2012. The 5C Program staff and consultant Christine Jordan, working with Forest Service and NOAA staff, undertook completion of Specialist Reports, Biological Evaluations and other reports needed to determine if the project met the criteria for a Categorically Excluded (CE) NEPA project or if it would require an EA. The

purchase of the bridge and arch structures was postponed until the NEPA and design revisions could be approved by NOAA and the Forest Service.

In July 2011, the Trinity River Management Unit District Ranger approved the NEPA review and issued a Decision Memo to Categorically Exclude the project from further NEPA review. Following the Ranger's decision, a 30-day waiting period passed with no public comments. During the same period NOAA/NMFS Fisheries affirmed that the designs complied with their fish passage criteria and US Fish and Wildlife Service affirmed their NEPA review. With federal compliance only assured by August 2011 it was impossible to order both structures, bid construction and/or build both crossing in the remaining two months of the 2011 construction season. In August, with the federal approvals, state permits were obtained, the pre-cast arch bridge structures were ordered (it took approximately 45 days to fabricate them once ordered), and an aggressive construction schedule was developed to complete the highest priority site, Conner Creek Road, by October 15th (subsequently extended to October 31st). The delay in NEPA determination, however, made it impossible to order the structures and construct both sites in 2011 and the Red Hill site has been scheduled for construction in 2012.

As-Built Project Description

The bridge and channel construction was contracted to and completed by TCDOT Weaverville, Hayfork and Burnt Ranch crews with Dennis Fullerton, Deputy Director overseeing logistics and operations and the Hayfork crew leader overseeing day-to-day removal of the old structure and construction and placement of the new bridge. Between September 5th and October 31st, 2011 the Conner Creek Road site was completed, with less than 31 days of actual construction activity.

The 5C Program staff coordinated with TCDOT to carry out mobilization, staging area development, installation of diversions, screen maintenance, de-watering and pump management, streambed construction, erosion control, riparian management, revegetation and overall site control. Having 5C Program staff on-site and responsible for many of the non-traditional excavating and construction tasks proved valuable in minimizing impacts on riparian areas and assuring water quality objectives at all times.

Ross Taylor, contracted fisheries biologist, Jim Thompson, CA Department of Fish and Game Biologists, and David Colbeck, 5C Project Manager relocated fish within the project area (see Appendix 5 for report). The bridge and multi-plate arch structures were ordered from ConTech of Redding and Dura Crane of Anderson provided the heavy lift crane needed to set the pre-fabricated ConSpan arch structures. All other equipment rentals, concrete, rock, lumber, carpentry and plumbing supplies were contracted locally.

A 50-foot section of the stream channel was reconstructed with engineered streambed mix using D_5-D_{85} sized materials. The streambed materials were jetted into place using a ¼" bore nozzle on a Honda WH20 pump. A series of pumps recycled jetted water and discharged excess water onto a stable bench away from the live channel. The primary function of the channel is to provide for improved fish passage in a 6% gradient channel reach, including passage of all life stages of salmonids during all migration flows. In addition to the channel modifications, riparian planting and streambank stabilization techniques were utilized. Attachment 1 includes the project plans and Attachment 2 is a detailed photo-log. Pre, during and post-project monitoring consists of photo-points; fish presence/absence survey counts; and a pre and post-project longitudinal profiles in 2011, 2012 and 2013 with additional monitoring possible in subsequent years.

CEQA/Fish and Game Permitting

This project was subject to CEQA and NEPA (due to federal funding sources and federal land

ownership). 5C Program staff completed the environmental review process in cooperation with the USFS, USFWS and NMFS staff (refer to discussion above). 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). 5C Program staff completed NEPA in coordination with a USFS interdisciplinary team. Biological survey information collected by the USFS was utilized in conjunction with subsequent 5C Program surveys. The 5C Program 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 issued to the USFWS on June 9, 2010.

Aquatic Species Relocation

Fish Relocation was conducted on September 2, 2011 by Ross Taylor (5C Program fisheries biologist), David Colbeck (5C Program Project Manager) and Jim Thompson (CDFG Habitat Specialist). At the time of relocation, there was surface flow upstream of the crossing. 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. Three passes were made through the length of the project site below and above the concrete box culvert with 15 fish (from 70 mm to 180 mm) and 9 amphibians captured with no mortalities. See Attachment Table 2 below for details.

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	6	5	0	0	1
Pass #2	1	2	0	0	0	7
Pass #3	1	0	0	0	0	1
TOTALS	**2**	**8**	**5**	**0**	**0**	**9**

Table 2. Fish Relocation Results, Conner Creek Migration Barrier Removal Project, 9-2-11

Construction Activity Summary

On September 1st the staging area was developed and 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 September 3rd the 18-foot long, 6-foot tall, 14-foot wide concrete box culvert was excavated along with the 250 cubic yards (yd^3) of roadfill material and pavement; the pavement, concrete and metal 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 as backfill for the new abutments. From September 28 through October 27, the bridge abutment footings and stem walls were excavated, formed and poured and the roughened channel was excavated, constructed and jetted into place. From October 27 through October 29, the detour bridge was pulled, the new ConSpan bridge was delivered, lifted into placed and secured. The streambank stabilization, riparian planting and seeding of the staging area and all other disturbed areas was completed between October 29 and November 1.

Creek Dewateing and Water Quality Protection

The stream which has a consistent 2-3 cfs flow was dewatered by running it through the project

site in a pipe prior to excavation of the box culvert. An approximately 3 foot high dam was constructed out of plastic sand bags, rocks and plastic sheeting at the upper end of the project, at the downstream side of a natural pool below the upper fish exclusion screen, in order to divert flows through a 60' long by 36" wide HDPE culvert. The dewatering culvert was chained together at each pipe segment to assure that it would not come apart during construction. A series of wood beams were placed under the pipe to allow work to be done under it, and to allow it to slide from side to side as needed. Having the dewatering pipe in the middle of the construction site did slow some excavation work, but it minimized the need to cut a trench on the bank to handle the flows.

Approximately 95% of flows were successfully diverted through the diversion culvert but subsurface flows were encountered during culvert excavation and a sump with a gas pump was installed downstream of the project construction area, above the downstream fish screen, to pump water out of the construction area. A second sump was excavated below the diversion dam and above the project to catch subsurface water and pump it into the bushes clear of the project. Finally, a shallow trough was dug and lined with plastic below the diversion dam to catch any remaining subsurface flows and pipe it through the project to discharge in the creek. Due to the depth of the preexisting plunge pool at the bottom of the project, but upstream of the diversion culvert carrying creek flow, all water draining through the site was captured and sediment was allowed to settle out before entering the creek. As a precaution, woven geotextile fabric was installed at the outlet of the plunge pool in order to assure that any water re-entering the stream was filtered and sediment introduction was minimized. Due to this construction technique, it was not necessary to continually pump the plunge/sump pool at the bottom of the project. Gas pumps were used periodically to maintain the pool depth and allow sediment time to settle out.

The discharge pipe for the lower sump was located approximately 100 feet from the creek and discharged into vegetated area downstream of the project and to the right of the creek. The discharge was monitored daily to assure no delivery to the creek. The discharge pipe for the upper sump was located approximately 100 feet from the creek and discharged into a ditch running parallel to the creek. The discharge was monitored to assure no delivery to the creek and was relocated periodically to ensure the soil was not oversaturated. In addition to the pumping, an oil-absorbing boom was installed prior to culvert excavation to prevent any incidental petroleum contamination to the downstream portion of the creek.

Detour Installation and Box Culvert Removal

One of the goals of the project was to minimize construction disturbance to the area as wide as the shadow of the road would cast on the stream channel and even in that area retain all trees greater than 6" in diameter. To do this the site detour design had to be flexible enough to allow construction from various angles to minimize vegetation disturbance and road access.

To accomplish that goal the Trinity County DOT utilized a Bailey Bridge and a rented 320 Cat excavator to work in tandem with their own 320 Cat excavator. They also rented a small excavator that could be lowered into the stream channel and work under the Bailey Bridge. The approaches on the Bailey Bridge were ramped up 2' to give room for equipment to work under it. These approaches provided the maneuverability and long reaches needed to work from the road surface, minimizing the project footprint area.

In a single day the deck of the existing box culvert was removed intact using the two large excavators and the Bailey Bridge was installed adjacent to the now open box culvert. From that day until October 31st residents used the Bailey Bridge detour around the worksite. The walls and floor of the concrete box were pneumatically hammered into pieces and end hauled to a disposal area. In order to protect tree trunks during portions of the work, a series of guys were

used to pull tree boles back 1'-2' leaving room for the bridge to squeeze into the confined work space. In most jobs the trees would have been cut and removed to make room for a detour bridge. In order to protect all of the trees in the channel area, the demolition of the box culvert was done from the banks and the road and the Bailey Bridge was periodically disassembled and re-assembled some times several times a day.

The end result was a nearly completely natural stream crossing with minimal need for revegetation and near complete canopy closure on the final day of the project.

Removing culvert and deck (left and middle), and lowering a small excavator to work under the detour bridge to dig footing and the new stream channel and floodplain areas.

Channel Excavation and Footing Construction

Based on the geotechnical investigation (Taber Consulting), both the soil and rocky material found at the site are capable of supporting bridge footings without distress. Based on ConTech's engineering recommendations, footings were excavated 3 feet deep and approximately 4 feet wide. The footings assure structural stability for the concrete abutments. After each footing was excavated, a concrete truck either used a chute or a pump to fill the footing excavation. After each abutment was formed/framed, a concrete pump truck was used to pump directly into the forms. Due to the weight limitations of the detour bridge, it was not possible to use a chute to directly fill the forms from the truck. Each abutment was backfilled with a compacted mix of 3" minus and native rock while they cured for about 2 weeks. During this time in-stream work continued including excavation to form the new channel and set it at the desired gradient. The final rock ribbons were in place and the streambed was completed by October 26. The detour bridge was removed and the new precast ConSpan bridge and wing walls were lifted into place on October 29, 2011. The new bridge was mortared into place and the wing wall and abutment were backfilled and compacted.

The wing walls were protected by installing ½-ton to 1-ton rock-slope protection (RSP) 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 oil-absorbing boom, and fine-meshed block nets were removed on October 27 after the final streambed work was complete. The bridge approach paving will not be completed until 2012 contingent on TCDOT work scheduling. A temporary concrete k-rail barrier was installed to allow for safe passage over the bridge until TCDOT's work schedule will allow for installation of permanent guardrails.

Engineered Channel Construction

The design of the engineered channel is included as Attachment 1. The total length of stream channel treated was 50 feet consisting almost entirely of the section under and downstream of the bridge. Construction of the channel occurred in two phases. The existing box culvert was first entirely removed and debris end-hauled. The roughened channel was constructed after the removal of the old bridge and the extension of the temporary Bailey bridge detour to accommodate the width of the excavated section of creek. The newly poured abutments were then armored with 1-2 ton native rock at an approximate depth of 2 feet. The upstream/downstream rock ribbon weir designed to divide the channel between high and low flows was excavated to an approximate 3-foot width in order to accommodate 1-2 ton rock. The low flow channel walls were constructed with an approximate 1.5:1 grade in order to provide a defined channel.

The remaining roughened channel consists of three rock ribbon grade-control structures constructed with 1-2 ton rock, buried 2 layers deep and keyed together and into the banks. 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 using a Honda WH20 pump with a ¼ smooth bore nozzle. During jetting, turbid water was pumped from the lower end of the project and recirculated into the jetted material. A non-woven geo-fabric dam trapped fine sediment and constant pumping of the lower end of the project removed turbid water before it could re-enter the stream.

Excavating channel (left) and footings (middle) and water quality protections during jetting, which created the most turbid water conditions (right).

Wes Scribner, the Trinity County Department of Transportation engineer assigned to this project, conducted the majority of construction engineering and contract inspection throughout the project. 5C Program staff assisted with the channel engineering construction and inspection as needed, and conducted the water quality, fish exclusion, Best Management Practice and photo monitoring.

Bridge Placement

Once the streambed gradient was set and the footing forms removed, the Bailey Bridge was removed and the actual bridge structure was placed. To place the bridge a 100 ton crane was mobilized to the site the day before placement and the structures arrived the next morning. The entire project was completed in a matter of hours and the road re-opened.

Above Placing the ConSpan arches on the footings

Streambank Stabilization & Revegetation

On November 1st the site final erosion control and temporary reseeding effort was completed. 10 pounds of native grass (Blue Wild Rye: (Elymus glaucus), Meadow Barley: (Hordeum Brachyantherum), Beardless Wild Rye (Leymus Triticoides) was planted and mulched with native mulch/compost provided by TCDOT in October and November. Seed was purchased by the Trinity County Resource Conservation District (RCD) and was a locality mix. Seeded portions included sections of Conner Creek road north of the bridge that were disturbed during construction as well as all disturbed soil along Conner Creek, the riparian area and the staging area at the barrier site. Ten incense cedar trees will be planted in the riparian area this winter.

Organic compost (left) and native pine needle mulch (middle) were applied and water quality BMP's applied (right).


Above left concrete washout stations were required and riparian sediment fencing and silt waddles in place (right)

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 was performed. Photo monitoring during construction and post-project monitoring activities has also occurred (Attachment 2).

Longitudinal Profile/Thalweg Monitoring: The pre-project longitudinal and thalweg surveys utilized for designing the bridge and channel were completed in 2006 by SHN Consulting 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). Four cross-sections were also measured. A post-project profile will be taken again following project construction in December 2011. The third profile will be taken in April/May 2012, and again after the second and third winters (April/May 2013 and 2014). 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 Program Migration Barrier Inventory data collected prior to the project. The culverts were assessed as complete barriers to juvenile coho and steelhead during the Trinity County barrier inventory. The Conner Creek Road barrier was a complete barrier for adults in most flows and the Red Hill Road crossing is a partial barrier to adults.

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): **2.5 miles of adult habitat and 1,000' of juvenile habitat. In 2012 the upstream project will open 2.3 miles of juvenile habitat.**
B. Instream habitat structures to be installed (number): **0**
C. Fencing length to be installed/repaired (distance in feet): **0**
D. Road length treated/assessed (distance in miles): **0**
E. Stream crossings treated (number): **1**
F. Sediment prevented from entering the stream (volume in cubic yards): **250 cubic yards**

G. Trees planted (number): **10**
H. Area planted/preserved/assessed (area in acres): **0.25 acres total (area reseeded along riparian zone and the staging area**
I. Public meetings (number): **0. Public meets were not required, however all neighbors were sent a public notice as part of the NEPA process. Two newspaper articles and above-the-fold front page photo were published on September 21, 2011 and November 16th in 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**
M. spoils volumes:

Measure Category	**Measure**
Stream crossings treated to improve fish passage (number)	1
Stream length opened for fish passage by improving stream crossings (miles)	2.5 miles
Bridges installed or improved (number)	1
Rocked fords replaced (number)	N/A
Road crossings removed (number)	N/A
Total length of stream made accessible by removing blockages (miles)	2.5 miles
Total blockages/impediments/barriers removed/altered (number)	1
Overall stream length treated (miles, count one side of stream only)	.011
Length of aquatic habitat disturbed (feet)	60
Area (footprint) of instream features installed within bankfull channel (square feet)	600 ft^2

1. An annual report will be submitted each year, no later than December 1, detailing the work completed that field season. The annual report will include, but not necessarily be limited to the following where applicable:
    - Implementation start and end dates; September 1, 2011 – November 1, 2011
    - Percentage of the project completed to date; 50%
    - Dewatering and fish relocation data on DFG data sheet (to be provided by the DFG Grant manager upon request); fish relocation data included with report
    - Projected start and end dates for work to be implemented the following season. July to November 2012

List of Attachments

Attachment 1 – Project Plans

Attachment 2 – Fish Relocation Report