

FINAL REPORT TOMKI ROAD PROTOTYPE VENTED LOW WATER CROSSING

JANUARY 25, 2010

WATERSHED
TOMKI CREEK HYDROLOGIC SUB AREA OF THE UPPER MAIN EEL RIVER HYDROLOGIC AREA

PROJECT TYPE
HABITAT AND SPECIES PROTECTION & WATER QUALITY IMPROVEMENT

FUNDING
PROJECT FUNDED BY THE AMERICAN RECOVERY AND REINVESTMENT ACT
THROUGH THE STATE WATER RESOURCES CONTROL BOARD
CLEAN WATER STATE REVOLVING FUND

STATE REVOLVING FUND PROJECT NO. C-06-6994-110
AGREEMENT NO. 08-305-550-0

ARRA FINANCING: \$149,450
COUNTY MATCH: \$123,016



PREPARED BY

ALEX STRAESSLE
MENDOCINO COUNTY DEPARTMENT OF TRANSPORTATION

1-25-2010



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Executive Summary

Tomki Road is a gravel county road connecting Redwood Valley to Little Lake Valley and is adjacent to Cave Creek. This road has nine stream crossing fords through Cave Creek and tributary side creeks, which are impassable during parts of some winters. These ford crossings generate significant turbidity in the creek, lead to the introduction of oils and grease into the system and may result in direct fish mortality from vehicles. According to nearby landowners, nearly every year vehicles are stranded in the creek when drivers attempt to cross the creek and become stuck mid-stream. Biologists from the National Marine Fisheries Service (NMFS), and California Department of Fish and Game (CDFG) have expressed concern over the fisheries impact of this road and Regional Water Quality Control Board (RWQCB) staff have expressed concern over the turbidity and sedimentation issue.

In order to address impacts to Cave Creek as a result of Tomki Road, the Department has;

- 1) prepared a feasibility study to evaluate options,
- 2) constructed a prototype vented low water crossing at the most southerly crossing that may be used at the other crossing locations if proved successful.

The Tomki Road Prototype Vented Low Water Crossing started out as part of a larger project that also included a Feasibility Study. The project was initially funded under the 2005-2006 Consolidated Grants Program (Prop. 40 – Integrated Watershed Management Plan Implementation) through the State Water Resources Control Board. The Feasibility Study and some preliminary low water crossing work was completed under the Prop. 40 funds (450K project with 25% local Match). Due to the State budget crisis, a stop work order was issued and the project later funded under the American Recovery and Reinvestment Act through the CWSRF in the amount of the remaining balance from the original funding source (ARRA Financing: \$149,450, County Match: \$123,016, TOTAL: \$272,466).

The vented low water crossing replaced the unimproved stream crossing at MP 6.17 with a 20' wide x 5' high x 60' long pre-manufactured bottomless concrete arch structure designed to allow anadromous fish passage at all life stages and pass stream bed material using natural streambed geomorphology. The proposed structure was designed to accommodate the 10-year, or 10% probability storm event without overtopping, and pass the 100-year storm event, 1% probability of occurrence, without structural damage.

The Tomki Road Prototype Vented Low Water Crossing was built in-house by the Mendocino County Department of Transportation Road Department.

Problem Statement and Relevant Issues

The below chronology of events best explains the problem and relevant issues.

June 18, 2001- A field meeting initiated by Forestlands Inc. & Wildlife Inventory Systems was held to address concerns of water pollution and fisheries impacts to Cave Creek as a result of the use of Tomki Road. Those present were; Wildlife

Inventory Systems, Forestlands Inc., Mendocino County Department of Transportation, Mendocino County Water Agency, North Coast Regional Water Quality Control Board, and California Department of Fish and Game. It was at this meeting that two of the major landowners tentatively offered an existing alternative route on there property along the ridge past the first low water crossing.

August 31, 2001- Letter received by Department of Transportation from North Coast Regional Water Quality Control Board stating that impacts to cold water fish habitat are in violation of Water Quality Control Plan for the North Coast and pursuant to Section 13267(b) of the California Water Code the Department shall submit a technical report that includes a plan correct the sediment pollution associated with Tomki Road. The Department of Transportation has been submitting biannual progress reports to the Regional Water Board since that time.

March 13, 2002- The Department of Transportation held a well-attended meeting with landowners to gauge support for various options. The landowners expressed support for significant changes to the existing road condition. The options discussed included: 1) total road relocation to a ridge position, 2) partial road relocation to avoid some crossings, 3) road abandonment by the County, 4) seasonal closure of the road, 5) installing bridges, 6) upgrading the crossings with alternative designs such as vented or un-vented low water crossings.

February 12, 2003- An on-site meeting was held with the 5 Counties fisheries biologist, Mendocino County Department of Transportation, North Coast Regional Water Quality Control Board and California Department of Fish and Game. The purpose of the field meeting was to discuss the ongoing erosion and sediment issues, discuss the short-term and long-term options to correct the problems, and examine the nine crossings. As a result of this meeting a report was prepared that addressed the impacts as pertains to fish habitat and life cycle requirements, and discussed both short term and long term actions with recommendations.

February 25, 2003- Letter received by Department of Transportation from NOAA Fisheries Enforcement Division recommending that the Department of Transportation continues to cooperate with CDFG and RWQCB, and consider options to current road use as discussed during a recent meeting with both agencies.

Project Goals

The primary project goal is intended to reduce fish mortality from being directly run over and improve in-stream habitat conditions by reducing turbidity, sedimentation and vehicle fluid deposits caused by vehicles passing directly through the stream.

The crossing will also be monitored as part of previous biannual reporting requirements established by the NCRWQCB. The Effectiveness Monitoring and Reporting Program to be conducted bi-annually (Fall and Spring) in order to evaluate the following:

- a. effectiveness of crossing design,
- b. changes in crossing conditions,
- c. changes in road surface conditions,
- d. changes in stream conditions,
- e. required repairs to crossing,
- f. any additional pertinent information.

Should the prototype prove successful it could be proposed as a long-term solution to improve water quality for the remaining eight crossings on the present road alignment.

Project Description

Project Description - Project involved the construction of a vented low water crossing at the southern most crossing of nine crossings on Tomki Road. The vented low water crossing replaced the unimproved stream crossing at MP 6.17 with a 20' wide x 5' high x 60' long pre-manufactured bottomless concrete arch structure designed to allow anadromous fish passage at all life stages and pass stream bed material using natural streambed geomorphology. The proposed structure was designed to accommodate the 10-year, or 10% probability storm event without overtopping, and pass the 100-year storm event, 1% probability of occurrence, without structural damage.

Low Water Crossing Construction - The Tomki Road Prototype Vented Low Water Crossing was built in-house by the Mendocino County Department of Transportation Road Department.

Construction involved excavation for two strip footings located at the approximate limits of the bankfull channel and set below the anticipated scour depth. Once footings cured, the structure components were lowered into place with a crane. Once set, water proofed and grouted, the structure was backfilled with material from footing excavation and import material to the desired finished road grade. The structure embankments and roadway was encapsulated with concrete to prevent erosion during high flow events. The stream channel within the immediate area that was severely impacted by vehicular traffic was reconfigured so as to conform to the anticipated stable channel grade and bank full dimensions. Upstream and down stream segments were revegetated to help improve stream habitat conditions and provide for bank stability. The existing road alignment was slightly realigned for approximately 200 feet in order to reduce skew for hydraulic considerations, allow for an elevated road elevation for structural and hydraulic considerations, and meet minimum road width and turning radii requirements. No site dewatering and sensitive species relocation was needed because the stream was dry prior to initiation of construction

Percent schedule elapsed (total project)

First day of construction was July 20, 2009. The project was buttoned up and completed on December 9, 2009.

Initial construction estimate was 30 days assuming contract labor. Project was built in house with the County Road Department. Due to available equipment and man power, full mobilization of equipment and crews were not available to complete construction within the initially estimated time frame assuming contract labor. Also, delivery of the structure was postponed by 17 working days from August 17th to September 9th due to; steel back orders, and product vendor requiring 1/3 deposit up front before fabricating the structure. (working day basis, 85 elapsed working days) (55 actual working days)

Change orders and amounts, work descriptions, changes in contract amounts and schedule

None- project was not put out to contract.

Problems encountered, proposed resolution, schedule for resolution, status of previous problems and resolutions

Project was being built in house with the County Road Department. Due to the other 1,019 road miles that needed to be maintained, available man power and equipment, full crews were not available to complete construction within the initially estimated time frame assuming contract labor.

Delivery of the structure was postponed by 17 working days from August 17th to September 9th due to; steel back orders, and product vendor requiring 1/3 deposit up front before fabricating the structure. There was nothing that could be done about this except extension of the anticipated completion date.

The construction estimate assumed a cut and fill road section for a section of the roadway realignment. Due to logistics of situating the crane to unload and place the structure elements, this road section needed to be removed to accommodate the crane and unloading the structure sections while allowing the road to be kept open to pass traffic. The only resolution was to extend the allowable construction time and import extra material for building the road back up.

The County Road Department had a source of material to build the road back up. Unfortunately, the material is moisture sensitive and inclement weather limited its use. To remedy the situation the Department has resorted to purchasing class II base rock to complete building to road. An unanticipated expense that could not be avoided in an effort to complete the project this year.

Number of jobs created or preserved due to project

<u>CWSRF ARRA FTE Report No.</u>	<u>Period</u>	<u>FTE</u>
1- submitted September 17, 2009	12/18/2008 – 9/30/09	0.8
1- submitted September 17, 2009	7/1/09 – 9/30/09	2.3
2 - submitted December 8, 2009	10/1/09 – 12/31/09	1.7

Low Water Crossing Funding - The Tomki Road Prototype Vented Low Water Crossing started out as part of a larger project that also included a Feasibility Study. The project was initially funded under the 2005-2006 Consolidated Grants Program (Prop. 40 – Integrated Watershed Management Plan Implementation) through the State Water Resources Control Board. The Feasibility Study and some preliminary low water crossing work was completed under the Prop. 40 funds (450K project with 25% local Match). Due to the State budget crisis, a stop work order was issued and the project later funded under the American Recovery and Reinvestment Act through the CWSRF in the amount of the remaining balance from the original funding source (ARRA Financing: \$149,450, County Match: \$123,016, TOTAL: \$272,466).

For all practical purposes, it may be assumed that Proposition 40 time period covered the Feasibility Study and the ARRA time period funded the Vented Low Water Crossing, there is of course some overlap between the two.

Cost of the Low Water Crossing is estimated at some \$350,000. This number includes all appurtenant tasks; planning, engineering & design, environmental studies and reports, permits, materials, labor, and project funding reporting requirements.

Pollutant Load Reductions - No numeric pollutant load reductions were allocated to this project.

An Effectiveness Monitoring and Reporting Program was required under the Proposition 40 grant conditions to supplement preexisting reporting requirements for a period of three years after project completion. Project monitoring to be conducted bi-annually (Fall and Spring) is more qualitative in nature in order to evaluate the following:

- g. effectiveness of crossing design,
- h. changes in crossing conditions,
- i. changes in road surface conditions,
- j. changes in stream conditions,
- k. required repairs to crossing,
- l. any additional pertinent information.

A key component to this monitoring program will be a qualitative assessment of stream habitat conditions utilizing a variation of the California Stream Bioassessment Procedure by

the California Department of Fish and Game Aquatic Pollution Control Laboratory with an emphasis on stream channel and stream substrate conditions.

Public Outreach

Public outreach for the project included the following activities.

On 13 March 2002 the Department of Transportation held a well-attended meeting with landowners to gauge support for various options on how to remedy the situation between Tomki Road and Cave Creek. The landowners expressed support for significant changes to the existing road condition. The options discussed included: 1) total road relocation to a ridge position, 2) partial road relocation to avoid some crossings, 3) road abandonment by the County, 4) seasonal closure of the road, 5) installing bridges, 6) upgrading the crossings with alternative designs such as vented or un-vented low water crossings.

Under the 2005-2006 Consolidated Grants Program (Proposition 40 – Integrated Watershed Management Plan Implementation) through the State Water Resources Control Board that got the project off the ground and started, a Feasibility Study was prepared. As part of the Feasibility Study local landowners were sent surveys to document support and concerns for options for Tomki Road and were kept informed of the Low Water Crossing Project.

The public was also kept abreast of the project and invited to comment through the CEQA process which included an Initial Study towards a Mitigated Negative Declaration.

Conclusions

Project Evaluation & Effectiveness (Results of PAEP) - The PAEP outlines three Project goals and targets to achieve those goals. Project goals and targets are as follows:

Project Goal	Targets	Status
1) Develop a Feasibility Study that identifies options for relocating, either wholly or in part, Tomki Road away from Cave Creek.	Final Feasibility Study with ranking matrix of all options and recommended alternative.	Feasibility Study Completed.
2) Design a prototype vented low water crossing that may be used for other low water crossings if evaluated to be successful.	Permit approval and acceptance of project by regulatory agencies.	Project designed, permitted and constructed.
3) Develop and Effectiveness Monitoring and Reporting Program to evaluate the prototype vented low	1) Agency approval of Effectiveness Monitoring	1) Effectiveness Monitoring Program, approved by NCRWQCB

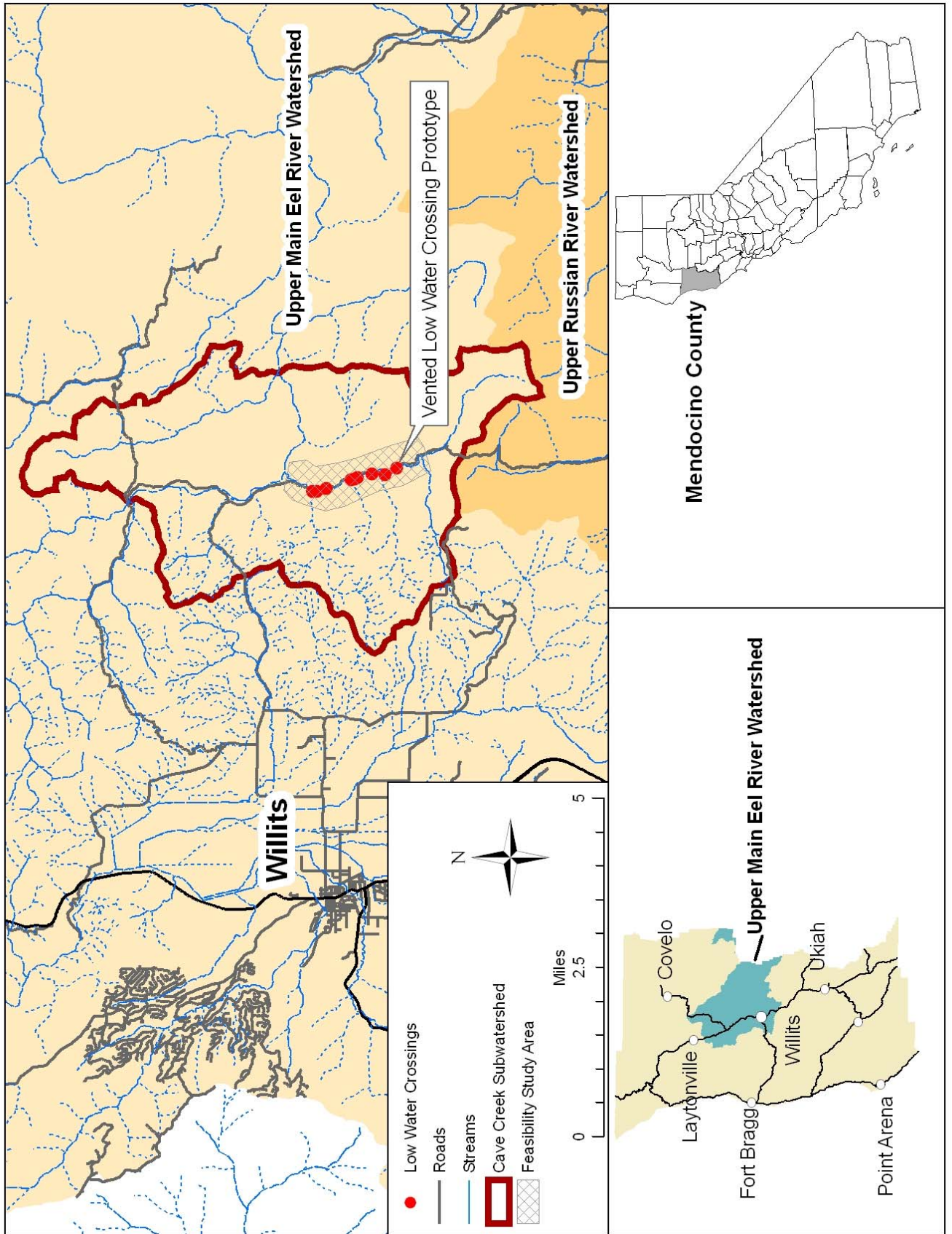
water crossing then conduct a bi-annual volunteer monitoring program for three years after construction.	Program, 2) Bi-annual progress reporting requirements completed.**	2) Not yet started- intended to start after project is completed and continue for a period of three years after project completion.
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** Development of the Effectiveness Monitoring and Reporting Program was required under the Proposition 40 grant conditions to supplement preexisting reporting requirements for a period of three years after project completion.

Next Steps - The next key steps are;

- 1) Implement effectiveness Monitoring and Reporting Program as a part of required biannual reporting to RWQCB.
- 2) Secure grant funding towards addressing the other eight unimproved stream crossing on Tomki Road.

APPENDIX



GRANT SUMMARY FORM

Completed Grant Summaries are made available to the public on the State Water Resources Control Board's (SWRCB) website at <http://www.waterboards.ca.gov/funding/grantinfo.html>

Use the tab and arrow keys to move through the form. If field is not applicable, please put N/A in field.

Date filled out: January 20, 2010

Grant Information: Please use complete phrases/sentences. Fields will expand as you type.	
1. Grant Agreement Number: 08-305-550-0	
2. Project Title: Tomki Road Prototype Vented Low Water Crossing	
3. Project Purpose - Problem Being Addressed: Project addresses increases in vehicle pollution, sedimentation, turbidity and fish mortality by constructing a prototype vented low water crossing. This project is also part of a larger effort that includes a Feasibility Study to investigate options for relocating Tomki Road, either wholly or in part, from Cave Creek. It is anticipated, that if proved successful, this low water crossing will prove to be a viable low cost alternative to the other eight unimproved crossings on Cave Creek.	
4. Project Goals	
a. Short-term Goals: Construction of a prototype vented low water crossing as a potential alternative to the remaining low water crossings.	
b. Long-term Goals: Improvements in water quality such as reduced vehicle pollution, reduced siltation of fish habitat, reduced turbidity and reduced fish mortality as a result of vehicle use on Tomki Road/Cave Creek.	
5. Project Location: (lat/longs, watershed, etc.) Cave Creek tributary to Tomki Creek tributary to Eel River, Lat 39.41667 degrees N , Long 123.23333 degrees W, Foster Mountain 7.5 Minute USGS Quadrangle, Tomki Creek Hydrologic Sub Area of the Upper Main Eel River Hydrologic Area	
a. Physical Size of Project: (miles, acres, sq. ft., etc.) 1/4 acre	
b. Counties Included in the Project: Mendocino	
c. Legislative Districts: (Assembly and Senate) Assembly District 1, Senate District 2	
6. Which SWRCB program is funding this grant? Please "X" box that applies.	
<div style="display: flex; justify-content: space-between; align-items: center;"> <input type="checkbox"/> Prop 13 <input type="checkbox"/> Prop 40 <input type="checkbox"/> Prop 50 <input type="checkbox"/> EPA 319(h) <input checked="" type="checkbox"/> Other </div>	
Grant Contact: Refers to Grant Project Director.	
Name: Alex Straessle	Job Title: Engineer II
Organization: Mendocino County Department of Transportation	Webpage Address: http://www.co.mendocino.ca.us/
Address: 340 Lake Mendocino Drive, Ukiah CA, 95482-9432	

Phone: (707) 467-2542	Fax: (707) 463-5474
E-mail: straessa@co.mendocino.ca.us	
Grant Time Frame: Refers to the implementation period of the grant.	
From: July 15, 2009	To: December 9, 2009
Project Partner Information: Name all agencies/groups involved with project. Mendocino County Water Agency, 5 Counties Salmonid Conservation Program, State Water Resources Control Board, North Coast Regional Water Quality Control Board.	
Nutrient and Sediment Load Reduction Projection: (If applicable) NA	

Please provide an electronic copy to your Grant Manager and Program Analyst for the State Water Board web site posting. All fields must be completed. Incomplete forms will be returned.

List of Deliverables

DESCRIPTION	CRITICAL DUE DATE	ESTIMATED DUE DATE	% OF WORK COMPLETED	DATE SUBMITTED
PLANS AND COMPLIANCE REQUIREMENTS				
GPS information for Project site and monitoring locations		Completed	100%	- - -
Project Assessment and Evaluation Plan (PAEP)		Completed	100%	- - -
Non Point Source Pollution Reduction Follow-up Survey Form		Annually by 12/15	100%	Jan. 11, 2010
Monitoring Plan		If Needed	100%	- - -
Monitoring Reports		Quarterly	100%	When needed
Quality Assurance Project Plan (QAPP)		Completed	100%	- - -
Copy of Final CEQA/NEPA Documentation		Completed	100%	- - -
Land Owner Agreement		As needed	100%	July 15, 2009
Applicable Permits		As needed	100%	- - -
DESIGN AND CONSTRUCTION				
Easement Documentation		July 2009	100%	Nov. 12, 2009
Final Design Drawings		July 2009	100%	Nov. 12, 2009
WPCP or SWPPP		July 2009	100%	July 9, 2009
As-built drawings		Dec. 2009	100%	Jan. 11, 2010
Effectiveness Monitoring and Reporting Program		Bi-annually (Apr 15 th & Oct. 15 th)	100%	- - -
INVOICING		Quarterly		July 15, 2009 Jan. 11, 2010
REPORTS				
Progress Reports by the twentieth (20 th) of the month following the end of the calendar quarter (March, June, September, and December)		Quarterly	100%	July 15, 2009 Nov. 12, 2009 Jan. 11, 2010
DBE utilization (State Water Board Form DBE UR334)	Semiannually within ten (10) calendar days following April 1 and Oct 1.	Oct. 30, 2009 April 30, 2009 Oct. 30, 2010	100%	Oct. 19, 2009 Jan. 11, 2010
CWSRF / ARRA Jobs Created or Retained	Sept. 17, 2009 Dec. 17, 2009 March 17, 2010 June 17, 2010 Sept. 17, 2010	Sept. 17, 2009 Dec. 17, 2009 March 17, 2010 June 17, 2010 Sept. 17, 2010	100%	Sept. 17, 2009 Dec. 8, 2009
Natural Resource Projects Inventory (NRPI) Project Survey Form	Before final invoice		100%	Jan. 11, 2010
Draft Project Certification	July 1, 2010		100%	Jan. 21, 2010
Final Project Certification	August 1, 2010		100%	Jan. 25, 2010

Project Assessment and Evaluation Plan

Tomki Road Feasibility Study and Prototype Vented Low Water Crossing

I. Project Summary

A. Funding Program:

This Project is supported by Proposition 40 Integrated Watershed Management Plan (IWMP) Implementation Grant Program and local matching funds.

B. Project Description:

Tomki Road is a gravel County road between Redwood Valley and Little Lake Valley, that parallels Cave Creek, a tributary to Tomki Creek in the Upper Eel River watershed. There are nine ford crossings on Cave Creek that generate significant sediment and turbidity from traffic using the existing low water crossings. There are also hazards to stream wildlife from the crushing weight of tires, as well as from vehicular oils and greases. This project proposes to conduct a feasibility study that will explore the best, most feasible methods for the County to alleviate the erosion and sediment problems caused by the nine low water crossings. A prototype vented low water crossing is also proposed to be constructed at a critical control point that will provide direct water quality benefits and be a demonstration site for consideration in feasibility study alternatives if proved to be successful. A volunteer Effectiveness Monitoring and Reporting Program will be conducted bi-annually for three years in order to evaluate the prototype vented low water crossing for consideration in feasibility study alternatives if proved to be successful.

C. Problem Statement

i. Identify or characterize baseline data

According to nearby landowners, nearly every year vehicles are stranded in the creek when drivers attempt to cross the creek and become stuck mid-stream. Biologists from the National Marine Fisheries Service (NMFS), and California Department of Fish and Game have expressed concern over the fisheries impact of this road and Regional Water Quality Control Board (RWQCB) staff have expressed concern over the turbidity and sedimentation issue.

During the spring of 2003, The Five Counties Salmon Restoration effort funded, through a grant from the California Department of Fish and Game, employed Ross Taylor, a fisheries biologist, to assess impacts to salmonid habitat and management options to reduce impacts as pertains to the biology and condition of Cave Creek and the effects of Tomki Road as part of the County Maintained Road System which is the responsibility of the Mendocino County department of Transportation - MCDOT. This report limits itself to water quality issues related to the interaction of the county road and the creek. Other issues discussed in Taylor's "Draft

Assessment” related to criminal actives, off road trespass, etc, are not dealt with here, but included in Taylor’s “Draft Assessment”.

Carcass surveys were conducted in 1984-1997 by Jones and 1998-2000 by Harris. Both carcasses and live Chinook and steelhead were observed each year and appreciable silt and sediment generated by the road was noted by Jones (California Coastal Salmon and Steelhead, Current Steam Habitat Distribution Table, Jones 2000).

ii. Identify pollution source categories

Pollutant source categories associated with Tomki Road on Cave Creek are ; increased turbidity and siltation of spawning gravells as a result of low water crossing use, the introduction of oils and grease into the system from vehicles, illegal dumping and recreational OHV use. Other pertinent issues are increases in fish mortality from fish and redds being run over.

iii. Identify and describe current restoration activities; BMPs; load reduction activities; prevention activities

None, the purpose of this grant is to determine the most feasible restoration activities by either complete or partial road relocation to disconnect Tomki Road from Cave Creek and construct a prototype vented low water crossing that may be used for other stream crossings if proved successful.

iv. Describe the manner in which the proposed best management practices or management measures will be implemented

Best Management Practices and management measures will include strong consideration to road and stream crossing design guidance as outlined in; “*A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds*” from the 5 Counties Salmonid Conservation Program, “*5C Road Design Guidelines for Low Impact to Hydrology*” from the 5 Counties Salmonid Conservation Program, “*Manual of Forest and Ranch Roads*” by Pacific Watershed Associates, “*Guidelines for Salmonid Passage at Stream Crossings*” by NOAA Fisheries, “*Culvert Criteria for Fish Passage*” by the California Department of Fish and Game, and “*Designing Watercourse Crossings for Passage of 100-year Flood Flows, Wood, and Sediment*” by the California Department of Forestry and Fire Protection.

v. Summarize how the effectiveness of the proposed practices or measures in preventing or reducing pollution will be determined.

As part of the prototype vented low water crossing the Department will develop and implement a volunteer Effectiveness Monitoring and Reporting Program bi-annually for three years after construction of the crossing to evaluate the following:

- a. effectiveness of crossing design,
- b. changes in crossing conditions,

- c. changes in road surface conditions,
- d. changes in stream conditions,
- e. required repairs to crossing,
- f. any additional pertinent information.

vi. Determine “changes in flow pattern” in affected water bodies.

Development of the Feasibility Study is not intended to measure any changes in flow patterns. The prototype vented low water crossing will be monitored as part of a volunteer Effectiveness Monitoring and Reporting Program for three years after construction of the crossing. As part of this volunteer monitoring program, instream conditions both upstream and downstream of the structure will be evaluated for hydrologic and geomorphologic changes to the immediate stream habitat as pertains to fish spawning and rearing requirements.

vii. Determine economic benefits of implementing the project.

Anadromous salmonids will benefit from the implementation of the treatment(s) selected as a result from the feasibility study through elimination of excessive turbidity, sedimentation, oil-based pollutants, and mortality from vehicular traffic in Cave Creek.

D. Project Activities or Tasks:

TASK 1: Feasibility Study

1.1 Prepare a Feasibility Study to evaluate and quantify options for eliminating the impact of nine (9) stream crossing fords on approximately two (2) miles of County Road. The study and/or associated studies will contain the following information:

- a. Aerial topographic map with 5 foot contour intervals,
- b. Soils and geologic assessment,
- c. Preliminary biological assessment(s),
- d. Preliminary designs of options,
- e. Estimated sediment delivery rates of all options,
- f. Estimated reductions in vehicle pollution to Cave Creek from all options,
- g. Analysis of environmental studies to compare impacts of various options,
- h. Ranking matrix for all options,
- i. Detailed cost estimates for all options,
- j. Recommended alternative based upon above information in the Feasibility Study.

1.2 Submit the draft Feasibility Study Report to Grant Manager for review and comment.

1.3 Finalize the Feasibility Study Report incorporating the items below:

- 1.2.1 Results of the consultant review and selection process,
- 1.2.2 Scope of work for consultant agreements,
- 1.2.3. Consultant products upon review of 85% completion,

- 1.2.4 Draft Feasibility Study
- 1.2.5 Final Feasibility Study

1.4 Submit Final Feasibility Study Report to Grant Manager.

TASK 2: Prototype Low Water Crossing

- 2.1 Finalize design for a Prototype Vented Low Water Crossing to be installed at the existing wet ford located at marker six point seven (6.7) on Tomki Road.
- 2.2 Hire biological consultant to perform the necessary site assessments and proposed mitigation measured for the Prototype crossing.
- 2.3 Complete preliminary design.
- 2.4 Obtain easements to construct the prototype low water crossing.
- 2.5 Complete final design and construction planning from input through the CEQA, permit, and environmental clearance process.
- 2.6 Determine if contaminated soil remediation is necessary.
 - 2.6.1 Address concerns of contaminated soil, potential soil remediation, and further instream contamination as a result thereof for:
 - a. Area less than one (1) acre; develop a Water Pollution Control Plan (WPCP) following the format as required by California Department of Transportation (CDOT).
 - b. Area disturbed one acre or larger; develop a Stormwater Pollution Prevention Plan (SWPPP) incorporating SWPPP Sections five hundred point three point three (500.3.3) and six hundred (600).
 - 2.6.2 Submit the WCPC or SWPPP to the Grant Manager prior to construction.
- 2.7 De-water site, relocate sensitive species and install clean water bypass (if necessary).
- 2.8 Excavate for footing, prepare footing sub-grade, build footing forms, and pour footing structure.
- 2.9 Deliver and Install pre-manufactured concrete arch structure per design plans.
- 2.10 Track design changes in the form of as built drawings. Submit As Built Drawings.

TASK 3: Develop Post Installation Monitoring Program

- 3.1 Develop an Effectiveness Monitoring and Reporting Program to be conducted bi-annually (Fall and Spring) in order to evaluate the following:
 - a. effectiveness of crossing design,
 - b. changes in crossing conditions,
 - c. changes in road surface conditions,
 - d. changes in stream conditions,
 - e. required repairs to crossing,
 - f. any additional pertinent information.

- 3.2 Sign commitment letter agreeing to perform volunteer Effectiveness Monitoring and Reporting Program in Item 3.1 for three years beyond contract completion.

E. Category of Project Activities or Tasks:

All project activities and tasks fall into the Planning, Research, Monitoring and Assessment Category.

II. Project Goals & Desired Outcomes

The goals of this project are:

- 1) Develop a Feasibility Study that identifies options for relocating, either entirely or in part, Tomki Road away from Cave Creek.
- 2) Design a prototype vented low water crossing that may be used for other low water crossings if evaluated to be successful.
- 3) Develop and Effectiveness Monitoring and Reporting Program to evaluate the prototype vented low water crossing then conduct a bi-annual volunteer monitoring program for three years after construction.

The desired outcomes of this project are:

- 1) Identification of the most feasible alternative for road relocation in consideration of; sediment load reductions, habitat protection and cost. And that may also be used in the future to secure further funding sources for final design and construction of the most feasible alternative.
- 2) Construction of a prototype vented low water crossing that will prove to be a viable alternative for road relocation options.

III. Project Performance Measures Tables

Please see attached Table 1 on next page.

Table 1					
Tomki Road Feasibility Study and Prototype Vented Low Water Crossing					
Project Goals	Baseline Measurements and Information	Output Indicators	Outcome indicators	Measurement Tools and Methods	Targets
1) Develop a Feasibility Study that identifies options for relocating, either wholly or in part, Tomki Road away from Cave Creek.	1) aerial photography, 2) topography, 3) NRCS soils data, 4) Division of Mines and Geology Landslide Inventory Maps, 5) Timber Harvest Plan records from California Dept of Forestry, 6) vegetation community type mapping, 7) preliminary biological assessments, 8) preliminary road alignments	1) Aerial topographic map with 5 foot contour intervals and overlay information as identified in 2 through 8 in shapefile and dwg formats and in hardcopy, 2) Feasibility Study at 85% completion, 3) Draft Feasibility Study	Ranking matrix of all options and recommended alternative.	Ranking Matrix of options.	Final Feasibility Study with ranking matrix of all options and recommended alternative.
2) Design a prototype vented low water crossing that may be used for other low water crossings if evaluated to be successful.	1) site topographic information, 2) hydrologic information, 3) channel substrate and geomorphologic information, 4) species specific swimming performance data, 5) assessment for contaminated soils	1) biological assessment and proposed mitigation measures for low water crossing, 2) preliminary designs, 3) obtain construction easements, 4) complete the CEQA, permit and environmental clearance process, 5) final design	Low water crossing that eliminates and/or significantly reduces increases in turbidity and siltation as a result of use and allows unimpaired fish passage at all life stages	NOAA Fisheries “ <i>Guidelines for Salmonid Passage at Stream Crossings</i> ”, California Department of Fish and Game “ <i>Culvert Criteria for Fish Passage</i> ”	Permit approval and acceptance of project by regulatory agencies.
3) Develop and Effectiveness Monitoring and Reporting Program to evaluate the prototype vented low water crossing then conduct a bi-annual volunteer monitoring program for three years after construction.	As built drawings and channel topography and substrate information.	1) Draft Effectiveness Monitoring and Reporting Program, 2) letter of commitment to perform volunteer monitoring program for three year period after construction of the prototype low water crossing.	1) effectiveness of crossing design, 2) changes in crossing conditions, 3) changes in road surface conditions, 4) changes in stream conditions, 5) required repairs to crossing, 6) any additional pertinent information.	1) A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds, (http://www.5counties.org/Projects/FinalGeneralProjectPages/RoadsManual800.htm) 2) California Stream Bioassessment Protocols for Physical Habitat Conditions (slightly modified to suit project goals). (http://www.dfg.ca.gov/cabw/csbp_2003.pdf)	1) Agency approval of Effectiveness Monitoring Program, 2) Bi-annual progress reporting requirements completed.

Pre-project Photos



Looking down-stream to proposed structure to be located just beyond rock on right bank.



Looking up-stream from where the structure will be located.



Looking up-stream from the down-stream portion of the crossing.



October 17, 2007.



First crossing approach going north.



First crossing approach going south.

Construction Photos



Strip footings are in and getting ready to place select streambed strata mix.



A portion of the select streambed strata mix.



09 08 2009 15:12

Select streambed strata placement, fines portion prior to jetting in.



09 09 2009 14:14

Final streambed strata prior to establishment of low flow channel.



09 10 2009 09:57

Placing the first concrete arch element.



09 14 2009 10:35

Structure set in place.



Backfilling the structure.



Structure backfill and roadway realignment.



Down stream- live willow staking with subsurface perforated pipe for irrigation.



Up stream- brush layering in progress.



Brush layering completed.



Looking up stream from the down stream end.



Looking up stream from the structure.



Looking towards the up stream direction.



Looking down stream from the structure.



Up stream end looking down stream.

Post-construction Photos

