



FOR DEPARTMENT USE ONLY

Date Received	Amount Received	Amount Due	Date Complete	Notification No.
	\$	\$		
Assigned to:				

NOTIFICATION OF LAKE OR STREAMBED ALTERATION

Complete EACH field, unless otherwise indicated, following the [instructions](#) and submit ALL required enclosures, attachments, and fee(s) to the [CDFW regional office](#) that serves the area where the project will occur. Attach additional pages to notification, if necessary.

1. APPLICANT PROPOSING PROJECT

Name	Chris Collins
Business/Agency	County of Mendocino, Dept of Transportation
Mailing Address	340 Lake Mendocino Drive
City, State, Zip	Ukiah, California, 95482
Phone Number	(707) 234-2818
Email	collinsch@mendocinocounty.org

2. CONTACT PERSON (Complete only if different from applicant.)

Name	Kevin Sevier
Business/Agency	Gallaway Enterprises
Mailing Address	117 Meyers Sreet, Suite 120
City, State, Zip	Chico, California, 95928
Phone Number	(530) 332-9909
Email	kevin@gallawayenterprises.com

While an applicant is legally responsible for complying with Fish and Game Code section 1602 et seq., an applicant may designate and authorize an agent (e.g., lawyer, consultant, or other individual) to act as a Designated Representative. The Designated Representative is authorized to sign the notification and any agreement on behalf of the Applicant.

Do you authorize the Contact Person above to represent you as your Authorized Designated Representative?

☒ Yes, I authorize.

☐ No, I do not authorize.

3. PROPERTY OWNER (Complete only if different from applicant)

Please refer to the attached supplemental information for a list of property owners and associated APN's.

Name	
Mailing Address	
City, State, Zip	
Phone Number	
Email	



4. PROJECT NAME AND AGREEMENT TERM

A. Project Name	Robinson Creek Bridge Replacement on Lambert Lane		
B. Agreement Term Requested	☒ Regular (5 years or less) ☐ Long-term (greater than 5 years)		
C. Project Term	Beginning (year)	2022	Ending (year) 2026
D. Seasonal Work Period			
Season(s)*	Start Date (month/day)	End Date (month/day)	E. Number of Work Days
1	June 15	October 15	80
2	June 15	October 15	80
3	June 15	October 15	80
4	June 15	October 15	80
5	June 15	October 15	80

* Continue on additional page(s) if necessary

5. AGREEMENT TYPE

Check the applicable box. If boxes B – F are checked, complete the specified attachment .	
A.	Standard (Most construction projects, excluding the categories listed below) – Effective September 1, 2020, notification for Standard Agreements shall be submitted through the EPIMS Permitting Portal.
B.	☐ Gravel/Sand/Rock Extraction (Attachment A) Mine I.D. Number: _____
C.	☐ Timber Harvesting (Attachment B) THP Number: _____
D.	Water Diversion/Extraction/Impoundment (Attachment C) – Attachment no longer available. Notification shall be submitted through the EPIMS Permitting Portal.
E.	☐ Routine Maintenance (Attachment D)
F.	Cannabis Cultivation (Attachment E) – Attachment no longer available. Notification shall be submitted through the EPIMS Permitting Portal.
G.	☐ CDFW Grant Programs Agreement Number: _____
H.	☐ Master
I.	☐ Master Timber Operations



6. FEES

See the [current fee schedule](#) to determine the appropriate notification fee. Itemize each project's estimated cost and corresponding fee. **Note: CDFW may not process this notification until the correct fee has been received.**

A. Project Name		B. Project Cost	C. Project Fee
1	Robinson Creek Bridge Replacement on Lambert Lane	\$5.3 Million	\$5,596.00
2			
3			
4			
5			
6			
7			
8			
9			
10			
		D. Base Fee (if applicable)	
		E. TOTAL FEE*	\$5,596.00

* Check, money order, and [Visa or MasterCard](#) (select Environmental Fees from Menu) payments are accepted.

7. PRIOR NOTIFICATION AND ORDERS

A. Has a notification previously been submitted to, or a Lake or Streambed Alteration Agreement previously been issued by, CDFW for the project described in this notification?

☐ Yes (Provide the information below) ☒ No

Applicant	Notification Number	Date

B. Is this notification being submitted in response to a court or administrative order or notice, or a notice of violation (NOV) issued by CDFW?

☐ Yes ☒ No (Enclose a copy of the order, notice, or NOV. If the applicant was directed to notify CDFW verbally rather than in writing, identify the person who directed the applicant to submit this notification, the agency he or she represents, and describe the circumstances relating to the order.)

Name of person who directed notification	Agency

Describe circumstances relating to order

☐ Continued on additional page(s)



8. PROJECT LOCATION

A. Address or description of project location.

(Include a map that marks the location of the project with a reference to the nearest city or town, and provide driving directions from a major road or highway.)

The Robinson Creek Bridge Replacement on Lambert Lane Project (Bridge No. 10C0146) (Project) is located in the town of Boonville, California on the western edge of the Anderson Valley. Project location maps are provided in the attached Natural Environmental Study.

☐ Continued on additional page(s)

B. River, stream, or lake affected by the project. Robinson Creek

C. What water body is the river, stream, or lake tributary to? Ornbaun Creek to Navarro River

D. Is the river or stream segment affected by the project listed in the state or federal [Wild and Scenic Rivers Acts](#)? ☐ Yes ☒ No ☐ Unknown

E. County Mendocino

F. USGS 7.5 Minute Quad Map Name	G. Township	H. Range	I. Section	J. ¼ Section
Boonville	T13N	R14W	2 and 11	

☐ Continued on additional page(s)

K. Meridian (check one) ☐ Humboldt ☒ Mt. Diablo ☐ San Bernardino

L. Assessor's Parcel Number(s)

Please refer to the attached supplemental information for a full list of APN's

☒ Continued on additional page(s)

M. Geographic coordinates *(Provide the latitude and longitude coordinates for the property where the project(s) will take place. CDFW utilizes decimal degrees and WGS 84 datum. Access [Google Maps Help](#) if you need assistance in finding your coordinates.)*

Latitude/Longitude	Latitude: 39.0089	Longitude: -123.3687
	Latitude: 39.0049	Longitude: -123.3674
	Latitude: ##.#####	Longitude: -###.#####
	Latitude: ##.#####	Longitude: -###.#####
	Latitude: ##.#####	Longitude: -###.#####



9. PROJECT CATEGORY

WORK TYPE	NEW CONSTRUCTION	REPLACE EXISTING STRUCTURE	REPAIR-MAINTAIN-OPERATE EXISTING STRUCTURE
Bank stabilization – bioengineering/recontouring	☐	☐	☐
Bank stabilization – rip-rap/retaining wall/gabion	☐	☐	☐
Boat dock/pier	☐	☐	☐
Boat ramp	☐	☐	☐
Bridge	☐	☒	☐
Channel clearing/vegetation management	☐	☐	☐
Culvert	☐	☐	☐
Debris basin	☐	☐	☐
Dam	☐	☐	☐
Filling of wetland, river, stream, or lake	☐	☐	☐
Geotechnical survey	☐	☐	☐
Habitat enhancement – revegetation/mitigation	☐	☐	☐
Levee	☐	☐	☐
Low water crossing	☐	☐	☐
Road/trail	☐	☐	☐
Sediment removal: pond, stream, or marina	☐	☐	☐
flood control	☐	☐	☐
Storm drain outfall structure	☐	☐	☐
Temporary stream crossing	☐	☐	☐
Utility crossing: horizontal directional drilling	☐	☐	☐
jack/bore	☐	☐	☐
open trench	☐	☐	☐
Water diversion without facility	☐	☐	☐
Water diversion with facility	☐	☐	☐
Other (specify):	☐	☐	☐



10. PROJECT DESCRIPTION

- A. Describe the project in detail. Include photographs of the project location and immediate surrounding area.
- Written description of all project activities with detailed step-by-step description of project implementation.
 - Include any structures (e.g., rip-rap, culverts) that will be placed or modified in or near the stream, river, or lake, and any channel clearing.
 - Specify volume, and dimensions of all materials and features (e.g., rip rap fields) that will be used or installed.
 - If water will be diverted or drafted, specify the purpose or use and include Attachment C.
 - Enclose diagrams, drawings, design plans, construction specifications, and maps that provide all of the following: site specific construction details; dimensions of each structure and/or extent of each activity in the bed, channel, bank or floodplain; overview of the entire project area (i.e., “bird’s-eye view”) showing the location of each structure and/or activity, significant area features, stockpile areas, areas of temporary disturbance, and where the equipment/machinery will access the project area.
 - A helpful resource to assist in the development of quality PDF maps in Google Earth. See [Using Google Earth to Map your Property \(PDF\)](#).

The proposed Project will replace the existing Robinson Creek Bridge on Lambert Lane, approximately 400 feet west of SR 128. The existing structure is 32 feet long and 26 feet wide with closed strutted abutments founded on spread footings on erodible alluvial material. This bridge has a history of scour issues which has undermined the integrity of the eastern bridge abutment. There are deficiencies in the bridge superstructure and substructure conditions. The replacement bridge will have 9-foot lanes and 5-foot shoulders in each direction resulting in a wider structure adhere to current safety standards.

The proposed Project will involve the rehabilitation of eroded and scoured lengths of stream bank upstream and downstream of the bridge replacement, and a section of scoured bank located near the Boonville Hotel. Bank stabilization will be conducted according to the Robinson Creek Channel Design for the Lambert Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc. (MLA). The installation of hybrid rock slope protection (RSP) revetments is intended to protect the roadway embankment, the abutments of the proposed bridge replacement and ultimately maintain a stable channel morphology to reduce the risk of scour and lateral channel migration.

Additional Project specific details, including Project plans, restoration design, and construction methodology are provided in the attached Natural Environmental Study.

☐ Continued on additional page(s)

- B. Specify the equipment and machinery that will be used to complete the project.

It is anticipated that excavators, dozers, cranes, pavers, dump trucks, concrete trucks, concrete pumps, and pile drilling equipment will be required. Construction within Robinson Creek is anticipated to be performed when the creek is dry or not flowing.

☐ Continued on additional page(s)

- C. Will water be present during the proposed work period (specified in box 4.D) in the stream, river, or lake (specified in box 8.B).
- ☒ Yes ☐ No (Skip to box 11)

- D. Will the project require work in the wetted portion of the channel?
- ☒ Yes (Enclose a plan to divert water around work site)
☐ No Please refer below to section 12.B



11. PROJECT IMPACTS

A. Describe impacts to the bed, channel, and bank of the river, stream, or lake, and the associated riparian habitat. Specify the dimensions of the modifications in length (linear feet) and area (square feet or acres) and the type and volume of material (cubic yards) that will be moved, displaced, or otherwise disturbed, if applicable.

Project activities will involve the removal of 15 native trees including live oak (*Quercus wislizeni*), California bay-laurel (*Umbellularia californica*), California buckeye (*Aesculus californica*), and one Oregon ash (*Fraxinus latifolia*). Vegetation removal activities will include the removal of 5 willows. The Project will involve 0.10 acre (227.0 linear feet) of temporary impacts and 0.09 acre (209.0 linear feet) of permanent impacts to the bed and banks of Robinson Creek. The riparian habitat impacted by Project activities will be re-vegetated according to the Robinson Creek Channel Design for the Lambert Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc (MLA).

See figure 6 and the MLA in the attached Natural Environmental Study, and a map depicting Impacts to the waters of the U.S. attached as supplemental information.

☐ Continued on additional page(s)

B. Will the project affect any vegetation?

☒ Yes (Complete the tables below) ☐ No (Include aerial photo with date supporting this determination)

Vegetation Type	Temporary Impact	Permanent Impact
Willows	Linear feet: <u>approx 209 feet</u> Total area: <u>approx .06 acres</u>	Linear feet: _____ Total area: _____
	Linear feet: _____ Total area: _____	Linear feet: _____ Total area: _____

The extent of anticipated vegetation removal has yet to be determined. Revegetation/restoration of the Project area is addressed by the Hybrid Revetment Design in accordance with the Mitigation Measure Bio-8.

Tree Species	Number of Trees to be Removed	Trunk Diameter (range)
California bay-laurel	8	3-91
Oregon ash	1	4
Live oak	5	9-36
California buckeye	2	2-4

☒ Continued on additional page(s)

C. Are any special status animal or plant species, or habitat that could support such species, known to be present on or near the project site?

☒ Yes (List each species and/or describe the habitat below) ☐ No ☐ Unknown

Special-status species that have the potential to occur within the BSA include the state Species of Special Concern (SSC) western pond turtle (*Actinemys marmorata*) and Navarro roach (*Lavinia symmetricus navarroensis*), the SSC northwest/north coast clade of foothill yellow-legged frog (FYLF, *Rana boylei*), the federally threatened northern California (NC) steelhead Distinct Population Segment (DPS) (*Oncorhynchus mykiss irideus*), tree roosting bat species protected by the California Fish and Game Code (CFG), and a variety of bird and raptor species protected by the Migratory Bird Treaty Act. In addition, Robinson Creek is designated as critical habitat for the NC steelhead DPS.

☐ Continued on additional page(s)

D. Identify the source(s) of information that supports a "yes" or "no" answer above in Box 11.C.

Biological resource surveys, habitat assessment, CNDDB, Critical Habitat Mapper. Please refer to additional information within the attached Natural Environmental Study.

☐ Continued on additional page(s)

E. Has a biological study been completed for the project site?

☒ Yes (Enclose the biological study) ☐ No

Note: A biological assessment or study may be required to evaluate potential project impacts on biological resources.



F. Has one or more technical studies (e.g., engineering, hydrologic, geological, or geomorphological) been completed for the project or project site?

☒ Yes (Enclose the study(ies)) ☐ No

Note: One or more technical studies may be required to evaluate potential project impacts to a lake or streambed.

G. Have fish or wildlife resources or waters of the state been mapped or delineated on the project site?

☒ Yes (Enclose the mapped results) ☐ No

Note: Check "yes" if fish and wildlife resources or waters of the state on the project site have been mapped or delineated. "Wildlife" means and includes all wild animals, birds, plants, fish, amphibians, reptiles and related ecological communities, including the habitat upon which the wildlife depends." (Fish & G. Code, § 89.5.) If "yes" is checked, submit the mapping or delineation. If the mapping or delineation is in digital format (e.g., GIS shape files or KMZ), you must submit the information in this format for CDFW to deem your notification complete. If "no" is checked, or the resolution of the mapping or delineation is insufficient, CDFW may request mapping or delineation (in digital or non-digital format), or higher resolution mapping or delineation for CDFW to deem the notification complete.

12. MEASURES TO PROTECT FISH, WILDLIFE, AND PLANT RESOURCES

A. Describe the techniques that will be used to prevent sediment, hazardous, or other deleterious materials from entering watercourses during and after construction.

Construction activities will be conducted during the dry season when flowing water is absent or minimal within Robinson Creek. The implementation of standard Caltrans best management practices (BMP's) will reduce erosion and restrict any discharge of sediment and construction-related debris from entering the Robinson Creek. The contractor will prepare a storm water pollution prevention plan and a spill prevention plan, and will avoid fueling and maintenance of equipment within 200 feet of the water course. The site will be graded according to the stream restoration design and planted with native trees and riparian vegetation upon completion of bridge construction and bank stabilization.

☐ Continued on additional page(s)

B. Describe project avoidance and/or minimization measures to protect fish, wildlife, and plant resources.

Aquatic and riparian habitat will be avoided to the greatest extent possible. Construction activities will be conducted during the dry season when aquatic habitat is absent or minimally present within Robinson Creek. If water is present within the work area, per Mitigation Measure Bio-1 and Bio-3, a temporary diversion plan will be implemented to avoid impacts to aquatic habitat, water quality, and aquatic species. To avoid impacts to amphibians, birds, and bats, the Project will comply with Mitigation Measures Bio-4, 5, 6, & 7. A qualified biologist will survey (and monitor as necessary) for the presence/absence of regulated species within the Project area to ensure that take does not occur.

☐ Continued on additional page(s)

C. Describe any project mitigation and/or compensation measures to protect fish, wildlife, and plant resources.

Project activities include a stream restoration component that involves re-vegetation and the removal of blockages that currently restrict passage for fish. The proposed revetments would replace a section of failed retaining wall and associated RSP repairs. To appropriately stabilize the banks of Robinson Creek in accordance to the new bridge construction the hybrid RSP revetment will incorporate a terraced embankment, re-vegetated with native trees and riparian vegetation. The revegetation of the re-contoured bank will increase bank stability, protect channel morphology during high flow events, and improve habitat complexity and wildlife access in Robinson Creek. Revetment of the severely damaged stream bank will create fish habitat and allow for fish to migrate to the upper reaches of Robinson Creek and associated tributaries. The stream restoration design is presented in the attached Natural Environmental Study and includes replanting 125 cottonwood/willow trees within the RSP, 220 native riparian tree species will be planted in the channel bank and low terrace, 5-10 native upland trees will be planted in the upper terrace.

☐ Continued on additional page(s)



13. PERMITS

List any local, State, and federal permits required for the project and check the corresponding box(es). Enclose a copy of each permit that has been issued.

- A. US Army Corps of Engineers, NWP 14 ☒ Applied ☐ Issued
- B. NCRWQCB water quality certification ☒ Applied ☐ Issued
- C. NMFS Biological Opinion ☒ Applied ☒ Issued
- D. Unknown whether ☐ local, ☐ State, or ☐ federal permit is needed for the project. (Check each box that applies)
☐ Continued on additional page(s)

14. ENVIRONMENTAL REVIEW

A. Has a [CEQA](#) lead agency been determined? ☒ Yes (Complete boxes B, C, D, E, and F) ☐ No (Skip to box 14.G)

B. CEQA Lead Agency Mendocino County

C. Contact Person Chris Collins D. Phone Number (707) 234-2818

E. Has a draft or final document been prepared for the project pursuant to CEQA and/or NEPA?

☒ Yes (Check the box below for each CEQA or NEPA document that has been prepared and enclose a copy of each.)

☐ No (Check the box below for each CEQA or NEPA document listed below that will be or is being prepared.)

☐ Notice of Exemption

☒ Mitigated Negative Declaration

☐ NEPA document (type):

☒ Initial Study

☐ Environmental Impact Report

☐ Negative Declaration

☐ Notice of Determination (Enclose)

☐ THP/ NTMP

☐ Mitigation, Monitoring, & Reporting Plan

F. [State Clearinghouse Number](#) (if applicable) 2021080470

G. If the project described in this notification is not the "whole project" or action pursuant to CEQA, briefly describe the entire project (Cal. Code Regs., tit. 14 § 15378).

☐ Continued on additional page(s)



H. Has a CEQA filing fee been paid pursuant to Fish and Game Code section 711.4?

☒ Yes (Enclose proof of payment) ☐ No (Briefly explain below the reason a CEQA filing fee has not been paid)

Note: The [CEQA filing fee](#) is in addition to the notification fee. If a CEQA filing fee is required, the Lake or Streambed Alteration Agreement may not be finalized until paid.

15. SITE INSPECTION

Check one box only.

- ☐ In the event CDFW determines that a site inspection is necessary, I hereby authorize a CDFW representative to enter the property where the project described in this notification will take place at any reasonable time, and hereby certify that I am authorized to grant CDFW such entry.
- ☒ I request CDFW to first contact (insert name) Chris Collins at
(insert phone number or email address) collinsch@mendocinocounty.org to schedule a date and time to enter the property where the project described in this notification will take place. I understand that this may delay CDFW's determination as to whether a Lake or Streambed Alteration Agreement is required and/or CDFW's issuance of a draft agreement pursuant to this notification.

16. DIGITAL FORMAT

Is any of the information included as part of the notification available in digital format (i.e., CD, DVD, etc.)?

- ☒ Yes (Please enclose the information via digital media with the completed notification form.)
☐ No

17. SIGNATURE

I hereby certify that to the best of my knowledge the information in this notification is true and correct and that I am authorized to sign this notification as, or on behalf of, the applicant. I understand that if any information in this notification is found to be untrue or incorrect, CDFW may suspend processing this notification or suspend or revoke any draft or final Lake or Streambed Alteration Agreement issued pursuant to this notification. I understand also that if any information in this notification is found to be untrue or incorrect and the project described in this notification has already begun, I and/or the applicant may be subject to civil or criminal prosecution. I understand that this notification applies only to the project(s) described herein and that I and/or the applicant may be subject to civil or criminal prosecution for undertaking any project not described herein unless CDFW has been separately notified of that project in accordance with Fish and Game Code section 1602 or 1611.

Signature of Applicant or Applicant's Authorized Representative

Date

Print Name

Robinson Creek Bridge Replacement of Lambert Lane

CDFW 1602 Application

List of Attachments

1 – Supplemental Information

- List of property owners and APN's
- Map: Draft Delineation of the Waters of the U.S.
- Map: Impact to the Waters of the U.S

2 – Natural Environment Study (NES)

- NES
- Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project, prepared by Michael Love & Associates (MLA).

3 – National Marine Fisheries Service Biological Opinion (NMFS BO)

Robinson Creek Bridge Replacement of Lambert Lane

CDFW 1602 Application

Attachment 1: Supplemental Information

- List of property owners and APN's
- Map: Draft Delineation of the Waters of the U.S.
- Map: Impact to the Waters of the U.S

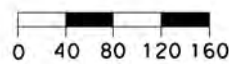
Supplemental information

Robinson Creek Bridge Replacement on Lambert Lane Project

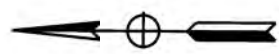
The Project boundary will be located within the existing public right-of-way and portions of the following APNs in the City of Boonville, Mendocino County, CA:

Assessor's Parcel Number (APN)	Property Owner
029-140-46	Burroughs, Joan M TTEE
029-130-05	BRH Associates Inc.
029-130-05	BRH Associates Inc.
029-150-39	Corlette, Michelle
029-110-12	County of Mendocino
029-150-12	County of Mendocino
029-130-11	Daniels, Steven & Beverly
029-130-13	Johnson, Gary & Wanda M
029-140-47	June, Janese A
029-130-07	McCarthy, Matthew & Dixie Lee TTEES
029-130-12	Pacific Telephone & Telegraph Company
029-110-23	Scommegna, Roger

- LEGEND:**
- ENVIRONMENTAL STUDY LIMITS
 - PROPERTY LINES
 - POTENTIAL STAGING AREA



SCALE: 1"=160'



029-130-12
PACIFIC TELEPHONE &
TELEGRAPH COMPANY

029-130-13
JOHNSON GARY & WANDA M

029-140-16
BURROUGHS
JOAN M TTEE

029-140-17
JUNE JANESE A

029-130-05
B R H ASSOCIATES INC.

029-130-04
B R H ASSOCIATES INC.

029-110-23
SCOMMEGNA ROGER

029-110-12
COUNTY OF MENDOCINO

029-130-07
MCCARTHY MATTHEW
& DIXIE LEE TTEES

029-130-11
DANIELS STEVENS
& BEVERLY

029-150-39
CORLETTE MICHELLE

EXISTING CONCRETE
BRIDGE TO BE REPLACED

LAMBERT LANE

ROBINSON CREEK

029-150-12
COUNTY OF MENDOCINO

DATE CREATED: 05/13/2016

COUNTY OF MENDOCINO
DEPARTMENT OF TRANSPORTATION
340 LAKE MENDOCINO DRIVE* UKIAH* CA * 95482
TEL (707) 463-4071

LAMBERT LANE
OVER ROBINSON CREEK BRIDGE
BRLO-5910(099)
BRIDGE No. 10C-0146
ENVIRONMENTAL STUDY LIMITS

SHEET 1
OF
1 SHEETS

DATE PLOTTED => 5/17/2016 DGN FILE => S:\Client\Mendocino\M10-700 Robinson Creek Bridge\500-Design\505 -PLOT\000 Title\Exhibits\M10700 ESL.dgn DESIGNED BY: RW DRAWN BY: AC REVIEWED BY: RW

Project Boundary - (3.6 acres)

5 foot contours

OHWM Transects

Photo Points - P#*

Data Points

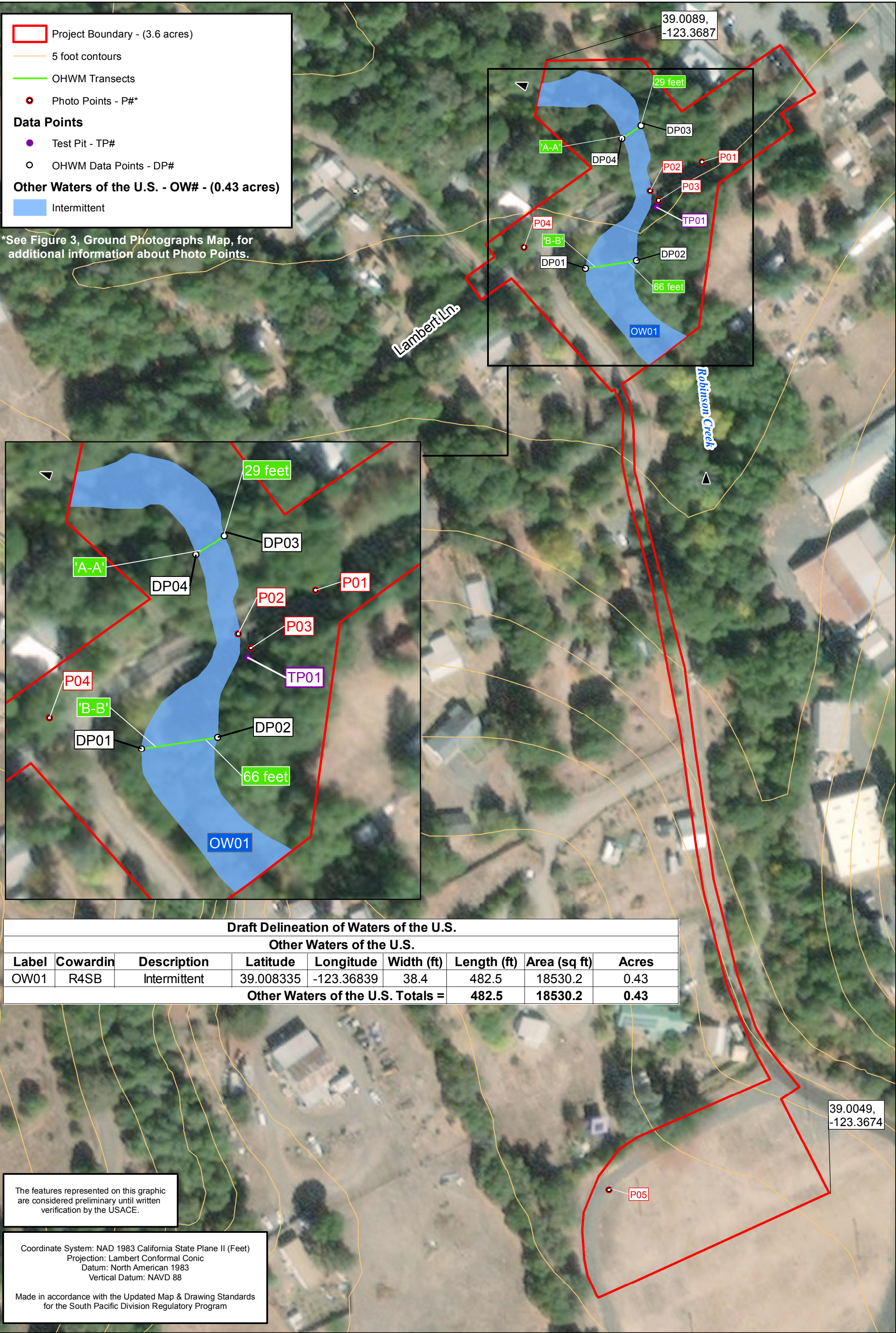
Test Pit - TP#

OHWM Data Points - DP#

Other Waters of the U.S. - OW# - (0.43 acres)

Intermittent

*See Figure 3, Ground Photographs Map, for additional information about Photo Points.



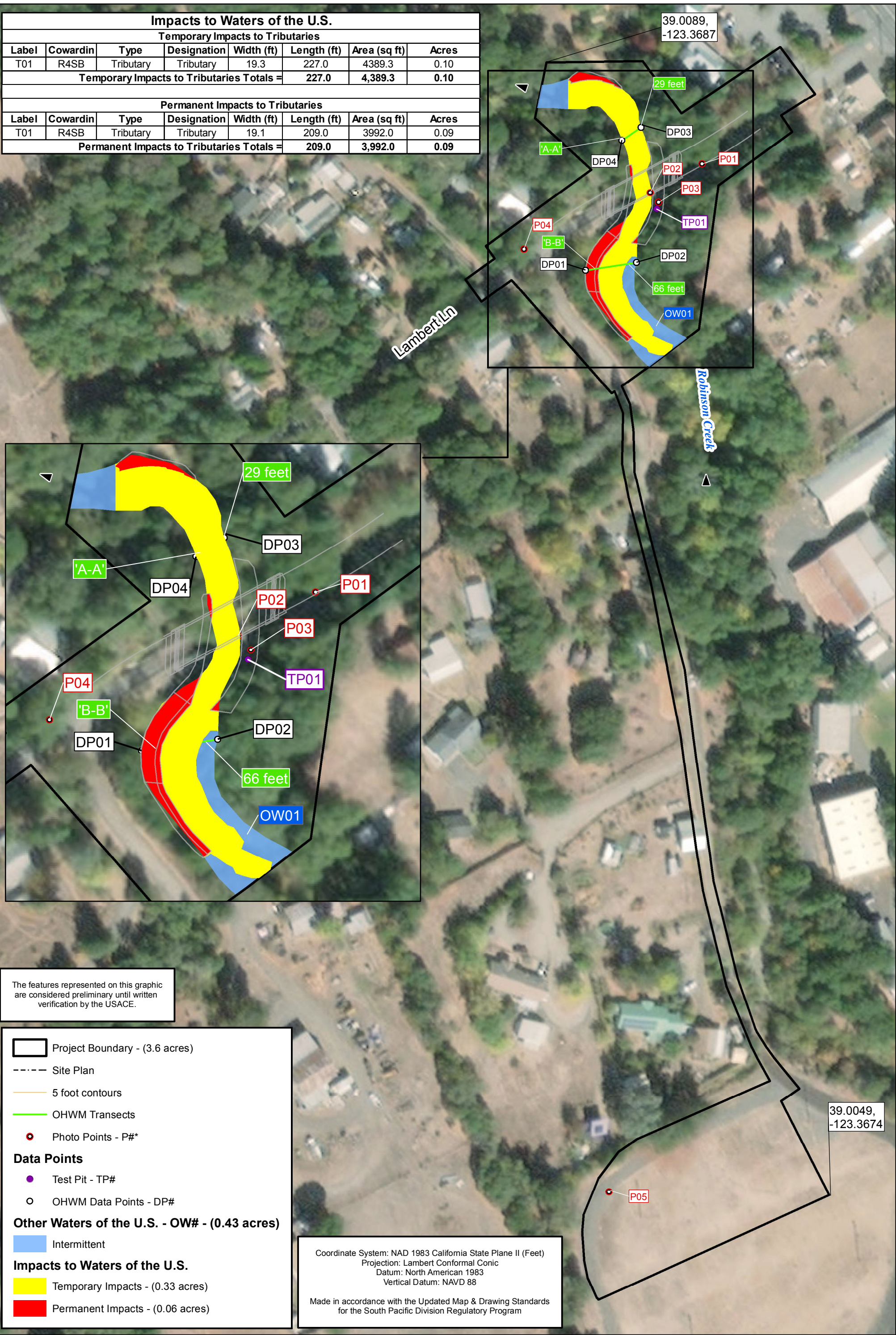
Draft Delineation of Waters of the U.S.								
Other Waters of the U.S.								
Label	Cowardin	Description	Latitude	Longitude	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Intermittent	39.008335	-123.36839	38.4	482.5	18530.2	0.43
Other Waters of the U.S. Totals =						482.5	18530.2	0.43

The features represented on this graphic are considered preliminary until written verification by the USACE.

Coordinate System: NAD 1983 California State Plane II (Feet)
Projection: Lambert Conformal Conic
Datum: North American 1983
Vertical Datum: NAVD 88

Made in accordance with the Updated Map & Drawing Standards for the South Pacific Division Regulatory Program

Impacts to Waters of the U.S.							
Temporary Impacts to Tributaries							
Label	Cowardin	Type	Designation	Width (ft)	Length (ft)	Area (sq ft)	Acres
T01	R4SB	Tributary	Tributary	19.3	227.0	4389.3	0.10
Temporary Impacts to Tributaries Totals =					227.0	4,389.3	0.10
Permanent Impacts to Tributaries							
Label	Cowardin	Type	Designation	Width (ft)	Length (ft)	Area (sq ft)	Acres
T01	R4SB	Tributary	Tributary	19.1	209.0	3992.0	0.09
Permanent Impacts to Tributaries Totals =					209.0	3,992.0	0.09



Robinson Creek Bridge Replacement of Lambert Lane

CDFW 1602 Application

Attachment 2: NES

- Natural Environment Study (NES)
- Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project, prepared by Michael Love & Associates (MLA).

ROBINSON CREEK BRIDGE REPLACEMENT ON LAMBERT LANE



Natural Environment Study

Boonville, Mendocino County, California

Section 2, Township 13N, Range 14W

Boonville, CA Quadrangle

District 1

Bridge No. 10C0146

BRLO-5910(099)

March 2019

Revised December 2020



Natural Environment Study

Section 2, Township 13N, Range 14W
Boonville, CA Quadrangle
Caltrans District 1

Federal Project Number BLO-5910(099)

Prepared By: Melissa Murphy Date: 12/8/20
Melissa Murphy, Senior Biologist
(530) 332-9909
Gallaway Enterprises
117 Meyers Street, Suite 120
Chico CA 95938

Approved By: Howard Dashiell Date: 1/28/21
Howard Dashiell, Director of Transportation
(707) 463-4363
County of Mendocino Department of Transportation
340 Lake Mendocino Drive
Ukiah, CA 95482

Approved By: Christa Unger Date: 01/28/21
Christa Unger, Environmental Planner/Biologist
California Department of Transportation
District 1

Approved By: Darrell Cardiff Date: 01/28/2021
Darrell Cardiff, Sr. Environmental Planner
Caltrans Office of Local Assistance
District 1

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Summary

Mendocino County (County) and the California Department of Transportation (Caltrans) are proposing to replace the Robinson Creek Bridge on Lambert Lane. The Robinson Creek Bridge Replacement on Lambert Lane Project (Bridge No. 10C0146) (Project) is located in the town of Boonville, California on the western edge of the Anderson Valley. Lambert Lane is the only public road access in and out of a residential and agricultural area. The existing bridge has been designated as functionally obsolete and scour critical by Caltrans, qualifying it for rehabilitation or replacement under the federal Highway Bridge Program (HBP). In winter of 2015, a retaining wall on the upstream side of the west approach washed out and collapsed into the creek causing the County to place revetment to prevent continued scouring and erosion. During the winter of 2016/2017 scour further undermined the eastern abutment footing. Under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife (CDFW) fish passage assessment guidelines (CDFG, 2002). The purpose of the Project is to replace the deficient bridge with a reliable structure to provide a safe crossing that meets current standards. Channel restoration will also take place as part of the Project and will include removing the collapsed retaining wall which will restore fish passage to the upstream reaches of Robinson Creek, protecting portions of the embankment slopes from erosion with hybrid rock slope protection revetment, channel grading to remove abrupt hydraulic changes, adding point bars along portions of the creek banks, and mitigating for the removal of riparian trees with like-kind plantings to be included as part of bank protection and restoration (Michael Love & Associates, Inc. 2018). Construction will take place from June 15 through October 15. If water is present within the project area, then fish relocation will be performed by a qualified biologist. Installation of a clear water diversion may be required. There is no pile driving proposed as part of this project; therefore, acoustical impacts to northern California (NC) steelhead Distinct Population Segment (DPS) (*Oncorhynchus mykiss irideus*) were not analyzed as part of this Natural Environment Study.

Land within the Biological Study Area (BSA) is characterized as barren, urban, riverine, annual grassland, valley-foothill riparian and valley oak woodland habitats. Special-status species that have the potential to occur within the BSA include the state Species of Special Concern (SSC) western pond turtle (*Actinemys marmorata*), Navarro roach (*Lavinia symmetricus navarroensis*), and foothill yellow-legged frog northwest/north coast clade

(FYLF, *Rana boylei*), the federally threatened NC steelhead DPS, tree roosting bat species protected by the California Fish and Game Code (CFGF), and a variety of bird and raptor species protected by the Migratory Bird Treaty Act. In addition, Robinson Creek is designated as critical habitat for the NC steelhead DPS and for the Central California Coast Coho salmon Evolutionary Significant Unit (ESU) (*Oncorhynchus kisutch*). The Project site falls within an area mapped by the National Marine Fisheries Service (NMFS) as potentially containing Essential Fish Habitat (EFH) for California Coastal Chinook salmon ESU (*Oncorhynchus tshawytscha*) and Central California Coast Coho salmon ESU; however, these species are not known to occur in Robinson Creek.

With the implementation of avoidance and minimization measures including construction timing, impacts to western pond turtle, Navarro roach, FYLF, roosting bats, or nesting birds will be minimal. This Project may affect and is likely to adversely affect the NC steelhead DPS through potential relocation efforts conducted by the qualified biologist. California Coastal Chinook salmon ESU and Central California Coast Coho salmon ESU are not known to occur within Robinson Creek; therefore, the Project will have no effect on these species. This Project is not likely to adversely modify critical habitat or EFH. The Project will result in a net benefit and be self-mitigating for impacts to critical habitat and EFH through onsite restoration and restored access to the upper reaches of Robinson Creek. Approximately 201.6 linear feet (0.14 acres) of temporary impacts and 93.1 linear feet (0.01 acres) of permanent impacts to NC steelhead DPS and Central California Coast Coho salmon ESU critical habitat within the BSA are proposed; however, the removal of the existing fish barrier upstream of the bridge will restore fish passage to 0.25 acres of critical habitat within the BSA.

The Project will result in 0.28 acres of temporary and 0.06 acres of permanent impacts to jurisdictional waters of the U.S. (WOTUS). This Project is self-mitigating as both temporary and permanent impacts will have a net benefit to WOTUS; therefore, the purchase of credits at a U.S. Army Corps of Engineers (Corps) approved mitigation bank or payment to a Corps approved in-lieu fund, will not be required. Impacts will be the result of restoration activities including removing the failed retaining wall and associated rock slope protection (RSP) from the creek, streambank stabilization through hybrid RSP revetment, vegetation of created point bars, and habitat enhancement. A Regional Water Quality Control Board (RWQCB) §401 Water Quality Certification permit, a California Department of Fish and

Wildlife (CDFW) §1602 Streambed Alteration Agreement, and a Corps Nationwide §404 permit shall be obtained for the project.

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List of Abbreviated Terms

BSA	Biological Study Area
BMP	Best Management Practices
CC	California Coastal
CCC	Central California Coast
Cal-IPC	California Invasive Plant Council
Caltrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFGF	California Fish and Game Code
CIDH	Cast-In-Drilled-Hole
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	United States Army Corps of Engineers
County	Mendocino County
CRPR	California Rare Plant Rank
CWA	Clean Water Act
DBH	Diameter at Breast Height
DPS	Distinct Population Segment
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
GIS	Geographic Information System
HBP	Highway Bridge Program
IPaC	Information for Planning and Conservation
LWD	Large Woody Debris

MBTA	Migratory Bird Treaty Act
MLA	Michael Love & Associates, Inc.
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NC	Northern California
NEPA	National Environmental Quality Act
NES	Natural Environmental Study
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
OHWM	Ordinary High Water Mark
RPW	Relatively Permanent Water
RSP	Rock Slope Protection
RWQCB	Regional Water Quality Control Board
SR	State Route
SSC	State Species of Special Concern
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WOTUS	Waters of the United States

1 Introduction

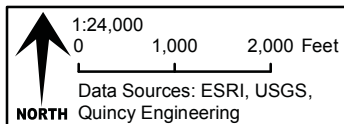
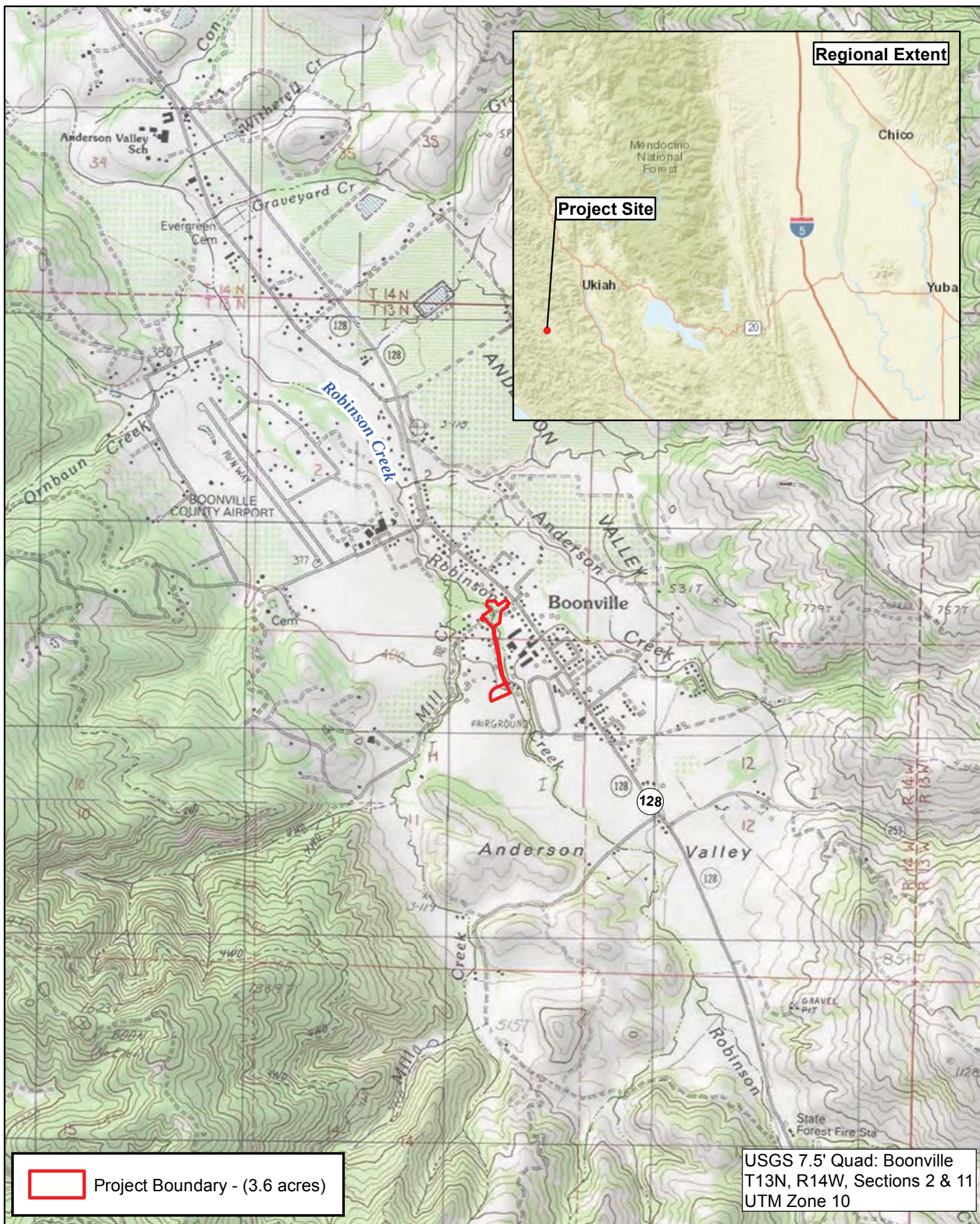
The purpose of the Robinson Creek Bridge Replacement on Lambert Lane Project (Bridge No. 10C0146) (Project) is to replace the existing Robinson Creek Bridge on Lambert Lane to provide the public with a safe, reliable crossing and improve traffic operations (**Figure 1: Regional Location Map, Figure 2: Project Location Map**). This Project is needed because the existing bridge has been designated as functionally obsolete and scour critical by the California Department of Transportation (Caltrans), due to the undermining of the spread footing foundations and collapse of a retaining wall. The purpose of this Natural Environment Study (NES) is to evaluate potential Project impacts to special-status species and their habitats within the Project vicinity.

Project History

The Project is located in the town of Boonville, California on the western edge of the Anderson Valley (**Figure 1**). The existing bridge was constructed on Lambert Lane over Robinson Creek in 1954. Lambert Lane is the only public access road in and out of a residential and agricultural area. The existing 32-foot long single span bridge is comprised of a concrete deck slab supported on tall closed strutted abutments founded on spread footings. The existing bridge has been designated as functionally obsolete and scour critical by Caltrans, qualifying it for rehabilitation or replacement under the federal Highway Bridge Program (HBP). In winter of 2015, a retaining wall on the upstream side of the west approach washed out and collapsed into the creek causing Mendocino County (County) to place revetment to prevent continued scouring and erosion. In the winter of 2016/2017, scour further undermined the eastern abutment footing along its entire length and reinforcing steel is exposed. The purpose of the Project is to replace the deficient, unstable bridge with a reliable structure to provide a safe crossing that meets current standards. The Project is funded through the HBP with matching funds from Federal Toll Credits. Caltrans will be the lead agency for National Environmental Policy Act (NEPA) compliance through delegation from the Federal Highway Administration (FHWA) and the County, the owner of the Project, will be the lead agency for California Environmental Quality Act (CEQA) compliance.

FISH PASSAGE

A fish passage assessment of stream crossings was conducted by Ross Taylor and Associates (Taylor 2001). Because the Lambert Lane bridge is a channel spanning crossing, it was considered to provide unimpeded fish passage and was not included in the assessment. However, under current conditions, the failed retaining wall and associated riprap creates a



Robinson Creek Bridge Replacement Project
Regional Location
Figure 1



3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife fish passage assessment guidelines (CDFG, 2002). Channel restoration designs for the site should satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001) guidelines.

GEOMORPHIC CHANNEL CONDITIONS

Changing geomorphic conditions within Robinson Creek and downstream Anderson Creek have been noted for decades. Channel incision (lowering of the channel bed) and channel bank erosion along Robinson Creek was noted as a significant source of sediment production within the 1998 Navarro River Watershed Restoration Plan. Incision has caused scour and undermining of bridge foundations, leading to the replacement of the State Route (SR) 128 crossing of Anderson Creek immediately upstream of the confluence of Robinson Creek and replacement of the Mountain View Road bridge crossing over Robinson Creek, downstream of Lambert Lane. Also, channel widening associated with incision processes has caused severe bank erosion threatening adjoining structures and resulting in loss of mature riparian vegetation throughout lower Robinson Creek.

The Mendocino County Resource Conservation District (RCD) and the Mendocino County Water Agency conducted studies of channel conditions to characterize the ongoing channel adjustments in Robinson Creek, focusing on the reach from the confluence with Anderson Creek to the Mendocino County Fair Grounds upstream of Lambert Lane. This included conducting profile surveys of the channel thalweg and surveys of channel cross sections in 2005 to document the channel morphology. Florsheim (2006) prepared a baseline assessment of bio-geomorphic conditions within lower Robinson Creek for the RCD and identified channel incision as the dominant process causing the observed channel instabilities. Follow-up monitoring surveys of the lower Robinson Creek channel thalweg were conducted in 2008, which found the channel showed signs of aggradation near the confluence with Anderson Creek, but also showed signs of incision within a reach between Mountain View Road and Lambert Lane bridge crossings (Florsheim, 2008). These findings were further described in a 2013 peer-reviewed publication (Florsheim et al., 2013). The RCD provided the original data from the 2005 and 2008 county surveys to MLA to compare to current channel conditions at the Lambert Lane bridge replacement Project.

Project Description

BIOLOGICAL STUDY AREA

The Biological Study Area (BSA) is the area in which biological surveys are conducted and where all construction and staging will occur (**Figure 3: Biological Study Area**). The BSA for this Project encompasses the bridge construction and stream restoration zone as well as the potential off-site staging area located at the County Fairgrounds. The BSA is a total of 3.6 acres.

PROPOSED PROJECT

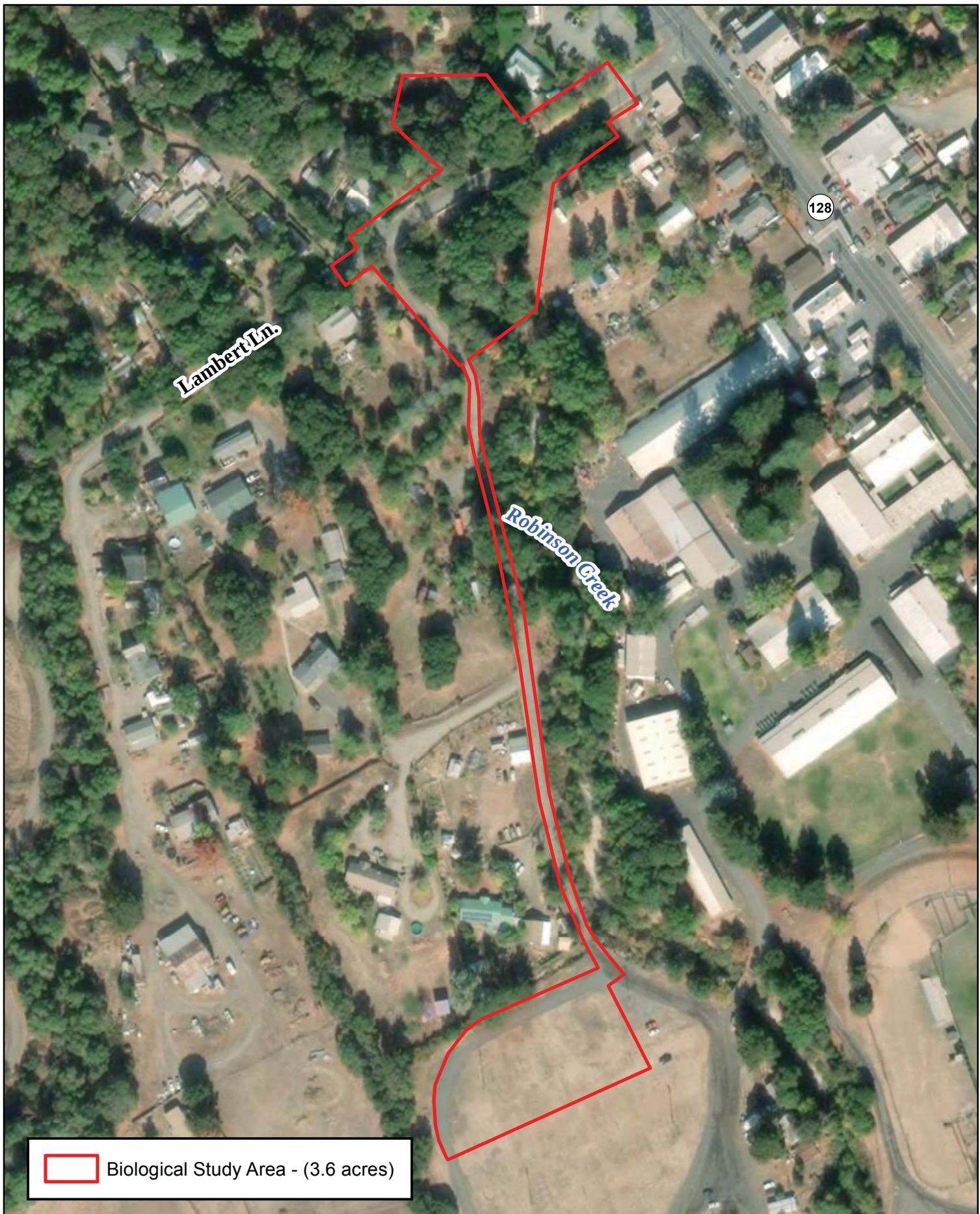
The proposed Project will replace the existing Robinson Creek Bridge on Lambert Lane, approximately 400 feet west of SR 128 (**Figure 2**). The existing structure is 32 feet long and 26 feet wide with closed strutted abutments founded on spread footings on erodible alluvial material. This bridge has a history of scour issues and a scour hole that has undermined the integrity of the easterly bridge abutment. There are deficiencies in the bridge width, superstructure and substructure conditions. The replacement bridge will have 9-foot lanes and 5-foot shoulders in each direction resulting in a wider structure which meets safety standards.

In addition to the bridge replacement, portions of the stream channel upstream and downstream of the bridge, as well as a localized downstream streambank scour area adjacent to the Boonville Hotel, will be stabilized according to the Robinson Creek Channel Design for the Lambert Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc. (MLA). The channel restoration is intended to provide geomorphically stable channel geometry while protecting the roadway embankment and vulnerable streambanks with hybrid rock slope protection (RSP) revetments where required due to risk of scour and lateral channel migration.

CONSTRUCTION METHODS AND ACCESS

The preferred construction method will be to build a replacement bridge on the existing alignment and provide a temporary detour. Based on Lambert Lane being the only public road access to approximately 30 parcels, it is necessary to keep at least one lane of traffic open during construction. Due to the instability of the existing bridge, a temporary bridge is proposed to be erected offset from the existing bridge to pass traffic around bridge construction operations within the Project site and avoid a road closure. This temporary bridge will either be a Bailey Bridge sourced from Mendocino County or a Contractor furnished temporary bridge structure.

A long span steel plate girder bridge will be constructed within the existing bridge alignment and can be fabricated in shorter lengths to facilitate transport and then assembled on-site



(Figure 4). This bridge option will have a shorter construction time and will minimize impacts to the creek since it does not require falsework in the creek. Additionally, this long span bridge option provides the ability to improve the alignment of the creek to minimize future potential scour issues by increasing the channel opening and providing a softer and more gradual turn of the creek. Weathering steel will be utilized to minimize future maintenance efforts and costs. Significant changes to the vertical profile are not anticipated as the existing and replacement bridge option provide adequate hydraulic freeboard. The structure depth will be 4 feet 9 inches.

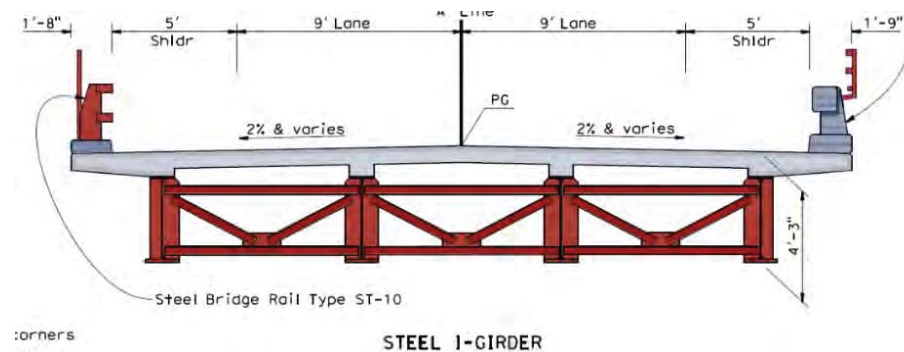


Figure 4. Long Span Prefabricated Steel Plate Girder Bridge Design Cross-Section

Deep foundation systems, drilled piles, will be required due to the presence of unconsolidated channel alluvium substrate. Pile type is Cast-In-Drilled-Hole (CIDH) piles. The foundation type for the retaining walls will be the same as for bridge abutments. It is anticipated that temporary shoring will be required during bridge construction.

The installation of a clear water diversion may be necessary. If required, the clear water diversion will be constructed of one appropriately sized culvert and cofferdam constructed of visqueen plastic, clean river gravel, and sandbags (**Appendix G**)

Geomorphic Channel Conditions Within the Project Area and the Proposed Bridge Structure

Lambert Lane crosses Robinson Creek approximately 2,860 linear feet upstream of the confluence with Anderson Creek and 400 feet west of SR 128. The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved alignment with the channel by decreasing the sharpness of the meander bend. A constraint to realigning the channel was the preservation

of large established trees along the right bank upstream and downstream of the crossing, including an 8-foot diameter heritage oak tree close to the existing right bank of the channel upstream of the bridge. The proposed alignment moves the approach channel further to the right (looking downstream) and has a sinuosity of 1.2 (valley length to channel length).

Stream Channel Restoration Geomorphic Characterization

It is proposed that portions of the embankment slopes will be protected from erosion with RSP and that willow plantings will also be included as part of bank protection and restoration. Channel grading will minimize abrupt hydraulic constrictions and areas of focused high velocities (**Figure 5**). The proposed riprap revetments upstream and downstream of the bridge crossing and downstream by the Boonville Hotel are to be vegetated with live willow cuttings following Caltrans "hybrid revetment" design. Further, this Project will include removing the rubble and reconfiguring the RSP that covers the creek bottom, restoring the channel to a more natural condition and restoring fish passage to sections of Robinson Creek above the failed retaining wall. Channel restoration designs for the site will satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001) guidelines (**Appendix A: Robinson Creek Channel Design Report**).

The channel configuration and extent of grading was influenced by the goal of preserving trees. The first design consideration was to minimize the removal of larger oak and bay trees. Planting the RSP with willow stakes and site revegetation is intended to offset temporary losses, as willows grow quickly. Large woody debris (LWD) will be placed along the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00. Removed trees to be used as LWD will be a minimum of 15 feet long and have a 16-inch diameter at breast height (DBH). A plan sheet showing the location of LWD placement in the restored stream will be included in the final design. Anchoring details will be included on the LWD plan sheet and at a minimum will include the construction details shown on the example plan sheet provided as **Appendix F**.

The stream channel component of the Project was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and by the United States Forest Service (USFS) (2008). The stream simulation approach is a geomorphically-based approach that requires a channel-spanning crossing structure with adequate capacity to convey the 100-year flow. The channel grading should

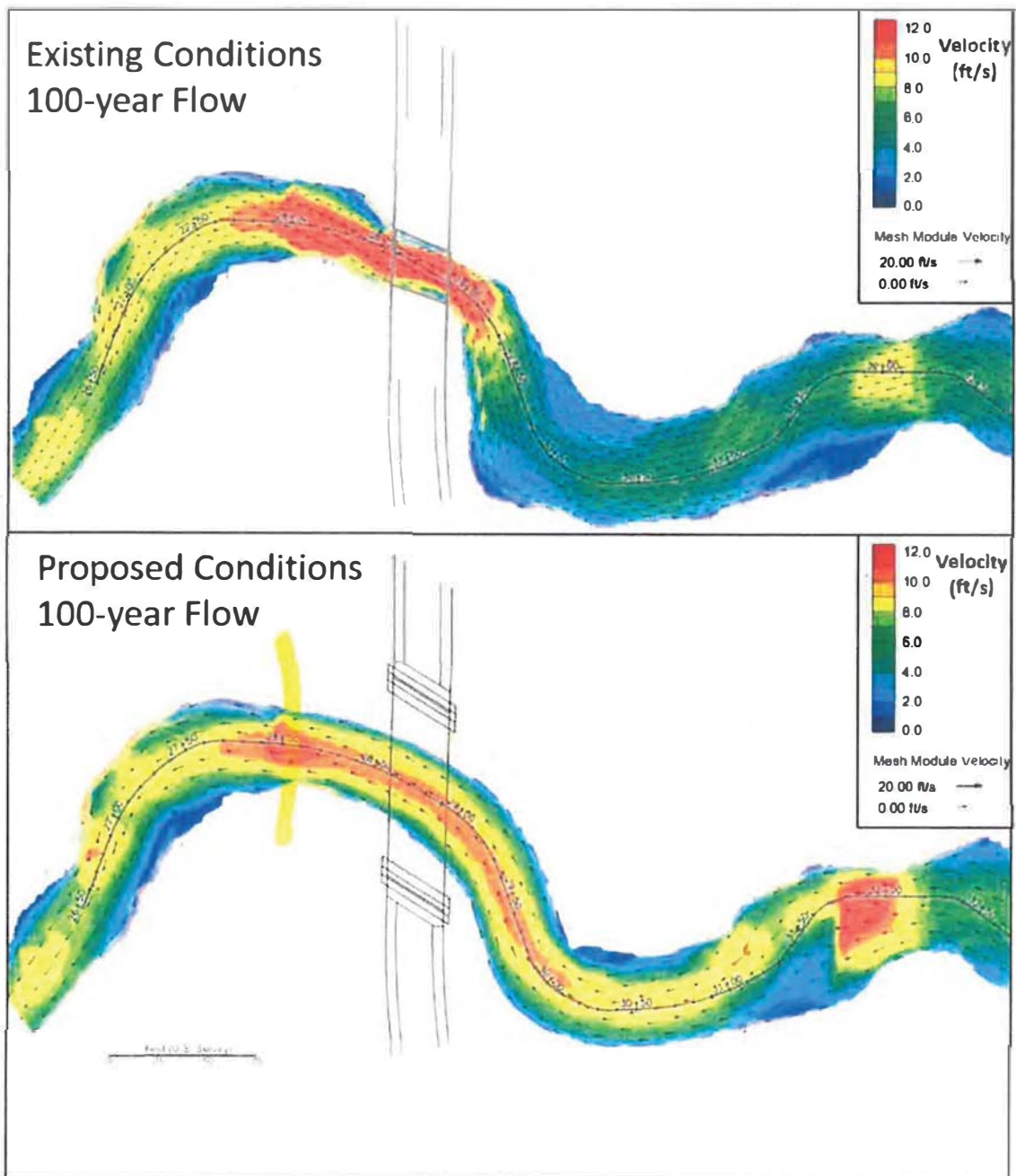


Figure 5. Predicted water velocities associated with the 100-year flow of 1,750 cfs for existing and proposed.

seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed. The approximate volume of streambed material to be stockpiled and placed back in the channel is 1,200 cubic yards. All this material will be salvaged streambed material from the project stream reach. No imported material will be brought in for this use.

Hybrid Revetment Design

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank.

Caltrans has developed recommendations for the use of a "hybrid revetment" that incorporates vegetation into RSP to provide the benefits of stream side vegetation while managing its uncertainties. The intent is to balance the engineering benefit of armoring a bank while promoting ecological processes. The hybrid RSP design consists of the standard RSP design as described above, with the addition of live willow staking that penetrates the rock layers and allows rooting into the native bank soils.

Species most commonly used as live stakes are native willow and cottonwood trees. Plantings are placed either vertical or perpendicular to the slope face and must be long enough to extend through to the subbase and into moist soil. Placement of live stakes is done in conjunction with rock placement. To provide protection to the live stakes during rock placement, cuttings should be placed into perforated cardboard tubes that are embedded into the subgrade and extend through the layered RSP. Cardboard is preferred as it can degrade over time and not hinder the growth of the cuttings. Growing medium is placed within the cardboard tubes to provide direct soil contact. Additionally, voids within the placed riprap should be filled with salvaged soil to further promote root growth within the layered RSP.

For Robinson Creek, it is assumed cutting shall be made from native willow species. Stakes may need to be as long as 12 feet and should be placed vertically to maximize their rooting depth, with the butt of the live stake at or near summer groundwater levels. The willow

plantings will start at bankfull, 2.3 feet above the finished channel bed, and extend up the RSP revetment. To ensure good establishment, the live stakes should be irrigated for a minimum of two seasons.

Based on the proposed channel grading, 19 trees will be removed (**Figure 6**). In addition to the plantings contained within the hybrid RSP revetment, native vegetation would be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants. In addition to the planting areas close to the channel, the Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks.

Channel incision, channel bank erosion, and channel widening associated with incision processes has caused severe bank erosion, resulting in loss of mature riparian vegetation throughout lower Robinson Creek. Though the riparian trees to be removed as a result of the Project are likely important components of northern California (NC) steelhead Distinct Population Segment (DPS) and Central California Coast (CCC) Coho salmon Evolutionary Significant Unit (ESU) critical habitat, current conditions have degraded the overall quality of the critical habitat. The Project proponent proposes to replant up to 355 trees, at a 18:1 ratio, in an effort to restore the creek and mitigate potential impacts to Essential Fish Habitat (EFH) critical habitat. Robinson Creek and its associated riparian vegetation will be restored to a net benefit to NC steelhead and the critical habitat present. The following are the preliminary estimates of trees to be replanted. Upon final design, a qualified landscape architect or botanist should be consulted to determine spacing and placement, species types, and any other factors appropriate to the site. The landscape architect or botanist shall provide provisions for harvesting and storage of cutting stock and irrigation design. A landscape architect or botanist shall be retained to ensure revegetation has a high potential for success.

Planted RSP (3,010 sf):

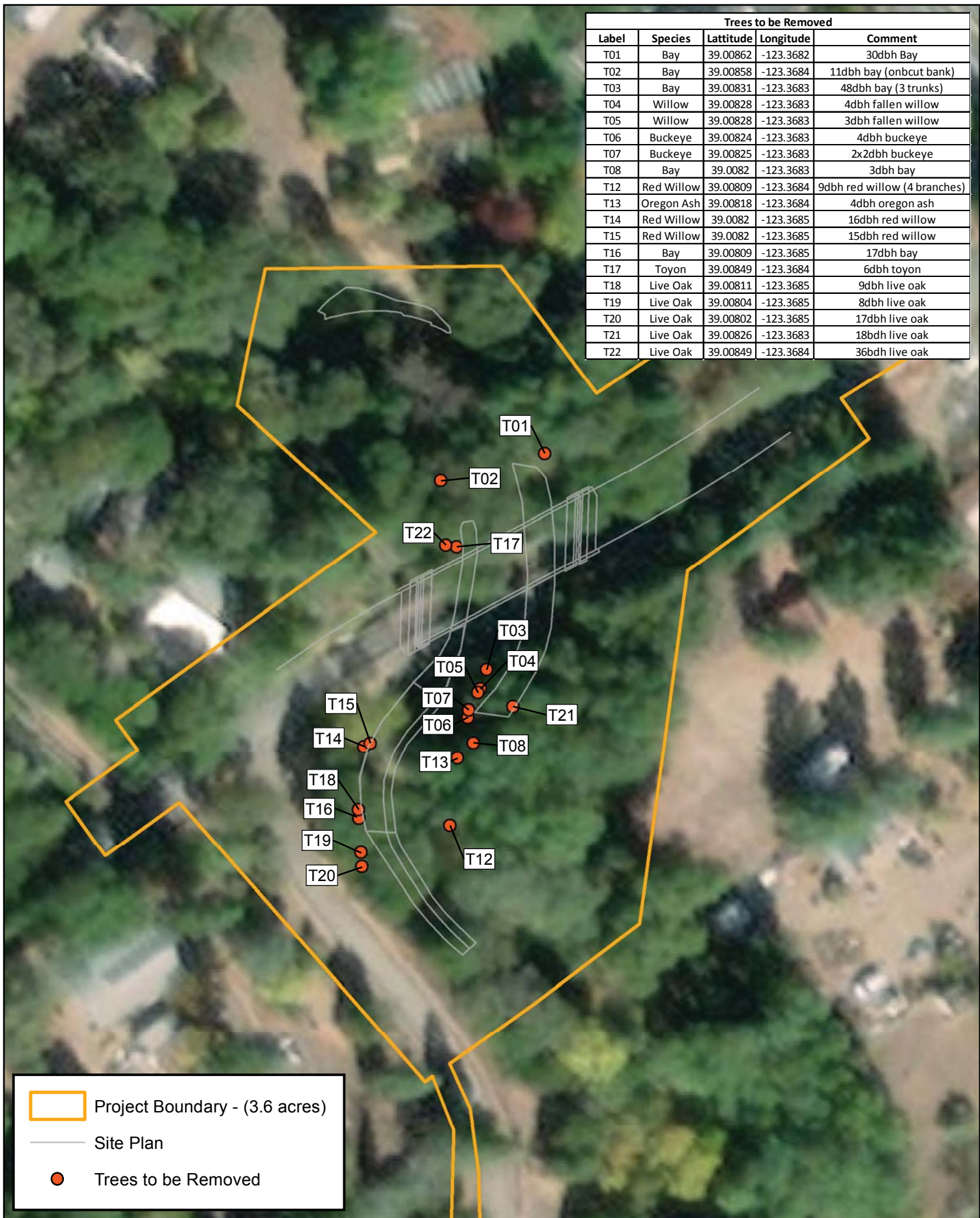
Willow/cottonwood at 5 feet on center = 125 trees

Channel bank and low terrace (1,823 sf):

Native riparian and understory at 3 feet on center = 220 trees

Upper Terrace (725 sf)

Native upland trees, such as oaks = 5-10 trees



A quantity estimate of both temporary fill materials and permanent features required for construction within Robinson Creek in the BSA is presented in **Table 1**.

Table 1. Impacts to Waters of the United States

Type of impact	Acreage of impact
Temporary Impacts – Access and Bridge Demolition/Construction	0.28 acres
Permanent Impacts – Hybrid RSP Revetment and Stream Restoration	0.06 acres

STAGING AREAS, RIGHTS OF WAY, AND UTILITIES

The Project staging areas will include portions of the closed roadway at each end of the bridge and the area just southeast of the bridge. If this area is unavailable or not sufficient in size, there is an alternative area off-site at the County Fairgrounds that can also serve as a staging area. Right-of-Way including slope easements, temporary construction easements, permanent maintenance easements, and permanent acquisitions will be required. There are existing overhead electrical and telephone utilities that will need to be relocated. Additionally, there is a storm water concrete pipe that outfalls into the creek that will need to be relocated. Coordination will begin early with PG&E.

CONSTRUCTION EQUIPMENT AND SCHEDULE

It is anticipated that excavators, dozers, cranes, pavers, dump trucks, concrete trucks, concrete pumps, and pile drilling equipment will be required. Construction within Robinson Creek is anticipated to begin in June 15, 2021 and continue through October 15, 2021.

2 Study Methods

The biological and botanical surveys were conducted by Gallaway Enterprises after consulting the United States Fish and Wildlife Services (USFWS) Information for Planning and Conservation (IPaC) species list, National Oceanic and Atmospheric Administration (NOAA) NMFS species list, NOAA NMFS EFH mapper database, California Department of Fish and Wildlife (CDFW) Natural Diversity Database (CNDDDB) search and the California Native Plant Societies (CNPS) list of rare and endangered plants gathered for the BSA (**Appendix B: Species Lists**). Additionally, a map was obtained from the CNDDDB Geographic Information System (GIS) database, which provided general locations of species that had recorded CNDDDB occurrences within a five-mile radius of the Project location (**Figure 7: CNDDDB Occurrences**). Based on the results of the species lists and CNDDDB map, appropriate biological and botanical surveys were conducted.

Regulatory Requirements

The following describes federal, state, and local environmental laws and policies that are relevant to the CEQA review process and to this NES.

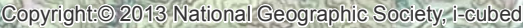
Federal

Federal Endangered Species Act

The United States Congress passed the Federal Endangered Species Act (ESA) in 1973 to protect species that are endangered or threatened with extinction. The ESA is intended to operate in conjunction with the NEPA to help protect the ecosystems upon which endangered and threatened species depend. The ESA makes it unlawful to “take” a listed animal without a permit. Take is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct.” Through regulations, the term “harm” is defined as “an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.”

Migratory Bird Treaty Act

The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North



America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA.

Waters of the United States, Clean Water Act, Section 404

The Corps and the U.S. Environmental Protection Agency (EPA) regulate the discharge of dredged or fill material into jurisdictional waters of the United States, under the Clean Water Act (CWA, §404). The term “waters of the United States” (WOTUS) is an encompassing term that includes “wetlands” and “other waters.” Wetlands have been defined for regulatory purposes as follows: “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR 328.3, 40 CFR 230.3). Wetlands generally include swamps, marshes, bogs, and similar areas.” other waters of the United States are seasonal or perennial water bodies, including lakes, stream channels, drainages, ponds, and other surface water features, that exhibit an ordinary high-water mark but lack positive indicators for one or more of the three wetland parameters (i.e., hydrophytic vegetation, hydric soil, and wetland hydrology) (33 CFR 328.4).

The Corps may issue either individual permits on a case-by-case basis or general permits on a program level. General permits are pre-authorized and are issued to cover similar activities that are expected to cause only minimal adverse environmental effects. Nationwide permits are general permits issued to cover particular fill activities. All nationwide permits have general conditions that must be met for the permits to apply to a particular Project, as well as specific conditions that apply to each nationwide permit.

Executive Orders 13112; Prevention and Control of Invasive Species

On February 3, 1999, Executive Order 13112 was signed establishing the National Invasive Species Council. Executive Order 11312 directs all federal agencies to prevent and control introductions of invasive nonnative species in a cost-effective and environmentally sound manner to minimize their economic, ecological, and human health impacts. Executive Order 11312 established a national Invasive Species Council made up of federal agencies and departments and a supporting Invasive Species Advisory Committee composed of state, local, and private entities. The Invasive Species Council and Advisory Committee oversees and facilitates implementation of the Executive Order, including preparation of a National Invasive Species Management Plan.

Section two (2) of the Executive Order states:

- (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, (1) identify such actions; (2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and (3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.
- (b) Federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.

The Magnuson-Stevens Act

The Magnuson-Stevens Act (MSA) was signed in 1996 and mandates the use of annual catch limits and accountability measures to end overfishing, provide widespread market-based fishery management through limited access privilege programs, and calls for increased international cooperation. The fish off the coasts of the United States, the highly migratory species of the high seas, the species which dwell on or in the Continental Shelf appertaining to the United States, and the anadromous species which spawn in United States Rivers or estuaries, constitute valuable and renewable natural resources and they and their habitats are protected under the MSA. A national program for the conservation and management of the fishery resources of the United States is necessary to prevent overfishing, to rebuild

overfished stocks, to insure conservation, to facilitate long-term protection of EFH, and to realize the full potential of the Nation's fishery resources.

Congress defined EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The EFH guidelines further interpret the EFH definition as:

- "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate.
- "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities.
- "necessary" means the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem.
- and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

Activities proposed to occur in EFH areas do not automatically require consultation. Consultations are triggered only when the proposed action may adversely affect EFH, and then, only Federal actions require consultation. States are not required to consult. However, if NOAA's National Marine Fisheries Service (NMFS) receives information on a State action that may adversely affect EFH, NMFS is required to provide EFH conservation recommendations to the State agency. States are not required to initiate consultation with NMFS nor respond to its recommendations (NOAA's National Marine Fisheries Service 2011).

State of California

California Endangered Species Act

The California Endangered Species Act (CESA) is similar to the ESA, but pertains to state-listed endangered and threatened species. The CESA requires state agencies to consult with the California Department of Fish and Wildlife (CDFW) when preparing documents to comply with the CEQA. The purpose is to ensure that the actions of the lead agency do not jeopardize the continued existence of a listed species or result in the destruction, or adverse modification of habitat essential to the continued existence of those species. In

addition to formal listing under the federal and state endangered species acts, “species of special concern” receive consideration by CDFW. Species of special concern are those whose numbers, reproductive success, or habitat may be threatened.

California Environmental Quality Act Guidelines §15380

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines §15380(d) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled based on the definition in the ESA and the section of the California Fish and Game Code (CFGC) dealing with rare, threatened, and endangered plants and animals. The CEQA Guidelines (§15380) allows a public agency to undertake a review to determine if a significant effect on species that have not yet been listed by either the USFWS or CDFW (e.g. candidate species, species of concern) would occur. Thus, CEQA provides an agency with the ability to protect a species from a Project’s potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

Clean Water Act, Section 401

The CWA (§401) requires water quality certification and authorization for placement of dredged or fill material in wetlands and other waters of the United States. In accordance with the CWA (§401), criteria for allowable discharges into surface waters have been developed by the State Water Resources Control Board, Division of Water Quality. The resulting requirements are used as criteria in granting National Pollutant Discharge Elimination System (NPDES) permits or waivers, which are obtained through the Regional Water Quality Control Board (RWQCB) per the CWA (§402). Any activity or facility that will discharge waste (such as soils from construction) into surface waters, or from which waste may be discharged, must obtain an NPDES permit or waiver from the RWQCB. The RWQCB evaluates an NPDES permit application to determine whether the proposed discharge is consistent with the adopted water quality objectives of the basin plan.

California Fish and Game Code

The CFGC (§3503.5) states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.” Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC (§3503) also states that “it is

unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.”

Rare and Endangered Plants

The CNPS maintains a list of plant species native to California with low population numbers, limited distribution, or otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. Potential impacts to populations of CNPS-ranked plants receive consideration under CEQA review. The CNPS California Rare Plant Rank (CRPR) categorizes plants as the following:

- Rank 1A: Plants presumed extinct in California;
- Rank 1B: Plants rare, threatened, or endangered in California or elsewhere;
- Rank 2: Plants rare, threatened, or endangered in California, but more numerous elsewhere;
- Rank 3: Plants about which we need more information; and
- Rank 4: Plants of limited distribution.

The California Native Plant Protection Act (CFGCA §1900-1913) prohibits the taking, possessing, or sale within the state of any plants with a state designation of rare, threatened, or endangered as defined by CDFW. An exception to this prohibition allows landowners, under specific circumstances, to take listed plant species, provided that the owners first notify CDFW and give the agency at least 10 days to retrieve (and presumably replant) the plants before they are destroyed. Fish and Game Code §1913 exempts from the ‘take’ prohibition ‘the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way.’

Studies Required

Gallaway Enterprises conducted biological and botanical habitat assessments and a protocol-level rare plant survey within the BSA. Biological and botanical surveys were conducted following review of the USFWS IPaC report, CNDDDB Rarefind 5 report, CNPS list, and the CNDDDB occurrence map (**Figure 7**). The United States Geological Survey (USGS) “Boonville” 7.5 minute quadrangle in which the Project is located were used to derive the agency species lists (**Appendix B: Species Lists**). Based on the results of the species lists, Gallaway Enterprises conducted a general habitat assessment and protocol level rare plant botanical survey to identify any rare, endangered, threatened, or sensitive species and their habitats that may have the potential to occur within the BSA.

Personnel and Survey Dates

The biological evaluation and rare plant botanical survey was conducted on June 29, 2018 by Gallaway Enterprises biologist, Melissa Murphy, and senior botanist and certified arborist, Elena Gregg. The purpose of the biological evaluation and rare plant botanical survey is to determine if suitable habitat occurs within the property for special-status species and if special-status species are present. Methods for each survey are described below.

Ms. Murphy has over eight years of experience surveying at the protocol and general level for listed reptiles and amphibians including foothill yellow-legged frog, giant garter snake (GGS), and California red-legged frog. Ms. Murphy has experience surveying for yellow billed cuckoo, foothill yellow-legged frog, PIT tagging reptiles, assisting in de-watering activities including fish relocation, surveying for nesting birds and raptors, capturing and banding waterfowl, and conducting habitat assessments for listed species. Ms. Murphy has installed bird and bat exclusion at a myriad of projects and works under Gallaway Enterprises' CDFW Scientific Collecting Permit as a Principal Investigator.

Mrs. Gregg has over twelve years of professional experience conducting rare plant surveys, wetland delineations, and habitat assessments in California. She has a working knowledge of CNPS, CDFW, and USFWS survey protocols and holds a CDFW collection permit for listed plant species. Through her extensive field experience in a wide array of habitats and eco-regions in northern California, Mrs. Gregg has gained knowledge of locally invasive plants species and noxious weeds.

BIOLOGICAL HABITAT ASSESSMENT

The biological evaluation was conducted by walking the entire BSA and identifying specific habitat types and elements. If habitat was observed for special-status species it was then evaluated for quality based on vegetation composition and structure, physical features (e.g. water, soils), micro-climate, surrounding area, presence of predatory species and available resources (e.g. prey items, nesting substrates). Biological species observed within the BSA are listed in **Appendix C**.

BOTANICAL HABITAT ASSESSMENT

A botanical habitat assessment was conducted on June 29, 2018 by senior botanist Elena Gregg to assess potential for special-status plant species to occur within the BSA. The assessment was conducted by walking in all accessible areas of the BSA and noting the habitat elements present (e.g. soils, geology, hydrology, topography, aspect, elevation, etc.)

and vegetation communities present. If present, natural and man-made disturbance patches were noted as well as the successional stage of vegetation within the BSA. Botanical species observed within the BSA during this field visit are listed in **Appendix C**.

PROTOCOL-LEVEL RARE PLANT SURVEY

The protocol-level rare plant survey was conducted on June 29, 2018 by senior botanist Elena Gregg following the initial botanical habitat assessment during the appropriate blooming period for the four (4) special-status plant species that were identified as having potential to occur within the BSA. The survey was conducted in accordance with the CDFW March 2018, *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Sensitive Natural Communities*. All accessible areas within the Project site were surveyed on foot. A Trimble Geo Explorer 6000 Series GPS Receiver was on hand to record any special-status plant occurrences observed. A list of plant species observed during the protocol-level survey is included as **Appendix C**.

Agency Coordination and Professional Contacts

Consultation to date has included emails, phone calls, and site visits with CDFW Environmental Scientist and Fisheries Specialist, Scott Harris. A Project focus meeting was held on July 9, 2020 with Caltrans Environmental, Gallaway Enterprises, Quincy Engineering Inc, Mendocino County Department of Transportation, and NMFS in attendance. The purpose of the meeting was to discuss the incorporation of fish relocation into the BA and changes in the Project impacts resulting from the Extended Phase 2 Cultural Review. A Biological Assessment (BA) has also been prepared for this Project.

The USFWS IPaC and CNDDDB Rarefind 5 species lists and the CNPS inventory of rare and endangered plants lists were reviewed in March 2019 for documentation of special-status species likely to occur within either the BSA or the USGS Bailey Ridge, Orrs Springs, Ukiah, Philo, Boonville, Elledge Peak, Zeni Ridge, Ornbaun Valley, and Yorkville 7.5 minute quadrangles (**Appendix B**). These lists were updated in December 2020. In addition to the species lists, a map was obtained from the CNDDDB GIS database, which provided general locations of species that had recorded CNDDDB occurrences within a five-mile radius of the Project location (**Figure 7**).

Limitations That May Influence Results

There were no limitations that may influence results of the habitat assessment and site assessment.

3 Results: Environmental Setting

Description of the Existing Biological and Physical Conditions

The Project site is positioned within the narrow Anderson Valley in the northern California coastal mountain range. The BSA consists of an approximately 3.6-acre survey area including the area surrounding the Lambert Lane bridge over Robinson Creek within the town of Boonville, Mendocino County, CA. The BSA is surrounded by a mix of rural residential homes and urban habitats. The Project is located within the Boonville USGS quadrangle, Section 2, Township 13N, Range 14W.

Study Area

Within the BSA, vegetation communities are highly disturbed. All construction related activities will be restricted to the limits of the BSA; therefore, habitat assessments and surveys were restricted to the area within the BSA.

Physical Conditions

The survey area ranges in elevation from 382 to 405 feet above sea level and is sloped between 0-9 percent. Soils within the survey area are loams and sandy loams with a deep restrictive layer located more than 80 inches deep. The average annual precipitation is 37.88 inches and the average temperature is 58.55° F (WRCC 2019) in the region where the survey area is located. Based on the current CWA definition of WOTUS, there is one tributary feature that meets the criteria to be considered a jurisdictional WOTUS within the BSA (**Appendix D**).

Biological Conditions in the Biological Study Area

The BSA consists of existing asphalt roadway, concrete bridge, gravel road shoulder, a mixed species tree canopy and patches of disturbed annual grassland. The existing roadway, concrete bridge and gravel road shoulder are characterized as barren habitat and are not considered habitat for any special-status species. Habitat types present within the BSA are described below based on Mayer and Laudenslayer's *A Guide to Wildlife Habitats of California* (1988).

VALLEY OAK WOODLAND

Along the tops of the banks of Robinson Creek, the majority of the vegetation was dominated by a dense tree canopy consisting of valley oaks (*Quercus lobata*) and live oak (*Quercus wislizeni*), a shrub layer of California bay-laurel (*Umbellularia californica*) and an understory dominated by Himalayan blackberry, periwinkle (*Vinca major*), English ivy (*Hedera helix*), poison oak (*Toxicodendron diversilobum*) and upland herbaceous species.

VALLEY FOOTHILL RIPARIAN

Below the ordinary high water mark (OHWM) of Robinson Creek, there is a narrow corridor of valley foothill riparian habitat. Vegetation along the edges of the creek bed and on the steep banks of the creek include arroyo willow (*Salix lasiolepis*), Himalayan blackberry, and the occasional Oregon ash (*Fraxinus latifolia*). The strip of valley foothill riparian habitat that occurs within the limits of Robinson Creek and the transition from this habitat type to adjacent valley oak woodland and urban habitat is abrupt. Valley foothill riparian habitats provide food, water, migration, and dispersal corridors for fish species and escape, nesting, and thermal cover for an abundance of other wildlife species. Within the BSA, this habitat type is extremely narrow and occurs in close proximity to residential homes, which greatly reduces the potential habitat benefits it can provide.

RIVERINE

Riverine habitat occurs within Robinson Creek in the BSA. Robinson Creek exhibits intermittent flow patterns and typically has a dry period starting in the early summer through fall. The channel morphology is characterized as gravel/cobble bedded pool and riffle with fairly shallow residual pool depths under the bridge. The banks of the creek were generally steep and channelized. Robinson Creek meanders tightly through the BSA with a series of s-curves causing an extensive bank failure and resulting large wood jam from mature trees sloughing into the creek. Upstream of the Robinson Creek bridge the partially failed retaining walls and road embankment is on the outside of a right bend within the channel. On the inside of the bend there is a depositional bar that appears to have formed relatively recently (since construction of the bridge), likely in-part due to backwater affects from the abrupt turn in the channel as it approaches the bridge. The bar appears to have sharpened the radius of the channel bend and pushed the channel thalweg up against the retaining wall along the road embankment and against the nearly vertical bank upstream of the retaining wall, where riprap has been placed, creating a 3-foot water surface drop which classifies the current conditions as a barrier to adult and juvenile steelhead based on the

CDFW fish passage assessment guidelines (CDFG, 2002). Western toad (*Anaxyrus boreas*) tadpoles and juveniles were observed in areas where small isolated pools remained in the channel during the June field visit.

ANNUAL GRASSLAND

Disturbed annual grassland habitat occurs as small patches of openings amongst the tree canopy within the area around the bridge and is the dominant habitat type in the proposed offsite staging area. Vegetation within these annual grassland portions of the survey area was primarily composed of perennial rye-grass (*Festuca perennis*), wall hare barley (*Hordeum murinum*), hawkbit (*Leontodon saxatilis*), smooth cat's-ear (*Hypochaeris glabra*), English plantain (*Plantago lanceolata*), and yellow star-thistle (*Centaurea solstitialis*). Wildlife species use grassland habitat for foraging but require some other habitat characteristic such as rocky out crops, cliffs, caves or ponds in order to find shelter and cover for escapement. Common species that are found breeding in this habitat when it is healthy include a variety of ground nesting avian species and small mammals (Mayer and Laudenslayer 1988).

URBAN

Urban habitat is present adjacent to the bridge site which is composed of residential homes and associated landscaping. This environment can present a mosaic of vegetation including primarily ornamental landscaping but can incorporate native tree species. Generalist and invasive species often occupy urban habitat such as common raven (*Corvus corax*), house sparrow (*Passer domesticus*), scrub jays (*Aphelocoma californica*) and brewers blackbirds (*Euphagus cyanocephalus*) as well as small to medium mammals (e.g., raccoon, opossum, striped skunk) (Mayer and Laudenslayer 1988).

BARREN

Within the BSA, the roadways and bridge structure present are characterized as barren habitat. Barren habitat is defined by the absence of vegetation. The barren habitat within the Project consists primarily of asphalt, concrete and gravel. Barren habitat types generally provide low quality of habitat for wildlife.

Regional Species and Habitats and Natural Communities of Concern

The following special-status species were identified under the USFWS IPaC, CNDDDB, NMFS and the CNPS species lists (**Appendix B: Species Lists**) as having potential to occur within

the USGS “Boonville” 7.5 minute and surrounding quadrangles. Species that have the potential to occur within the BSA are based on suitable habitat within the BSA, including elevation thresholds, CNDDDB occurrences within a five-mile radius of the BSA, and observations made during biological surveys and habitat assessment, thus not all species listed within the various species lists in **Appendix B** are included in **Table 2**. A summary of special-status species and their potential to occur within the BSA is provided in **Table 2**.

Table 2. Federal and State Listed and Candidate Species Potentially Occurring or Known to Occur in the Robinson Creek at Lambert Lane BSA.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
PLANTS					
Burke’s goldfields	<i>Lasthenia burkei</i>	FE/CNPS 1B.1	Vernal pools and swales. (April-Jun)	A	No vernal pools or swales present in the BSA and not observed during the field survey. The Project will have no effect on this species.
Coast fawn lily	<i>Erythronium revolutum</i>	CNPS 2B.2	Bogs, fens, and mesic streambanks. (Mar-Jul)	A	Not observed within the BSA during the field survey.
Contra Costa goldfields	<i>Lasthenia conjugens</i>	FE	Vernal pools. (Mar-Jun)	A	No suitable habitat present in the BSA. The Project will have no effect on this species.
Great burnet	<i>Sangisorba officinalis</i>	CNPS 2B.2	Rocky serpentine seeps, bogs, seasonal wetlands, sometimes stream banks. (Jul-Oct)	A	No suitable rocky or seep habitat present in the BSA.
North Coast semaphore grass	<i>Pleuropogon hooverianus</i>	CNPS 1B.1	Shady, wet grassy areas and freshwater marshes on forest floor. (Apr-Jun)	A	No suitable wet habitat present and not observed within the BSA during the field survey.
Roderick’s fritillary	<i>Fritillaria roderickii</i>	CNPS 1B.1	Coastal grassy slopes and mesas. (Mar-May)	A	No suitable habitat present within the BSA.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
Santa Cruz clover	<i>Trifolium buckwestiorum</i>	CNPS 1B.1	Present in gravelly margins and moist grassland, sometimes in gravel roads and ditches. (Apr-Oct)	A	No suitable gravelly habitat present and not observed within the BSA during the field survey.
Showy Indian clover	<i>Trifolium amoenum</i>	FE/CNPS 1B.1	Usually occurs in wetlands within valley grassland and wetland-riparian communities. (Apr-June)	A	No suitable habitat present and not observed during protocol level survey. The Project will have no effect on this species.
White-flowered rein orchid	<i>Piperia candida</i>	CNPS 1B.2	Sometimes serpentine soils, forest duff, mossy banks, rock outcrops. (May-Sep)	A	Not observed within the BSA during the field survey.
INVERTEBRATES					
There are no regulated invertebrates with the potential to occur in the BSA.					
FISH					
Central California Coast Coho salmon ESU	<i>Oncorhynchus kisutch</i>	FE/SE	Streams and small freshwater tributaries during juvenile stages, spawning habitat includes gravel substrate.	CH/A	Robinson Creek is designated as critical habitat for this species; however, within the BSA the creek is intermittent and dries completely during the summer months. CNDDDB observations between 1990 and 2016 show that there have been no observations of CCC Coho in Robinson Creek (Christy 2016). In addition, an extensive review of peer reviewed literature and citizen sightings conducted by CDFW showed

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
					only one equivocal record of CCC Coho occurring within Robinson Creek within the last 50 years (pers. comm Scott Harris, CDFW Environmental Scientist.). The Project will have no effect on this species.
California Coastal Chinook salmon ESU	<i>Oncorhynchus tshawytscha</i>	FT	Freshwater rivers, streams, and tributaries during the juvenile stages, prefers deep, large streams.	A	Robinson Creek is intermittent and dries completely during the summer months. In addition, an extensive review of peer reviewed literature and citizen sightings conducted by CDFW showed no occurrences of CC Chinook salmon occurring within Robinson Creek within the last 50 years (pers. comm Scott Harris, CDFW Environmental Scientist, Gavette 2014). The Project will have no effect on this species.
Navarro roach	<i>Lavinia symmetricus navarroensis</i>	SSC	Predominately found in small warm streams but are capable of thriving in larger colder streams with diverse conditions.	HP	Robinson Creek provides suitable habitat when water is present.

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
Northern California steelhead DPS	<i>Oncorhynchus mykiss iridius</i>	FT	Wintering habitat includes streams with deep low-velocity pools while spawning habitat includes gravel substrates free of excessive silt.	CH/HP	Robinson Creek is designated critical habitat for this species, but only provides habitat when water is present during winter and spring. In addition, the current site conditions of the failed retaining wall and associated riprap immediately upstream of the bridge are considered a barrier to adult and juvenile steelhead. The Project may affect, but is not likely to adversely affect through potential relocation efforts.
Tidewater goby	<i>Eucyclogobius newberryi</i>	FE	Shallow water bodies characterized by brackish water with low to moderate salinity.	A	The creek present has no tidal influence and does not provide suitable habitat. The Project will have no effect on this species.
REPTILES & AMPHIBIANS					
California red-legged frog	<i>Rana draytonii</i>	FT/SSC	Inhabits quiet pools of streams, marshes, and occasionally ponds.	A	There were no California red-legged frogs observed during the site visit. There is no suitable breeding habitat. There are no CNDDDB occurrences within 5 miles of the BSA, and no hydrologic connection to known populations. The Project will have no effect on this

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
					species.
Foothill yellow-legged frog – Northwest/ North Coast Clade	<i>Rana boylei</i>	SSC	Frequents rocky streams and rivers with rocky substrate and open, sunny banks, in forests, chaparral, and woodlands. Sometimes found in isolated pools, vegetated backwaters, and deep, shaded, spring-fed pools	HP	Creek only provides habitat when water is present during winter and spring.
Western pond turtle	<i>Emys marmorata</i>	SSC	Inhabits permanent streams, marshes, and ponds.	HP	Creek only provides habitat when water is present during winter and spring.
BIRDS					
Bald eagle	<i>Haliaeetus leucophaea</i>	FP	Coast, large lakes and river systems, with open forests with large trees and snags.	A	No nesting habitat within or adjacent to the BSA.
Northern goshawk	<i>Accipiter gentilis</i>	SSC	Continuous stands of deciduous or coniferous trees generally above 3000 feet.	A	Nesting habitat is not expected within ¼ mile of the roadway.
Osprey	<i>Pandion haliaetus</i>	WL	Associated strictly with large fish-bearing waters, needs large trees, snags, and dead-topped trees in open forests for cover and nesting.	A	Robinson Creek is not a large fish-bearing waterway. There are no known occurrences in the vicinity of the BSA.
Mammals					
Pallid Bat	<i>Antrozous pallidus</i>	SSC	Open dry habitats at lower elevations	HP	Mature trees with sloughing bark and/or cavities provide suitable day roosting habitat

Common Name	Scientific Name	Status	General Habitat Description	Habitat Present/Absent	Potential to Occur/Rationale
					within the BSA.
Sonoma tree vole	<i>Arborimus pomo</i>	SSC	Old-growth Douglas-fir forest and dense forests with Douglas fir, grand fir, hemlock or spruce.	A	Only a few small Douglas fir trees present, BSA is in a highly populated area and is in a valley with open grassland/agricultural land.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SSC	Roosts in mines and open caverns.	A	There are no mines or open caverns within the BSA; therefore, no suitable day roosting habitat present.
Code Designations					
Absent [A] - no habitat present and no further work needed. Habitat Present [HP] -habitat is, or may be present. The species may be present. Present [P] - the species is present. Critical Habitat [CH] - project footprint is located within a designated critical habitat unit, but does not necessarily mean that appropriate habitat is present. Status: Federal Endangered (FE); Federal Threatened (FT); Federal Candidate (FC), Federal Species of Concern (FSC); State Endangered (SE); State Threatened (ST); Fully Protected (FP); State Rare (SR); State Candidate (SC), State Species of Special Concern (SSC); State Watch List (WL); California Native Plant Society (CNPS); Sensitive Natural Community (SNC)					

4 Results: Biological Resources, Discussion of Impacts and Mitigation

Habitats and Natural Communities of Special Concern

There are no CDFW designated natural communities of special concern within or adjacent to the BSA.

There is one feature that qualifies as jurisdictional WOTUS within the BSA; Robinson Creek. Project activities will result in permanent impacts to 0.06 acres and temporary impacts to 0.28 acres of WOTUS. Impacts will be the result of channel restoration activities including removing the failed retaining wall and associated RSP from the creek, streambank stabilization through hybrid RSP revetment, vegetation of created point bars, and habitat enhancement. All impacts will have a positive benefit to Robinson Creek and water quality in general. A Draft Delineation of WOTUS Map is included as **Appendix D**.

Special-Status Plant Species

A protocol-level botanical survey was conducted on June 29, 2018 for a total of 13 of the special-status plant species identified on the USFWS, CNPS, and CNDDDB lists which have a blooming period that overlapped with the survey date. No special-status plant species were observed during the protocol-level survey. Further, a habitat assessment was conducted within the BSA on June 29, 2018 for all remaining special-status plant species identified on the CNPS and CNDDDB lists. Due to the lack of vernal, marsh or seep wetland habitat and volcanic, rocky or serpentine soils, none of these special-status plant species were determined to have potential to occur within the BSA. As such, the Project is not expected to have any effect on special-status plant species.

Special-Status Animal Species Occurrences

NORTHERN CALIFORNIA STEELHEAD

The NC steelhead DPS is considered threatened under the federal ESA. They rely on streams, rivers, estuaries and marine habitat during their lifecycle. Because young steelhead spend a significant portion of their lives in rivers and streams, they are particularly susceptible to human induced changes to water quality and habitat threats. Steelhead spawn in streams and rivers, steelhead rear in freshwater for 1 to 4 years before migrating downstream through estuaries to the open ocean. Steelhead spend 1 to 5 years at sea

before returning to natal streams or rivers. Steelhead do not always die after spawning, but will again migrate through estuaries to the ocean.

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for steelhead when water is present during winter and spring months. Additionally, Robinson Creek has been designated as critical habitat for NC steelhead DPS (**Figure 8: NC Steelhead and CCC Coho Salmon Critical Habitat**). During the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. Although there is no spawning habitat present, the BSA does offer suitable steelhead migration/emigration and non-natal rearing habitat during the late fall through late spring months (i.e. November 1 – May 31) when water levels are high and water temperatures are cool. When winter flows are adequate, the BSA provides suitable migration/emigration habitat for juvenile and adult steelhead. During the summer months (i.e. June 1 – October 31), the intermittent hydrology, still water, and warm temperatures make Robinson Creek within the BSA unsuitable habitat for any lifestage of salmonid including steelhead. Therefore, if the BSA contains water between June 1 and October 31 then there is a potential for non-natal juveniles to be present. There is potential for NC steelhead to become stranded within the BSA in isolated pools like the ones observed during the site visit.

Project Impacts

Construction activities will occur in Robinson Creek between June 15 and October 15. If water is present within the BSA, fish relocation will be conducted by a qualified biologist prior to the start of construction activities in the streambed. A clear water diversion shall be installed if needed. Therefore, the Project may affect, and is likely to adversely affect the NC steelhead DPS through potential relocation.

Avoidance and Minimization Efforts

The following recommendations, when implemented, will avoid and minimize impact to this species:

- Construction within Robinson Creek will be limited to June 15 through October 15.
- If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of salmonids is minimized and documented.

- If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
 - The qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to NC steelhead.
 - Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act*.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- Removal of the existing rubble and reconfiguring of the RSP that covers the creek bottom and restoring the channel to a more natural condition to promote fish passage. This will involve removing a current barrier to steelhead at the existing failed retaining wall, thereby restoring access to habitat for steelhead upstream of the bridge.

Compensatory Mitigation

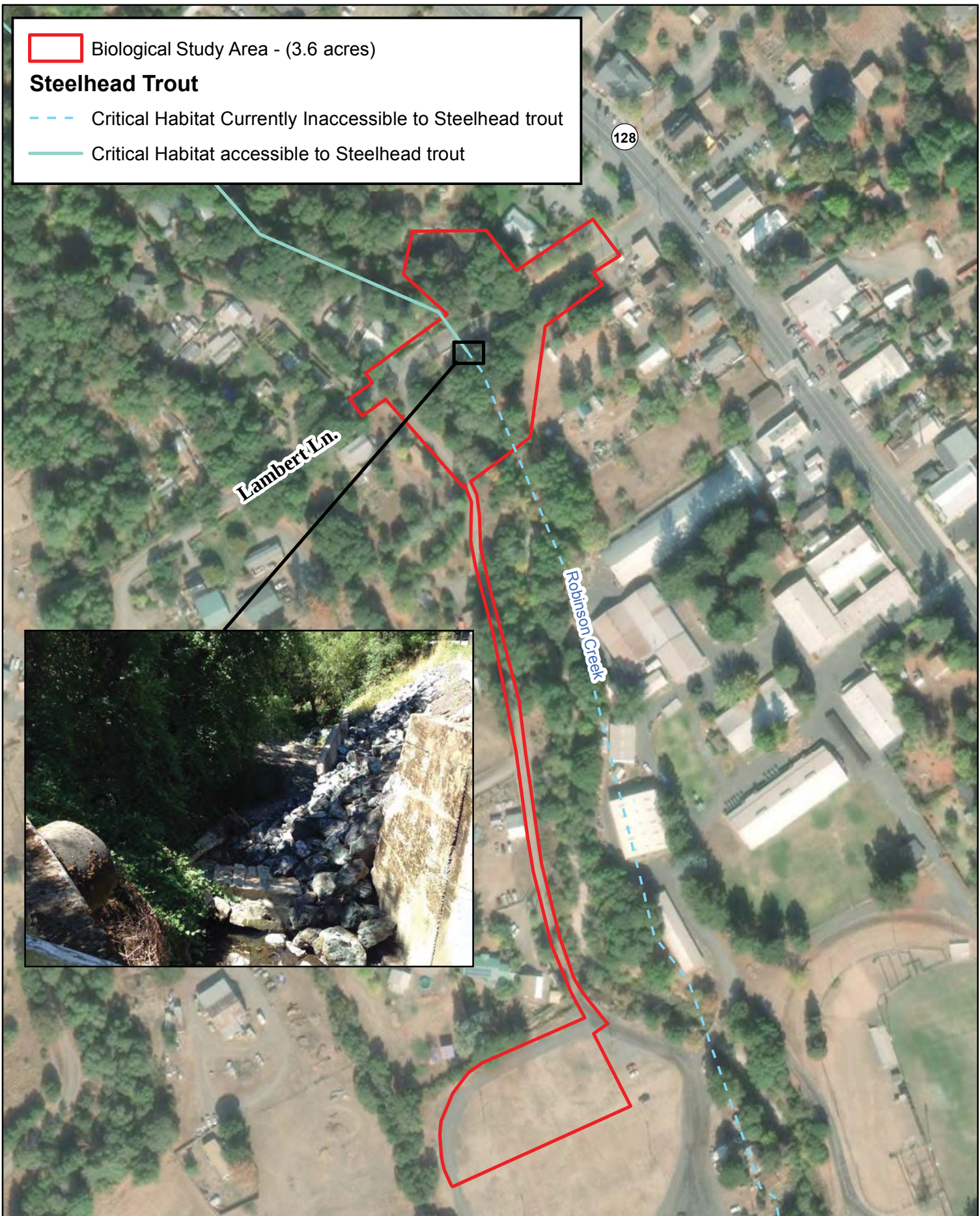
No additional compensatory mitigation will be required, as the implementation of the avoidance and minimization measures discussed above will result in a net benefit to NC steelhead and their habitat. The Project will restore access to 0.25 acres of critical habitat within the BSA and the proposed stream restoration will have a beneficial effect on critical habitat.



Biological Study Area - (3.6 acres)

Steelhead Trout

- - - Critical Habitat Currently Inaccessible to Steelhead trout
- Critical Habitat accessible to Steelhead trout



1:2,500

0 150 300 Feet

Data Sources: ESRI, USFWS, DigitalGlobe
10/31/2017, Quincy Engineering

Robinson Creek Bridge Replacement Project
Steelhead Critical Habitat
Figure 8

gallaway
ENTERPRISES

GE: #15-130 Map Date: 03/07/19

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten steelhead within the BSA or contribute to cumulative effects on steelhead.

NORTHERN CALIFORNIA STEELHEAD AND CENTRAL CALIFORNIA COAST COHO SALMOND CRITICAL HABITAT

Survey Results

Robinson Creek within the BSA is designated as critical habitat for NC steelhead and CCC Coho salmon ESU (**Figure 8**). When water is present in Robinson Creek, the following Primary Constituent Elements (PCEs) are present within the BSA:

- Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
- Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
- Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Project Impacts

The Project is not likely to adversely modify salmonid critical habitat. Critical habitat for salmonids will be affected by the proposed action through stream restoration activities and the placement of RSP within the creek with live willow staking that penetrates the rock layers and allows rooting into the native bank soils. The intent of the hybrid RSP revetment is to balance the engineering benefit of armoring a bank while promoting ecological processes. Proposed hybrid RSP revetment within the portions of Robinson Creek currently accessible to salmonids will result in approximately 93.1 linear feet (0.01 acres) of permanent impacts and temporary impacts of 201.6 linear feet (0.14 acres) to the stream (**Figure 9: Impacts to Critical Habitat**).

Impacts to CH Currently Accessible						
Temporary Impacts						
Label	Cowardin	Description	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Intermittent	29.2	201.6	5889.6	0.14
Temporary Impact Totals =				201.6	5889.6	0.14
Permanent Impacts						
Label	Cowardin	Description	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Intermittent	2.0	93.1	186.2	0.01
Permanent Impacts Totals =				93.1	186.2	0.01



Currently, Robinson Creek is inaccessible to NC steelhead upstream of the existing failed retaining wall (**Figure 8**). Removal of the failed retaining wall and RSP within the creek bottom will restore fish passage and access for steelhead to 0.25 acres of critical habitat within the BSA (**Figure 9**). In addition to the removal of the fish barrier, channel grading will minimize abrupt hydraulic constrictions and areas of focused high velocities.

Avoidance and Minimization Efforts

The critical habitat present within the BSA will likely be impacted by construction activities. The following recommendations, when implemented, will avoid and minimize impact to this species:

- All work within Robinson Creek will occur between June 15 and October 15 when PCEs are not present within the BSA. If water is present within the BSA then fish relocation will be conducted by a qualified biologist prior to the start of construction.
- The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.

Compensatory Mitigation

No compensatory mitigation will be required since there will be a net increase in accessible critical habitat through stream restoration and removal of the existing fish barrier.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten NC steelhead or CCC Coho salmon critical habitat within the BSA or contribute to cumulative effects on steelhead or their critical habitat.

NAVARRO ROACH

Navarro roach are capable of adapting to varying habitats from coastal streams to mountain foothill streams. They are predominately found in small warm streams but are capable of thriving in larger colder streams with diverse conditions. They may actually occupy several different habitat types within a single drainage. Extreme tolerance includes temperatures ranging from 30-35°C and dissolved oxygen levels as low as 1-2 ppm. In-stream location may vary depending on geography and predators. When Navarro roach share water with Sacramento pikeminnows, roach will stick to the stream margins, whereas in the absence of these piscivorous fish roach may venture into deeper pools. Navarro roach are omnivorous and diet may depend on stream size and food availability. In smaller rivers roach feed mostly on filamentous algae, supplementing their diet with crustaceans and insects. In larger rivers these fish may focus on a diet of aquatic insects year round. The growth and development of Navarro roach is largely seasonally dependent. Most growth occurs during the summer months and roach may grow 20-40 mm in a year. Most fish of this species reach sexual maturity at age 2-3 and rarely live beyond three years total. Spawning occurs in March through early July, and timing is temperature dependent. Navarro roach breed in gravel beds or riffles where groups of females lay eggs on and into the substrate. One or two males follow each female closely to fertilize the groups of eggs. Each female may produce 250-2,000 eggs per year depending on body size. The eggs hatch in 2-3 days, but the larvae remain in the protection of the gravel substrate before emerging to swim (CalFish 2018).

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for Navarro roach when there is flowing water present during the winter and spring months. During the June site visit, Robinson Creek was dry with the exception of a few small shallow, isolated pools. There is potential for Navarro roach to become stranded within the isolated pools such as those observed during the site visit.

Project Impacts

Construction activities will occur in Robinson Creek. Channel restoration activities will result in a net increase in both enhanced fish habitat and improved fish passage throughout the BSA. To ensure impacts to Navarro roach from the proposed Project are avoided, the following avoidance and minimization measures will be implemented.

Avoidance and Minimization Efforts

The following recommendations, when implemented, will avoid and minimize impact to this species:

- Construction in Robinson Creek will be limited to June 15 through October 15.
- If flowing water is present within the BSA between June 15 and October 15 then a clear water diversion using an appropriately sized culvert and sandbags will be installed. A qualified biologist shall monitor the construction site during placement and removal of stream diversions to ensure that any harm or loss of aquatic life is minimized and documented.
- If water is present within the Project site between June 15 and October 15, then a qualified biologist will perform fish relocation prior to the start of construction activities.
 - The qualified biologist with expertise in the areas of fisheries biology, including handling, collecting, and relocating fish; fish habitat relationships; and biological monitoring shall perform fish relocation. Fish relocation will be performed in a manner which minimizes all potential risks to Navarro roach.
 - Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NMFS Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act*.
- Installation of LWD will be anchored to bank at the inside bend in the upstream right bank between station 29+60 and 31+100, and on the downstream left bank around station 28+00 to create fish habitat.
- The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition to promote fish passage.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks.

Compensatory Mitigation

No additional compensatory mitigation will be required, as the implementation of the avoidance and minimization measures discussed above will result in a net benefit to

Navarro roach and their habitat. The Project will restore access to 0.25 acres of suitable habitat within the BSA and the proposed stream restoration will have a beneficial effect on habitat present.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten Navarro roach within the BSA or contribute to cumulative effects on Navarro roach.

CALIFORNIA RED-LEGGED FROG

California Red-Legged Frog (CRLF) (*Rana draytonii*) is federally threatened and is a species of special concern in California. The CRLF is the largest native frog in California, with adults obtaining a length of 3 to 5 inches. Adult CRLF have prominent dorsolateral folds, dark spots, a bright red dorsum, and a well-defined stripe running along the upper lip. This species is primarily aquatic and most active during the night occupying perennial water sources such as streams, springs, lakes, marshes, natural and manmade ponds, and ephemeral drainages. During the breeding season, which typically runs from November through April, males call to females from the margins of ponds and slow streams (Jennings et al. 1992). Mating most commonly occurs in February or March, but can vary depending on seasonal climatic patterns. The female lays a jellylike mass of 2,000 to 5,000 reddish brown eggs in the water attached to emergent vegetation, twigs, or other structure. The resulting tadpoles, which likely feed on algae, typically require about 3 weeks to hatch, and another 11 to 20 weeks to metamorphose into juvenile frogs. Metamorphosis, therefore, typically occurs from July to September, although some tadpoles have been observed to delay metamorphosis until the following March or April. Adults are predominantly nocturnal, while juveniles can be active at any time of day.

Survey Results

There were no life stages of California red-legged frog observed during the site visit and no suitable breeding habitat was present within the BSA. There are no known occurrences of CRLF within 5 miles of the BSA. Also, during the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. As such, Robinson Creek does not contain the necessary hydrologic regime required by CRLF for year-round occupancy.

Project Impacts

Due to the intermittent nature of Robinson Creek, there is no suitable breeding habitat for CRLF within the BSA. As such, the Project will have no effect on CRLF.

Avoidance and Minimization Efforts

The CRLF is not expected to occur within the BSA, therefore the Project will have no effect on this species and there are no recommendations for additional avoidance.

Compensatory Mitigation

No compensatory mitigation will be required since the Project will have no effect on CRLF or its habitat.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten CRLF within the BSA or contribute to cumulative effects on CRLF.

FOOTHILL YELLOW-LEGGED FROG

The foothill yellow legged frog northwest / north coast clade (FYLF, *Rana boylei*) is listed as a SSC. It is a gray to olive colored frog with occasional mottling or spots, and lacks a dorsolateral folk common in California Red-Legged Frog or eye strip common in Northern Pacific tree frogs (*Pseudacris regilla*). The FYLF range includes the coast ranges of Oregon south to Los Angeles County, in northern California west of the Cascade crest, and along the west side of the Sierra Nevada range as far south as Kern County. The FYLF has been found in a variety of habitats. Those habitats that have been found most suitable based on the majority of occurrences include a running perennial water source such as rocky rivers and step rocky tributaries. They have also been found in ephemeral streams, intermittent streams, and perennial ponds. Boulders and large cobble play an important role in the FYLF habitat and life history. FYLFs utilize boulders and large cobble in streams for areas of refuge from predators, basking, depositing eggs and cover during periods of inactivity such as over wintering or cold weather. Breeding season begins at the end of the spring flood season, which can be between March and May depending on local conditions. Breeding and egg laying occur in streams with running water and do not occur in ponds or lakes which are common for most ranids (true frogs). Current threats facing FYLF are primarily due to invasive and exotic predators such as the bullfrog (*Rana catesbeiana*) and centrarchid fish. Other threats include degradation of habitat, hydroelectric development, urban development, agriculture, and timber harvests (Zeiner, D.C. et al. 1990).

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for FYLF and there is a known CNDDDB occurrence of FYLF approximately 0.5 miles downstream of the

BSA (Occurrence # 467) within Anderson Creek near its confluence with Rancheria Creek. This occurrence was last observed in 2004 at the SR 128 bridge over Anderson Creek. However, during the June site visit, Robinson Creek was dry with the exception of a few small shallow, isolated pools. As such, Robinson Creek only contains suitable habitat for FYLF when there is flowing water present in the creek in the winter and spring months.

Project Impacts

Construction activities will occur in Robinson Creek, and have the potential to affect FYLF if present. To ensure no impacts to FYLF occur due to the proposed Project, the following avoidance and minimization measures will be implemented.

Avoidance and Minimization Efforts

While there were no observations of FYLF during the site visit, there is suitable FYLF habitat present within the BSA. The following recommendations, when implemented, will minimize impacts to this species:

- Construction within Robinson Creek will be limited to June 15 through October 15, during periods of low flows.
- A qualified biologist shall conduct a preconstruction survey to determine presence of FYLF immediately prior to the start of in-channel work. If found, FYLF will be relocated to suitable habitat outside of the BSA by a qualified biologist.
- Contractor shall not use plastic monofilament netting which can entrap the FYLF.
- The existing rubble from the failed retaining wall and RSP will be removed from the creek channel and the channel will be restored to a more natural condition.
- In addition to the willow plantings contained within the hybrid RSP revetment, native vegetation will be planted on the graded point bars on the inside of the channel bends. This vegetation should include native riparian tree species, as well as understory plants.
- The Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks.

Compensatory Mitigation

No compensatory mitigation will be required since the implementation of the avoidance and minimization measures discussed above will ensure that no impacts to FYLF will occur and channel restoration will have a beneficial effect on FYLF habitat.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten FYLF within the BSA or contribute to cumulative effects on FYLF.

WESTERN POND TURTLE

The western pond turtle (*Actinemys marmorata*) is a SSC in California. Western pond turtles are drab darkish colored turtles with a yellowish to cream colored head. They range from the Washington Puget Sound to the California Sacramento Valley. Suitable aquatic habitats include slow moving to stagnant water, such as back waters and ponded areas of rivers and creeks, semi-permanent to permanent ponds and irrigation ditches. Preferred habitats include features such as hydrophytic vegetation, for foraging and cover, and basking areas to regulate body temperature. In early spring through early summer, female turtles begin to move over land in search for nesting sites. Eggs are laid on the banks of slow moving streams. The female digs a hole approximately four inches deep and lays up to eleven eggs. Afterwards the eggs are covered with sediment and are left to incubate under the warm soils. Eggs are typically laid between March and August (Zeiner, D.C et al. 1990). Current threats facing the western pond turtle include loss of suitable aquatic habitats due to rapid changes in water regimes and removal of hydrophytic vegetation.

Survey Results

The stretch of Robinson Creek that occurs in the BSA contains suitable habitat for western pond turtles. However, during the June site visit, Robinson Creek was dry with the exception of a few small shallow pools. As such, Robinson Creek only contains suitable habitat for western pond turtles when there is flowing water present in the creek in the winter and spring months. Given the steep banks and abundance of cobble substrate there is no potential for western pond turtle nests to occur within the BSA.

Project Impacts

The Project has potential to impact western pond turtles through activities that may disturb western pond turtle habitat and relocation efforts as needed. There will be no impacts to western pond turtles with the implementation of avoidance and minimization measures.

Avoidance and Minimization Efforts

The following are recommended avoidance and minimization measures recommended in order to avoid and minimize potential impacts to western pond turtles.

- A qualified biologist shall conduct a preconstruction survey to determine presence of western pond turtle immediately prior to the start of in-channel work. If found, western pond turtles will be relocated to suitable habitat outside of the BSA by a qualified biologist.
- If a western pond turtle is observed within the Project site, then personnel shall stop work within a 50-foot radius of the sighting and notify the biologist or resident engineer (RE). Work shall not resume within the 50-foot radius buffer until the western pond turtle has left the Project site on its own volition or has been relocated by the qualified biologist.

Compensatory Mitigation

No compensatory mitigation will be required since the implementation of the avoidance and minimization measures discussed above will ensure that no impacts to western pond turtles will occur.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten western pond turtles within the BSA or contribute to cumulative effects on western pond turtles.

MIGRATORY BIRDS AND RAPTORS

Nesting birds are protected under the MBTA (16 USC 703) and the CFGC (3503). The MBTA (16 USC §703) prohibits the killing of migratory birds or the destruction of their occupied nests and eggs except in accordance with regulations prescribed by the USFWS. The bird species covered by the MBTA includes nearly all of those that breed in North America, excluding introduced (i.e. exotic) species (50 Code of Federal Regulations §10.13). Activities that involve the removal of vegetation including trees, shrubs, grasses, and forbs or ground disturbance has the potential to affect bird species protected by the MBTA.

The CFGC (§3503.5) states that it is “unlawful to take, possess, or destroy any birds in the order Falconiformes (hawks, eagles, and falcons) or Strigiformes (all owls except barn owls) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.” Take includes the disturbance of an active nest resulting in the abandonment or loss of young. The CFGC (§3503) also states that “it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.”

Survey Results

No active nests of any migratory bird or raptor species were observed during the biologist's field visit, however, the BSA contains vegetation and habitat that have the potential to support nesting migratory birds and raptors. Construction is proposed to occur outside of the avian nesting season, thus minimizing impacts to all avian bird species. A pre-construction survey is recommended if construction is delayed into the avian breeding season (February 1 – August 31) to determine potential locations of active avian species nests within or in close proximity of the BSA.

Project Impacts

With the implementation of avoidance and minimization measures specified above there will be no impacts to avian species of special concern or avian species protected under the MBTA and CFGC.

Avoidance and Minimization Efforts

To avoid impacts to avian species of special concern or avian species protected under the MBTA and the CFGC, the following avoidance and minimization measures are recommended.

The following are avoidance and minimization measures for California avian species of special concern and species protected under the MBTA and the CFGC.

- Any vegetation removal and/or ground disturbance activities should take place during the avian non-breeding season (September 1 – January 31).
- If construction is to begin within the avian breeding season (February 1 – August 31) then a migratory bird and raptor survey shall be conducted within the BSA by a qualified biologist. A qualified biologist shall:
 - o Conduct a protocol level survey for all birds protected by the MBTA and CFGC within seven (7) days prior to construction activities, and map all nests located within 200 feet of construction areas;
 - o Develop buffer zones around active nests as recommended by a qualified biologist. Construction activity shall be prohibited within the buffer zones until the young have fledged or the nest fails. Nests shall be monitored at least once per week and a report submitted to the County monthly.

- o If construction activities stop for more than ten (10) days then another migratory bird and raptor survey shall be conducted within seven (7) days prior to the continuation of construction activities.
- All staging and construction activity will be limited to designated areas within the BSA and designated routes for construction equipment shall be established in order to limit disturbance to the surrounding area.

Compensatory Mitigation

There will be no compensatory mitigation necessary for Project activities in regards to avian species of special concern or avian species protected under the MBTA and CFGC.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten migratory birds within the BSA or contribute to cumulative effects on migratory bird species.

BATS

Pallid bats are designated as a CDFW SSC. Pallid bats roost alone, in small groups (2 to 20 bats), or gregariously (100s of individuals). Day and night roosts include crevices in rocky outcrops and cliffs, caves, mines, trees (e.g., basal hollows of coast redwoods and giant sequoias, bole cavities of oaks, exfoliating Ponderosa pine and valley oak bark, deciduous trees in riparian areas, and fruit trees in orchards), and various human structures such as bridges (especially wooden and concrete girder designs), barns, porches, bat boxes, and human-occupied as well as vacant buildings. Roosts generally have unobstructed entrances/exits, and are high above the ground, warm, and inaccessible to terrestrial predators. However, this species has also been found roosting on or near the ground under burlap sacks, stone piles, rags, and baseboards. Lewis 1996 found that pallid bats have low roost fidelity and both pregnant and lactating pallid bats changed roosts an average of once every 1.4 days throughout the summer. Overwintering roosts have relatively cool, stable temperatures and are located in protected structures beneath the forest canopy or on the ground, out of direct sunlight. In other parts of the species' range, males and females have been found hibernating alone or in small groups, wedged deeply into narrow fissures in mines, caves, and buildings. At low latitudes, outdoor winter activity has been reported at temperatures between -5 and 10 °C.

Survey Results

During the field survey there was no evidence of bats roosting within the bridge structure. However, the mature oak trees surrounding the creek within the BSA have suitable habitat

elements (e.g. cavities, peeling bark) that may provide suitable day roost habitat for pallid bats.

Project Impacts

Construction timing within the creek is proposed from June 15 to October 15 which falls within the bat maternity season (April-August).

Avoidance and Minimization Efforts

If trees containing suitable bat habitat (i.e. sloughing bark, activities, or crevices) are removed between March 15 and August 31, a qualified biologist will conduct a preconstruction survey for roosting bats within seven days prior to tree removal. The survey will focus on suitable habitat to determine the absence or presence of roosting bats and type of roost within the tree. If the pre-construction survey determines that bats are not using the trees onsite as day roosts, then tree removal can proceed as planned.

If the tree is being utilized as a day roost and the qualified biologist determines that it is a maternity roost, then removal of the tree will be postponed until consultation with CDFW occurs. If the roost is not a maternity roost or if tree removal occurs during the winter months (i.e. October 16 – February 14), then the following phased removal of the occupied tree will be implemented:

- Day 1: All unoccupied roosting habitat (e.g. crevices, sloughing bark, cavities) should be removed or altered to make it less desirable for roosting. All portions of the tree that do not contain suitable habitat can be removed while avoiding occupied habitat.
- Day 2: All remaining portion of the tree including suitable roosting habitat can be removed.

A qualified biologist shall be onsite during tree removal activities if bats are detected.

Compensatory Mitigation

No compensatory mitigation necessary or required.

Cumulative Impacts

There are no foreseeable new actions that have potential to threaten bats within the BSA or contribute to cumulative effects on bats.

5 Conclusions and Regulatory Determinations

Federal Endangered Species Act Consultation Summary

The USFWS was contacted in March 2019 for a list of endangered, threatened, sensitive and rare species, and their habitats within the BSA. This list was updated in December 2020. The list was later referenced to determine appropriate biological and botanical surveys and potential species occurrence within the BSA. The Project may affect and is likely adversely affect the NC steelhead DPS. With the implementation of avoidance and minimization measures, the Project will have no effect on any other federally listed species. The Project is not likely to adversely modify NC steelhead DPS and CCC Coho salmon critical habitat. The Project will both enhance salmonid habitat and restore fish passage to 0.25 acres of critical habitat within the BSA (**Figure 9**).

Essential Fish Habitat Consultation Summary

Robinson Creek within the BSA falls within the Big-Navarro-Garcia Hydrologic Unit, which is mapped as EFH for all Chinook and Coho salmon species. California Coastal Chinook salmon Coho salmon Evolutionarily Significant Unit (ESU) and Central California Coast (CCC) Coho salmon ESU are the Chinook and Coho salmon species that are known to occur in nearby streams that support salmonids.

Robinson Creek is intermittent and dries completely during the summer months. CNDDDB observations between 1990 and 2016 show that there have been no observations of CCC Coho in Robinson Creek (**Figure 10: Chinook and Coho Salmon Observation Based Distribution**). In addition, an extensive review of peer reviewed literature and citizen sightings conducted by CDFW indicated no occurrences of CC Chinook and only one equivocal occurrence of CCC Coho occurring within Robinson Creek within the last 50 years (pers. comm. Scott Harris, CDFW). There is no evidence or documentation that indicates that Robinson Creek was within the historical distribution of CCC Coho or CC Chinook salmon. The proposed Project will have no effect on these species.

Due to the fact that these species do not occur within Robinson Creek and the lack of evidence of historical distribution within the BSA, Robinson Creek does not meet the definition of necessary waters for Chinook and Coho salmon species and should not be considered EFH. The proposed Project will have beneficial effects to EFH. No additional mitigation for affects to EFH will be required.

Temporary impacts to EFH during construction activities will be compensated for through the beneficial effects on habitat from the Project. Removal of a failed retaining wall and RSP will restore fish passage to 0.25 acres of EFH within the BSA. In addition, habitat enhancements to Robinson Creek throughout the BSA will be achieved through stream restoration including protecting the embankment slopes from erosion with hybrid RSP revetment, channel grading to remove abrupt hydraulic changes, the addition of point bars along the banks of the creek, and willow and tree plantings (**Appendices A & F**). Additionally, LWD will be anchored in place upstream and downstream of the new bridge and will provide enhanced habitat.

California Endangered Species Act Consultation Summary

The CDFW was contacted in March 2019 for a list of endangered, threatened, sensitive and rare species, and their habitats within the BSA. This list was updated in December 2020. The list was later referenced to determine appropriate biological and botanical surveys and potential species occurrence within the BSA. With the implementation of avoidance and minimization measures, the Project is expected to have no effect on state listed species.

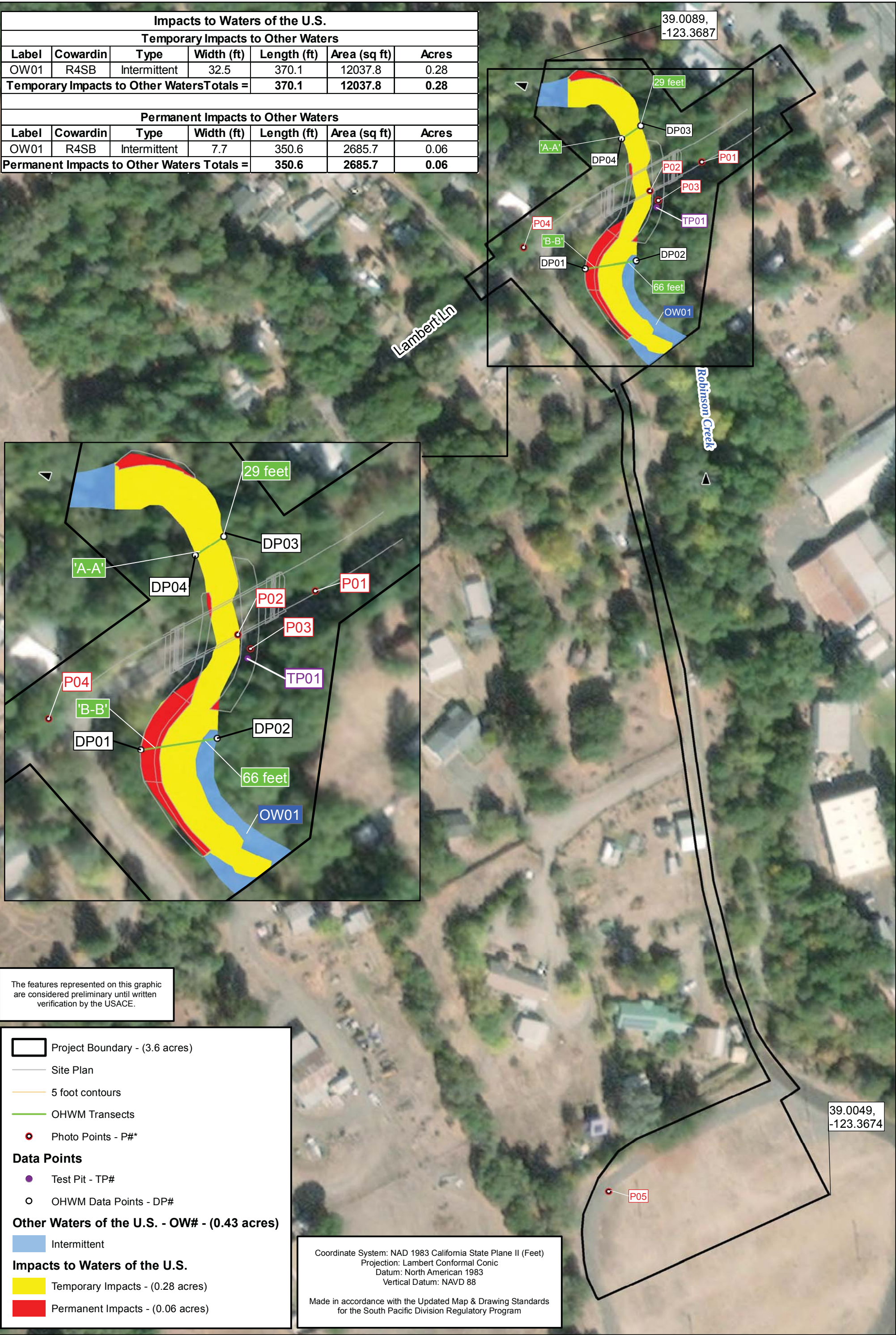
Wetlands and Other Waters Coordination Summary

Gallaway Enterprises conducted a Delineation of WOTUS within the BSA.

The BSA was surveyed on-foot by Gallaway Enterprises staff on June 29, 2018 to identify potentially jurisdictional features. The surveys involved an examination of botanical resources, soils, hydrological features, and determination of wetland characteristics based on the United States Army Corps of Engineers Wetlands Delineation Manual (1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (2008). The boundaries of non-tidal, non-wetland waters, when present, were delineated at the OHWM as defined in 33 Code of Federal Regulations (CFR) 328.3 and further described in the U.S. Army Corps of Engineers *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (2008). The OHWM represents the limit of Corps jurisdiction over non-tidal waters (e.g., streams and ponds) in the absence of adjacent wetlands (33 CFR 328.04) (Curtis, et. al. 2011).

The one tributary was identified within the BSA. No wetlands were determined to be present. The one tributary will be impacted by the Project activities. As such, a RWQCB §401 Water Quality Certification permit and a U.S. Army Corps of Engineers (Corps) Nationwide

Impacts to Waters of the U.S.						
Temporary Impacts to Other Waters						
Label	Cowardin	Type	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Intermittent	32.5	370.1	12037.8	0.28
Temporary Impacts to Other Waters Totals =				370.1	12037.8	0.28
Permanent Impacts to Other Waters						
Label	Cowardin	Type	Width (ft)	Length (ft)	Area (sq ft)	Acres
OW01	R4SB	Intermittent	7.7	350.6	2685.7	0.06
Permanent Impacts to Other Waters Totals =				350.6	2685.7	0.06



Robinson Creek Bridge Replacement Project
Impacts to Waters of the U.S.
Figure 11

§404 14 permit are necessary. The Project will result in 0.28 acres of temporary and 0.06 acres of permanent impacts to jurisdictional WOTUS (**Figure 11: Impacts to Waters of the US**). This Project is self-mitigating as both temporary and permanent impacts will have a net benefit to WOTUS; therefore, the purchase of credits at a Corps approved mitigation bank or payment to a Corps approved in-lieu fund, will not be required. Impacts will be the result of restoration activities including removing the failed retaining wall and associated RSP from the creek, streambank stabilization through hybrid RSP revetment, vegetation of created point bars, and habitat enhancement.

Invasive Species

Many non-native plant species occur in California's natural lands. Some of these non-natives have become naturalized and are relatively benign; however, there are a number of these non-natives that are considered highly invasive. The non-native plants that are considered invasive are tracked and ranked by their invasiveness by the United States Department of Agricultural (USDA) Natural Resource Conservation Service (NRCS) and the California Invasive Plant Council (Cal-IPC). Within the BSA, 15 invasive plant species were observed that are included on the USDA and/or Cal-IPC invasive and noxious weed plant list as having a moderate or higher degree of invasiveness in California (**Table 3**).

Table 3. Invasive Plant Species Identified within the BSA

Scientific Name	Common Name	CAL-IPC	USDA California State
<i>Ailanthus altissima</i>	Tree-of-heaven	Moderate	N/A
<i>Avena barbata</i>	Wild Oats	Moderate	N/A
<i>Bromus diandrus</i>	Ripgut brome	Moderate	N/A
<i>Bromus madritensis</i> <i>ssp. rubens</i>	Red brome	High	N/A
<i>Cynodon dactylon</i>	Bermuda grass	Moderate	CW
<i>Cynosurus echinatus</i>	Hedgehog dogtail	Moderate	N/A
<i>Festuca myuros</i>	Rat-tail fescue	Moderate	N/A
<i>Festuca perennis</i>	Italian ryegrass	Moderate	N/A
<i>Hedera helix</i>	English ivy	High	N/A

Scientific Name	Common Name	CAL-IPC	USDA California State
<i>Hordeum murinum</i>	Wall hare barley	Moderate	N/A
<i>Lythrum hyssopifolia</i>	Hyssop loosestrife	Moderate	N/A
<i>Mentha pulegium</i>	Pennyroyal	Moderate	N/A
<i>Rubus armeniacus</i>	Himalayan blackberry	High	N/A
<i>Torilis arvensis</i>	Hedge-parsley	Moderate	N/A
<i>Vinca major</i>	Periwinkle	Moderate	N/A

CODE DESIGNATIONS
Moderate – Ecological impacts are substantial, but not severe; moderate to high rates of dispersal but establishment dependent on ecological disturbance; limited to widespread distribution. High – Ecological impacts severe; moderate to high rates of dispersal and establishment; widely distributed. CW = C List (noxious weeds)

It is recommended that general best management practices (BMP) be implemented prior and during construction activities as recommended under the Cal-IPC Preventing the Spread of Invasive Plants: Best Management Practices for Transportation and Utility Corridors (2012). The following are the recommended general BMP's under Cal-IPC:

- Schedule activities to minimize potential for introduction and spread of invasive plants.
- Designate specific areas for cleaning tools, vehicles, equipment, clothing and gear.
- Designate waste disposal areas for invasive plant materials, and contain invasive plant material during transport.
- Plan travel routes to avoid areas infested with invasive plants.
- Clean tools, equipment, and vehicles before transporting materials and before entering and leaving worksites.
- Clean clothing, footwear and gear before leaving infested areas.
- Prepare worksites to limit the introduction and spread of invasive plants.

- Minimize soil and vegetation disturbance.

Other

Sudden Oak Death Syndrome

Best Management Practices should be employed to prevent the spread of Sudden Oak Death Syndrome (SOD) and other plant pathogens related to the disposal of vegetation being removed by the Project. The following are the recommended BMPs for prevention of the spread of SOD.

Sudden Oak Death Construction BMPs:

- Ensure all equipment is clean and free of any mud, duff, or vegetation prior to entering or leaving the Project site.
- If any known host species are planned for removal within the Project, all branches will be chipped and the chips spread and kept on-site and the trunks be cut into firewood for burning.
- Avoid using watering trucks in areas around host species.
- Avoid trimming any vegetation of host species during wet conditions.
- Clean and properly sanitize all cutting tools (i.e., chainsaws, hand saws, axes, mauls, etc.).

Sudden Oak Death Revegetation BMPs:

- Limit the amount of host species used as re-planting stock.
- Do not plant acorns or other seeds collected from areas known to be infested with SOD.
- Do not import soil, mulch, duff, or other organic material from areas known to be infested with SOD.
- Inspect all nursery stock for signs of infection or cankers.
- Mulch replanted area with no more than 4 inches of clean coarse bark and avoid mulching directly around trunk collar.

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Appendix A – Robinson Creek Channel Design Report

Robinson Creek Bridge Replacement on Lambert Lane,
Mendocino California

Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project



Federal-Aid Project No. BLO-5910(099)

Mendocino County Project No. B1302

Existing Bridge No. 10C0146

Prepared for:

**Quincy Engineering
and
County of Mendocino Department of Public Works**

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March 2019

Robinson Creek Channel Design Report for the Lambert Lane Bridge Replacement Project

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March 2019

Cover Photo: Oak tree recently fallen into Robinson Creek upstream of Lambert Lane following bank erosion.

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1 INTRODUCTION

1.1 Purpose of Report

The purpose of this report is to summarize the channel design for a bridge replacement project on Lambert Lane at Robinson Creek, a tributary to Anderson Creek, in the unincorporated community of Boonville, Mendocino County, California. The bridge replacement designs are being developed by Quincy Engineering for the county and is intended to replace an obsolete and scour critical bridge.

1.2 Project Background

The County of Mendocino and the California Department of Transportation (Caltrans), are planning to replace Lambert Lane Bridge at Robinson Creek (Bridge No. 10C0146). Lambert Lane crosses Robinson Creek approximately 2,860 linear feet upstream of the confluence with Anderson Creek and 500 feet west of State Route SR128 (Figure 1). The contributing drainage area at the bridge crossing is approximately 4.0 square miles. The bridge has been labelled functionally obsolete and is scour critical. Originally built in 1954, the existing 32-foot long single span bridge is supported on concrete abutments founded on spread footings which were placed on the alluvial channel material. Caltrans has noted hydraulic undermining of the abutments since the year 2000. In February 2015 a retaining wall along the roadway embankment on the upstream side of the western bridge approach collapsed, falling across the stream channel. This created a flow obstruction that further increased scour of the bridge foundation. As an emergency measure the county placed riprap at the base of the roadway and later pumped concrete underneath the undermined footing and formed a concrete skirt in front of the exposed footing, as seen in Figure 2.

Previous work has been conducted by Quincy Engineering in partnership with County of Mendocino Department of Public Works, including a Bridge Design Hydraulic Study (2018) and Project Report (2018). These works provide the basis for design of the proposed bridge replacement. Michael Love & Associates, Inc. (MLA) has been contracted to develop the geomorphic design and stabilization measures for the stream channel within the bridge replacement project reach, which is described within this report.

1.3 Fisheries Habitat and Fish Passage

Robinson Creek is a tributary to Anderson Creek within the Navarro River watershed. Robinson Creek is designated as critical habitat for Northern California steelhead, which is federally listed as a threatened species. Streamflows within Robinson Creek are intermittent, with the channel drying by early summer. These conditions suggest that the habitat available in lower Robinson Creek is primarily suitable for spawning and over-winter rearing for steelhead.

A fish passage assessment of stream crossings was conducted by RTA (2001). Because the Lambert Lane bridge is a channel spanning crossing, it was considered to provide unimpeded fish passage and was not included in the assessment. However, under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife fish passage assessment guidelines (CDFG, 2002). Channel restoration designs for the site should satisfy current fish passage standards, as described in CDFG (2009) and NMFS (2001).

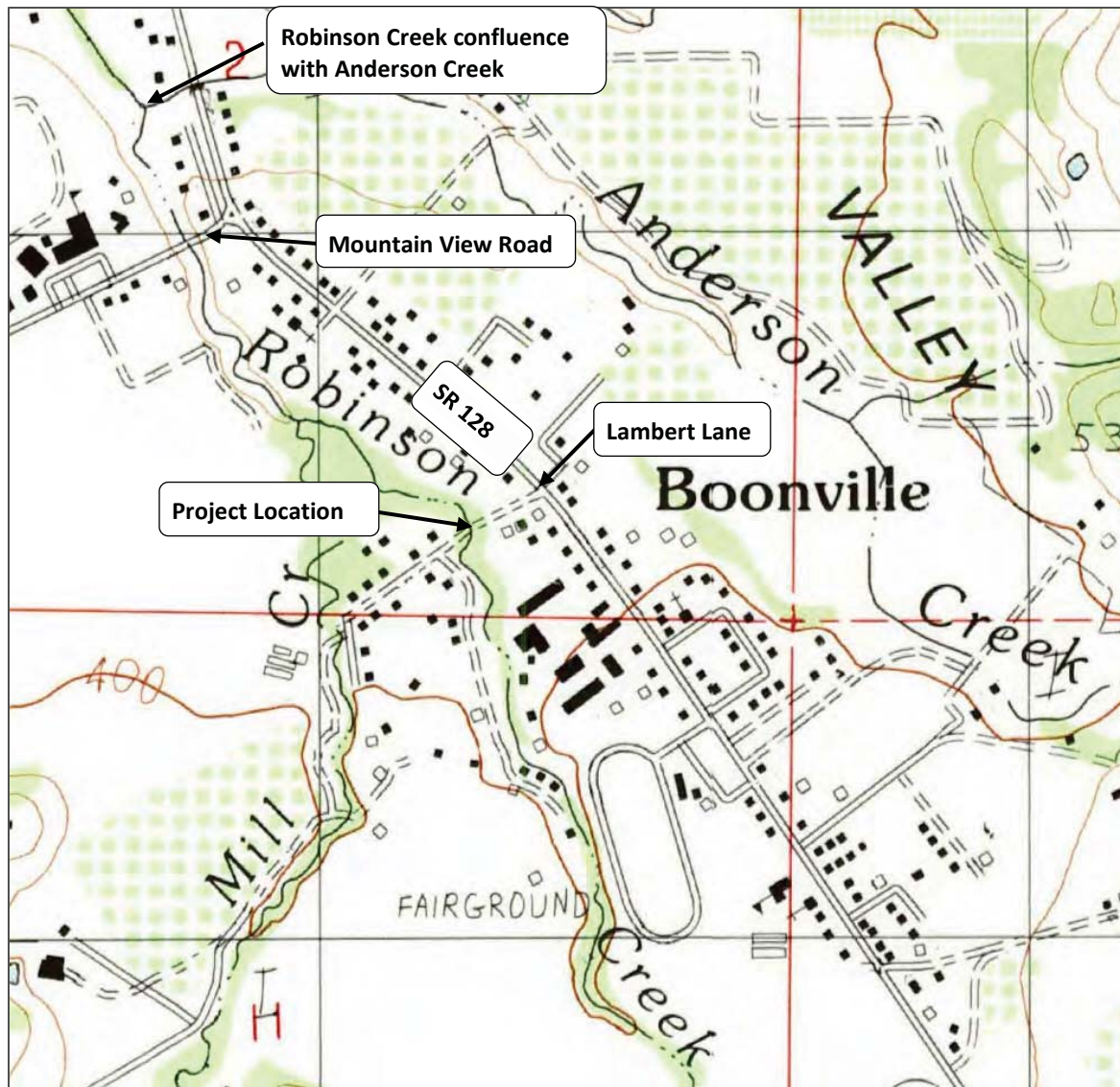


Figure 1. Project location for bridge replacement on Lambert Lane at Robinson Creek, Boonville, Mendocino County, California.



Figure 2. Current condition of the channel at the Lambert Lane Bridge, with (a) riprap placed along roadway embankment at location of collapsed retaining wall and (b) a new concrete skirt along the undermined footing.

1.4 Previous Studies of Geomorphic Channel Conditions

Changing geomorphic conditions within Robinson Creek and downstream Anderson Creek have been noted for decades. Channel incision (lowering of the channel bed) and channel bank erosion along Robinson Creek was noted as a significant source of sediment production within the 1998 Navarro River Watershed Restoration Plan. Incision has caused scour and undermining of bridge foundations, leading to the replacement of the Highway 128 crossing of Anderson Creek immediately upstream of the confluence of Robinson Creek and replacement of the Mountain View Road bridge crossing over Robinson Creek, downstream of Lambert Lane. Also, channel widening associated with incision processes has caused severe bank erosion threatening adjoining structures and resulting in loss of mature riparian vegetation throughout lower Robinson Creek,

The Mendocino County Resource Conservation District (RCD) and the Mendocino County Water Agency conducted studies of channel conditions to characterize the ongoing channel adjustments in Robinson Creek, focusing on the reach from the confluence with Anderson Creek to the Mendocino County Fair Grounds upstream of Lambert Lane. This included conducting profile surveys of the channel thalweg and surveys of channel cross sections in 2005 to document the channel morphology. Florsheim (2006) prepared a baseline assessment of bio-geomorphic conditions within lower Robinson Creek for the RCD, and identified channel incision as the dominant process causing the observed channel instabilities. Follow-up monitoring surveys of the lower Robinson Creek channel thalweg were conducted in 2008, which found the channel showed signs of aggradation near the confluence with Anderson Creek, but also showed signs of incision within a reach between Mountain View Road and Lambert Lane bridge crossings (Florsheim, 2008). These findings were further described in a 2013 peer-reviewed publication (Florsheim et al., 2013). The RCD provided the original data from the 2005 and 2008 county surveys to MLA to compare to current channel conditions at the Lambert Lane bridge replacement project.

1.5 Channel Restoration Design Approach

Development of the channel restoration design for the bridge replacement project involved:

- Reviewing previous geomorphic studies and data for Robinson Creek,
- Characterizing existing geomorphic processes related to previously noted channel incision and widening that may influence the project channel reach
- Identifying the design channel profile and estimate the potential range in variability of the channel bed elevation resulting from future incision or aggradation processes
- Identifying appropriate channel dimension based on a characterization of a stream reference reach
- Identifying appropriate bank treatments based on hydraulic forces acting on the streambanks within the project reach

Channel design followed stream simulation methodology from USFS (2008) and bank stabilization measures from Caltrans design documents, as referenced within this report. The channel design is intended to provide geomorphically stable channel geometry while protecting the roadway embankment and vulnerable streambanks with hybrid RSP revetments where required due to risk of scour and lateral channel migration.

2 STREAM CHANNEL GEOMORPHIC CHARACTERIZATION

The proposed stream channel component of the replacement crossing was designed using the stream simulation approach outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFG, 2009) and by the USFS (2008). The stream simulation approach is a geomorphically-based approach that requires a channel-spanning crossing structure with adequate capacity to convey the 100-year flow. The channel grading should seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed.

2.1 Field Activities

2.1.1 Lower Robinson Creek Reconnaissance and Observations

On September 12, 2018 staff from MLA walked Robinson Creek stream channel from the confluence with Anderson Creek to the bridge crossing at the Mendocino County Fair Grounds. In general, the channel appeared to be relatively stable vertically, with no obvious knickpoints. The channel morphology is characterized as gravel/cobble bedded pool and riffle with fairly shallow residual pool depths. Primary features forcing the channel morphology and pool scour appear to be channel constrictions, flow obstructions and wood recruitment from bank failures.

From upstream to downstream the channel widens, and the terraces that form the valley floor get higher above the channel bed, with heights ranging from 15 to 25 feet increasing in the downstream direction. Active bank erosion sites are located at numerous locations throughout lower Robinson Creek. Indicators suggest that the channel incision process noted by Florsheim (2006 and 2008) has slowed or stopped and the channel is actively widening due to the oversteepened banks created by incision. Several locations were recently treated for bank erosion, which involved use of both large rock and vegetation treatments (live willow stakes).

2.1.2 Geomorphic Site Surveys

On September 12 and 13, 2018 staff from MLA conducted a geomorphic survey of the stream channel extending 500 feet downstream and 1,182 feet upstream of Lambert Lane using a Trimble S7 robotic total station. The survey datum was State Plane Zone 2 in the horizontal and NAVD88 in the vertical based on survey control established by SHN for the project. At the time of the survey the channel was dry.

The geomorphic survey consisted of a longitudinal profile of the channel thalweg extending a total distance of 1,682 feet. The profile includes breaks in slope, such as riffle crests and pool bottoms. In addition to the thalweg, the margins of the actively scoured channel bed were surveyed. In potential reference reaches, persistent inset benches above the bankfull channel bed were also surveyed. Downstream of Lambert Lane the bases of several streamside heritage bay trees were also surveyed as indicators of historical incision.

A series of five channel cross sections were surveyed upstream and four downstream of Lambert Lane for use in developing reference reach channel geometry and to extend the project hydraulic model further upstream and downstream beyond the topographic survey limits provided by SHN. Cross sections noted geomorphic features, including active channel margins, bankfull indicators, and tops of inset benches.

Pebble counts were conducted at three locations upstream of Lambert Lane to characterize the bedload gradation that will be delivered to the project reach. A potential reference reach was identified and field sketches were prepared. An annotated map of the assessed channel reach is provided in Figure 3 showing the location of the reference reach, surveyed cross sections (XS) and pebble counts (PC), along with noted locations of active bank erosion and bank armoring. Additional geomorphic field data is provided in Appendix B.

2.2 Comparison of 2005, 2008, 2016, and 2018 Channel Profiles

The RCD provided the original spreadsheets containing the 2005 and 2008 channel thalweg survey conducted by the county. The county's profiles begin at station 0+00 at the confluence with Anderson Creek. The elevation data, which was in vertical datum NAVD29 was converted to NAVD88 by adding 2.971 feet to the surveyed elevations. The MLA 2018 thalweg was then overlaid onto the previous surveys along with the 2016 project survey by SHN, as shown in Figure 4.

Comparison of the profiles found them to be relatively consistent through time. As noted by Florsheim (2008), some channel aggradation was observed between 2005 and 2008 in the lower 300 feet of Robinson Creek and at the confluence with Anderson Creek, suggesting that incision originating from downstream has ceased. Also, comparing the 2005 to 2008 profiles shows some lowering of the channel bed between stations 16+00 and 21+00. This reach is located at the confluence of Mill Creek, and has recently experienced extreme channel bank erosion and widening, causing the channel bed to lose confinement. This appears to be the cause of the localized lowering of the stream profile within this reach, and does not appear to be due to headward migrating incision.

The overall slope of the channel is relatively constant from the Mountain View Road bridge crossing to the bridge at the County Fair Grounds, averaging approximately 1.19%. Plotting the overall profile highlights a 500-foot section of locally aggraded channel upstream of Lambert Lane extending from station 30+00 to 35+00. Field inspection of this reach suggests the aggradation is caused in whole or in part by backwater affects created by sharp channel bends associated with the Lambert Lane bridge approach. Between 2008 and 2016 additional sediment aggradation has occurred closer to the bridge crossing as a result of a flow obstruction created by the collapsed retaining wall and associated riprap.

2.3 Local Scour and Aggradation downstream of Lambert Lane

Under the bridge, the right (looking downstream) footing has experienced significant local scour caused in part by flow plunging over the failed retaining wall being directed into the footing. In 2018 the scour depth along the right footing had increased to 5 feet, partially undermining the recent interim repair.

Immediately downstream of the bridge there is a tight left bend in the channel. The bank along the outside of the bend located on the property of the Boonville Hotel is oversteepened and actively eroding (Figure 5). The resulting bank failures have toppled numerous mature trees into the channel, creating a large wood jam near station 28+00. This bank failure started in 2012 with the loss of a heritage oak tree (personal communication, Linda MacElwee, RCD), but became more extensive during the winter of 2017. Between the 2016 and 2018 surveys, the height of the channel bed upstream of the large wood jam aggraded approximately 1.6 feet.

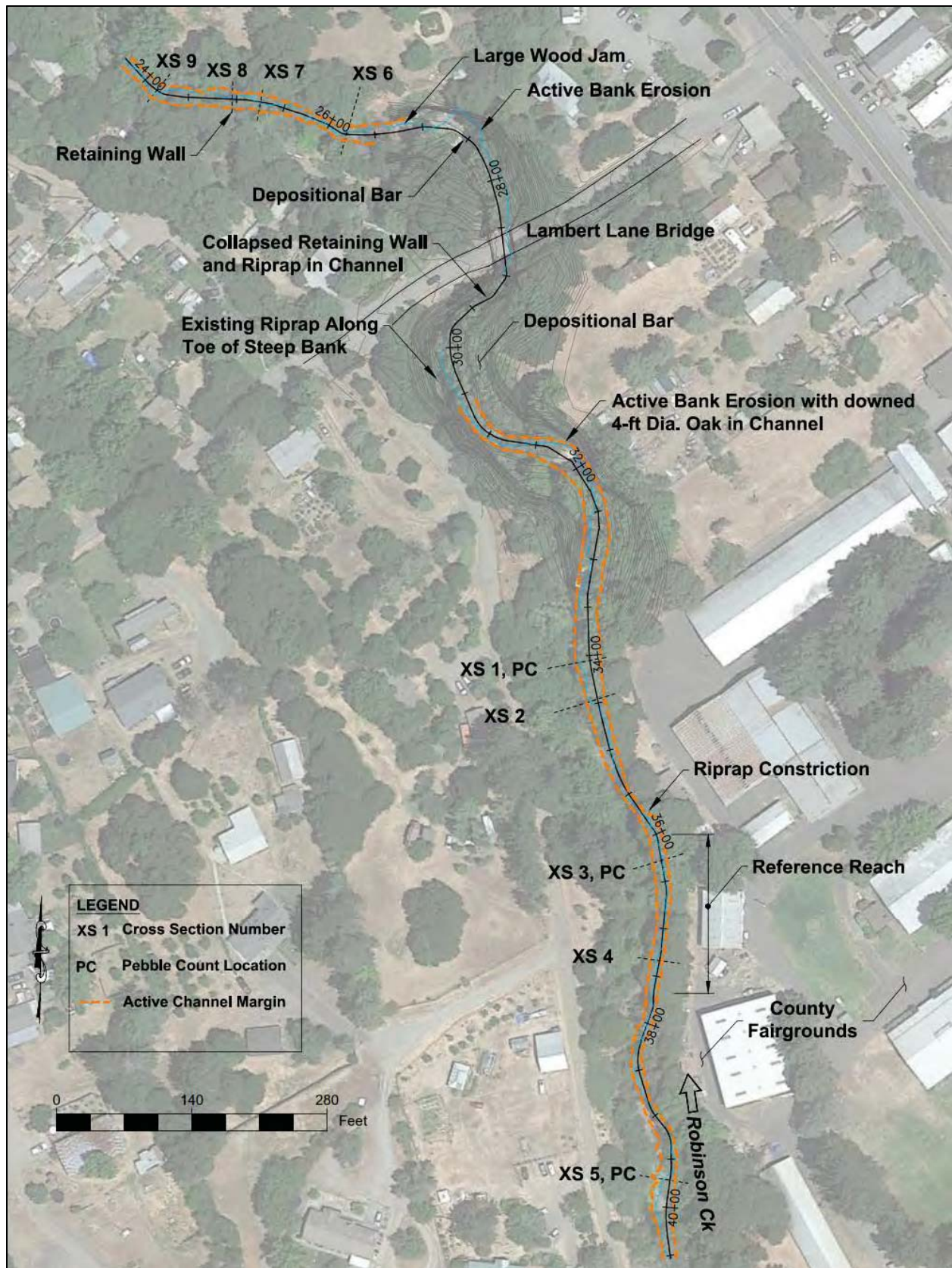


Figure 3. Robinson Creek plan view extents of the geomorphic survey of the channel.

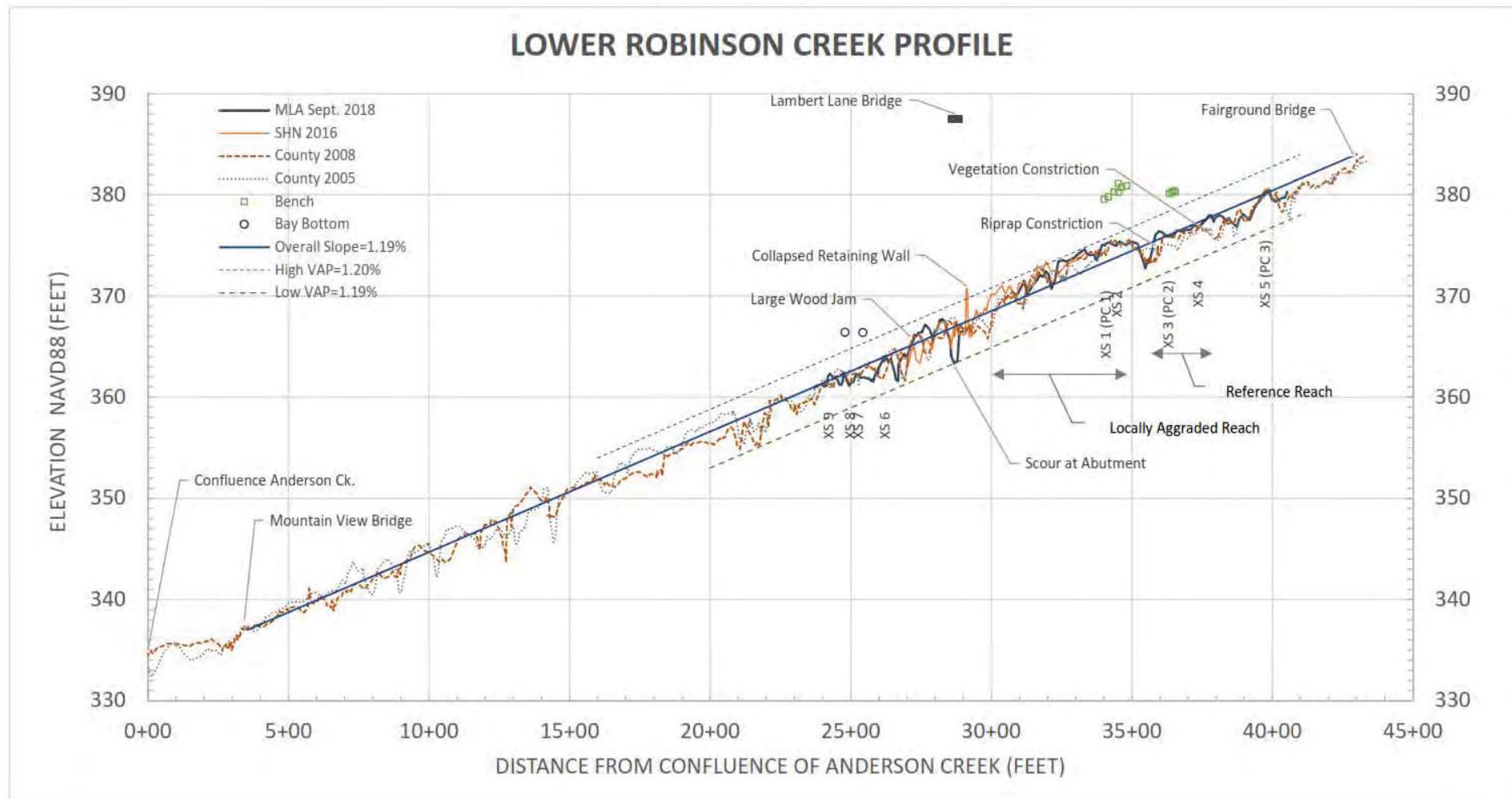


Figure 4. Channel thalweg profile showing the MLA survey (2018), SHN survey (2016), and County surveys from 2008 and 2005. Estimated overall channel profile and high and low vertical adjustment potential (VAP) profiles through the project reach are also shown.



Figure 5. Looking downstream at the active bank failure and local sediment aggradation upstream of large wood jam, 150 feet downstream of the Lambert Lane bridge (near station 27+50).

2.4 Stream Sinuosity

The channel has moderate sinuosity from upstream of Mountain View Road to approximately station 27+00. Beginning at station 27+00 to approximately 33+00 the channel sinuosity increases substantially, with the Lambert Lane crossing located within the most sinuous section of this reach (Figure 3). The Lambert Lane bridge crossing is located on an s-curve within the channel. The bridge is at the beginning of a tight meander towards the left. Downstream this meander continues bending left, causing the extensive bank failure and resulting large wood jam previously described.

Upstream of the Lambert Lane bridge the partially failed retaining walls and road embankment is on the outside of a right bend within the channel. On the inside of the bend there is a depositional bar that appears to have formed relatively recently (since construction of the bridge), likely in-part due to backwater affects from the abrupt turn in the channel as it approaches the bridge. The bar appears to have sharpened the radius of the channel bend and pushed the channel thalweg up against the retaining wall along the road embankment and against the nearly vertical bank upstream of the retaining wall, where riprap has been placed.

Farther upstream there is another meander bend near station 32+00. The bank along the outside of the bend is oversteepened and actively eroding, and caused a 4-foot diameter oak tree to topple into the channel. Upstream of this bend the channel is relatively straight, with low sinuosity.

2.5 Discussion of Geomorphic Conditions

The lower reach of Robinson Creek does not appear to be incising since the 2005 survey, and has transitioned to the widening stage of channel development, as described by Schumm et al. (1984). This is expressed by the frequent bank failure and in-channel deposition. Localized aggradation was observed upstream of the crossing, caused by the sharp bend and obstructed flow at the bridge and

from a large wood jam downstream of the bridge that resulted from bank failure at the bend immediately downstream of the crossing.

Pools were generally shallow, however deeper pools observed in the profile were usually forced by constrictions from riprap placement and flow obstructions from wood jams resulting from bank failure. The dominant bed material can be characterized as very coarse gravel with a large percentage of cobble. The bed material has minimal embeddedness, suggesting it is frequently mobilized.

2.6 Overall Slope and Channel Vertical Adjustment Potential (VAP)

Developing stream crossing and bank revetment designs requires consideration of the degree that the channel bed may aggrade or degrade (incise). This is accomplished through geomorphic interpretation of the channel thalweg profile, documented historical channel adjustments, and field observations of channel features, including depth of pools, location of riffle crests, height of banks, longevity of wood controls, and potential for increases or decreases in coarse sediment loads. Through this process, low and high “vertical adjustment potential” (VAP) profiles are plotted following methods outlined in Part XII of the California Salmonid Stream Habitat Restoration Manual (CDFW, 2009) and in USFS (2008).

The outcome of the channel VAP evaluation is the low and high VAP profiles and the current stable channel profile through the project reach. These VAP profiles define the estimated bounds of vertical channel adjustment that may occur in the project reach over the next several decades. The channel VAP profiles are based on both quantitative and qualitative evaluations with uncertainty inherent in their nature, which should be considered when developing engineering designs. The VAP profiles do not consider local scour, which is accounted for using other methods, but rather are based on reach scale aggradation or degradation potential.

2.6.1 Estimated Low Vertical Adjustment Potential (VAP) Profile

The low VAP profile is typically used as part of the overall scour analysis for setting the bottom of bridge footings and bank revetments. The estimated low VAP profile is shown on Figure 5 and Figure 6. This was estimated based on the interpretation that the channel incision process has slowed or stopped, with no substantial vertical adjustment between 2005 and 2018. Additionally, the channel bed of Anderson Creek at the confluence with Robinson Creek appears to be stable or aggrading. Therefore, the lowest points along the channel profile between station 20+00 and 43+00 were used to estimate the low VAP profile. The resulting profile has a slope equal to the overall slope of 1.19%, but is offset approximately 4 feet lower in elevation.

2.6.2 Estimated High Vertical Adjustment Potential (VAP) Profile

The high VAP profile is typically used to evaluate hydraulic conditions if the channel aggrades. This is applied when setting the top elevation for bank revetments and setting the soffit elevations for road-stream crossings. For the project reach, the high VAP profile was based in part on the likelihood that upstream locally aggraded sediments, as seen in Figure 5, will be released in response to a new larger bridge crossing and less abrupt channel bends. This sediment release could temporarily aggrade the channel within the project reach. Additionally, long-term aggradation could occur due to ongoing bank erosion and widening, leading to an overall increase in sediment supply. Therefore, the high VAP profile was set based on the current elevation of the aggraded channel reach, placing it approximately 2 feet higher than the overall channel profile as shown in Figure 6. The result is an estimated 6-foot range in potential channel bed elevations within the project reach during the next several decades.

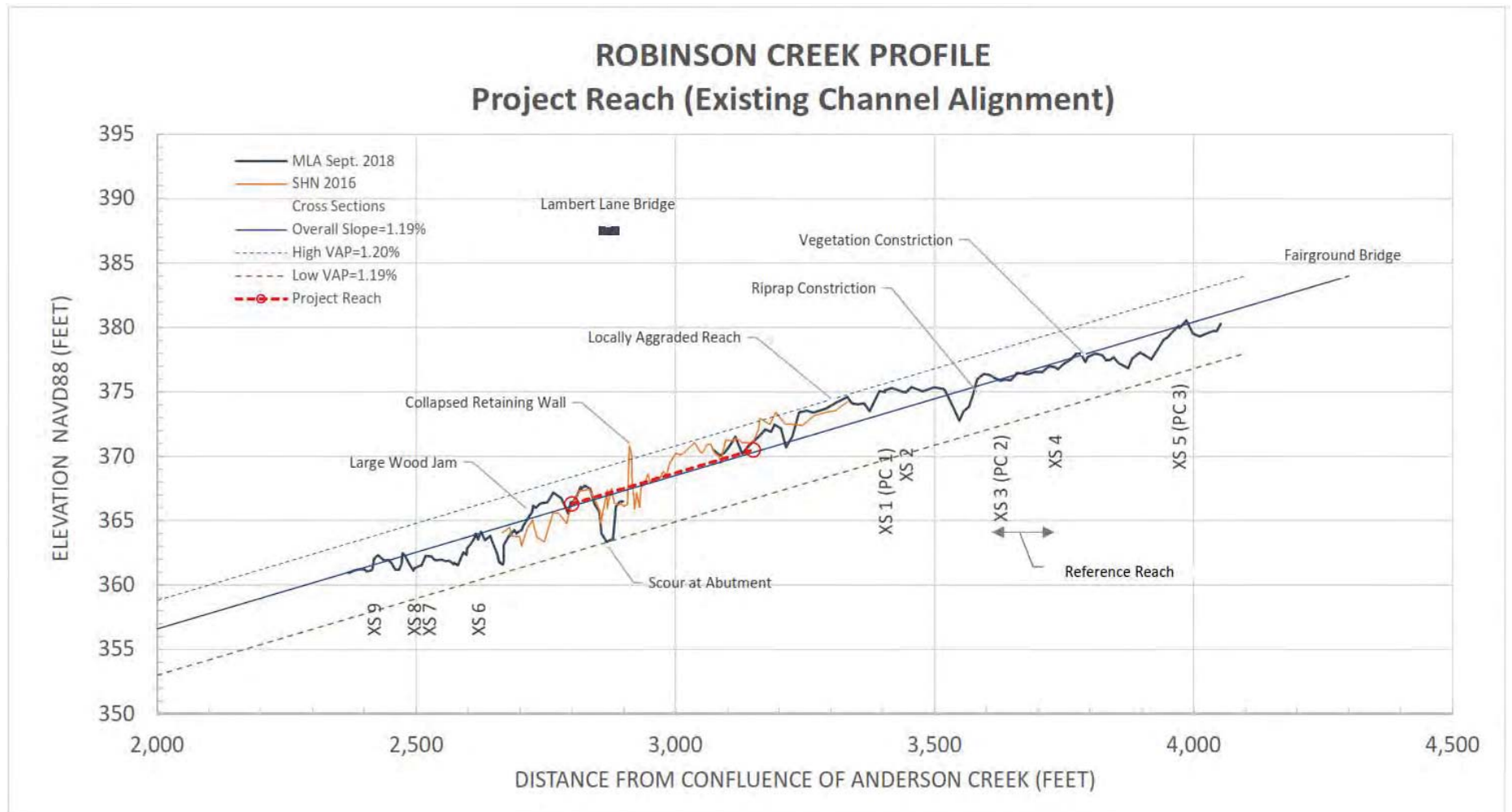


Figure 6: Robinson Creek channel thalweg profile upstream and downstream of the existing bridge crossing at Lambert Lane. Also plotted are the overall channel slope based on the entire lower Robinson Creek profile, the current project extents, and the low and high vertical adjustment potential (VAP) profiles for the project.

2.7 Hydrology

The contributing watershed area at the Lambert Lane crossing is approximately 4.0 square miles and is characterized by second growth forests in the steeper headwaters that drain into the agricultural land of Anderson Valley. The estimated mean annual precipitation for the watershed is 44.2 inches per year (USGS, 2018). A summary of basin statistics is provided in Appendix C.

The Draft Bridge Design Hydraulic Study Report by WRECO (2018) included estimates of the 50-year and 100-year return period flows calculated using two methods: the USGS North Coast regression equations (Gotvald et al. 2012) and the USACE rainfall-runoff model, HEC-HMS. WRECO (2018) selected the HEC-HMS 50- and 100-year flows of 1,340 and 1,750 cubic feet per second (cfs) for design of the Robinson Creek Bridge Replacement Project.

The USGS regression equations provide estimates of peak flows for return periods as low as the 2-year flow. Frequently occurring peak flows with return periods of 1.2 to 2.5 years are often the “channel forming flows” that convey the most sediment through time (Wollman & Miller, 1960; Leopold, 2005). There is also often a break in slope and change in vegetation within the channel cross section associated with the stream stage at the channel forming flow, which is referred to as “bankfull”. Therefore, to evaluate the channel hydraulic geometry, peak flows with these return periods were estimated by extrapolating the flows from the USGS regression using a log-linear regression. The estimated peak flows for the various return periods are provided in Table 1.

2.8 Representative Channel Geometry

Nine channel cross sections were surveyed as part of the geomorphic assessment and used to measure active channel width, bankfull width, and bankfull depth. In addition to these sections, the survey captured the left and right margins of the active channel bed and heights of inset benches above the thalweg. Averages of active channel width, bankfull width, and bankfull depth were computed and are provide Table 2. The typical bankfull depth and width was 2.3 feet and 25 feet, respectively. These values were used to determine the appropriate dimensions for the channel within the project reach.

2.9 Reference Reach Selection and Characterization

The reference reach is a selected section of channel that serves as a template for design of the project channel. The reference reach should have a similar drainage area and slope as the project reach and appear geomorphically stable. Ideally, it would also have a similar planform sinuosity as the project reach. Three reaches were surveyed and assessed for use as a reference reach for channel design. The reach containing cross sections (XS) 3 and 4 was selected, although it is relatively straight compared to the project reach (Figure 3). This reference reach is upstream of the aggraded sediment from the bridge crossing and has a slope that is close to the overall channel slope of 1.19% at the project site (Figure 4 and Figure 6). Cross sections, a pebble count of the bed material was conducted and site sketch prepared for the reference reach.

Table 1: Estimated peak flows for various return periods in Robinson Creek at Lambert Lane. Extrapolated values are indicated with (*).

Return Period of Peak Flow	Peak Flows Robinson Creek at Lambert Lane	
	North Coast Regional Regression Equations	HEC-HMS (from WRECO, 2018)
1.01-Year	77 cfs*	
1.2-Year	126 cfs*	
1.5-Year	187 cfs*	
2-Year	264 cfs	
5-Year	517 cfs	
10-Year	700 cfs	
25-Year	943 cfs	
50-Year	1,130 cfs	1,340 cfs
100-Year	1,320 cfs	1,750 cfs

Table 2: Measured channel dimensions upstream and downstream of the Lambert Lane crossing. The selected Reference Reach is indicated with (*).

Upstream of Lambert Lane				
Cross Section Location		Active Channel Width (ft)	Bankfull Width (ft)	Bankfull Depth (ft)
XS 1	STA 34+05	26.2	29.9	2.2
XS 2	STA 34+45	19.5	25	2.7 / 2.3
XS 3*	STA 36+27	15.4	21.4	2.4
XS 4*	STA 37+33	13.3	24.8	2.2
XS 5	STA 39+72	24.8	31.7	2.1
Average:		19.8	26.6	2.3
Downstream of Lambert Lane				
Cross Section Location		Active Channel Width (ft)	Bankfull Width (ft)	Bankfull Depth (ft)
XS 9	STA 24+20	17	23.7	1.8 / 2.1
XS 8	STA 24+95	18.1	19.6	
XS 7	STA25+25	19.7	25	2.3
XS 6	STA 26+20	19.6	28.8	2.6
Average:		18.6	24.3	2.2

2.9.1 Description

The reference reach has an average actively scoured bottom width of 14.4 feet and average bankfull width and depth of 23.1 feet and 2.3 feet, respectively. The reach has an inset floodplain bench running along its entire left side of the channel (looking downstream), as seen in Figure 7. This bench is consistently about 3.8 feet above the channel thalweg. There is also a discontinuous floodplain bench on the right side of the channel that is slightly lower in height. Cross section 3 is on the outside of a left bend in the reference reach. The thalweg is against the right bank, on the outside of the bend, and there is a gentle upward sloping point bar within the actively scoured channel (Figure 8).

The floodplain benches do not appear to be formed through deposition from overbank flows in the stream. Instead, they may be remnants of the historical channel bed prior to an incision event, as suggested by Florsheim (2006). As such, their inundation may not coincide to frequently occurring flows.



Figure 7. Looking upstream at selected reference reach, with typical channel cross section and location of inset floodplain bench noted.

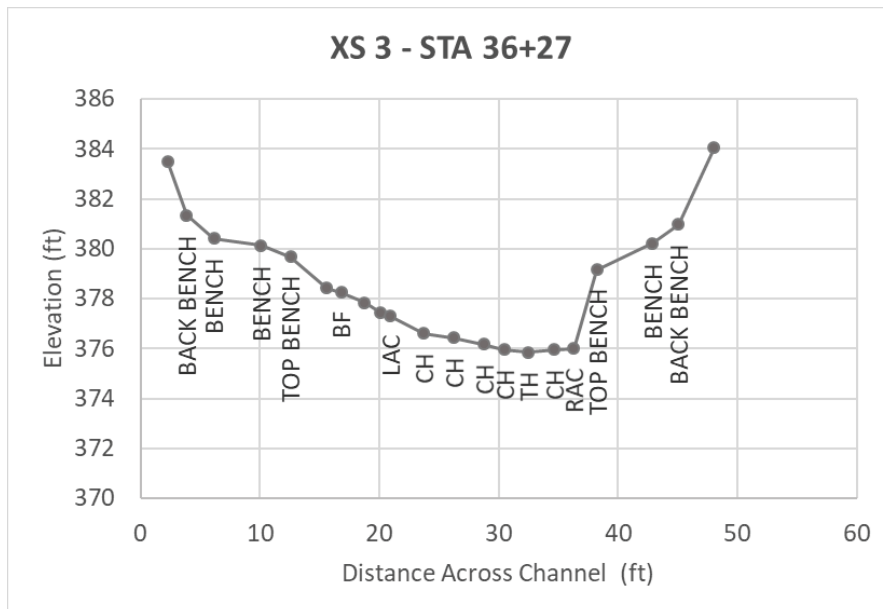


Figure 8. Reference reach cross sections, looking downstream, with typical bench geometry. Where LAC and RAC are left and right sides of active channel, BF is bankfull, and TH is thalweg.

2.9.2 Streambed Material

Pebble counts of the surface streambed material were conducted at three locations upstream of the Lambert Lane crossing to characterize the sediment size (Figure 9). Pebble count (PC) 1 was the furthest downstream and well within the influence of the existing bridge and failed retaining wall. It had substantially finer material than the other two pebble counts. PC-2 was within the reference reach. The median particle size within this reach was very coarse gravel (64 mm) and the D84 was medium cobble (128 mm).

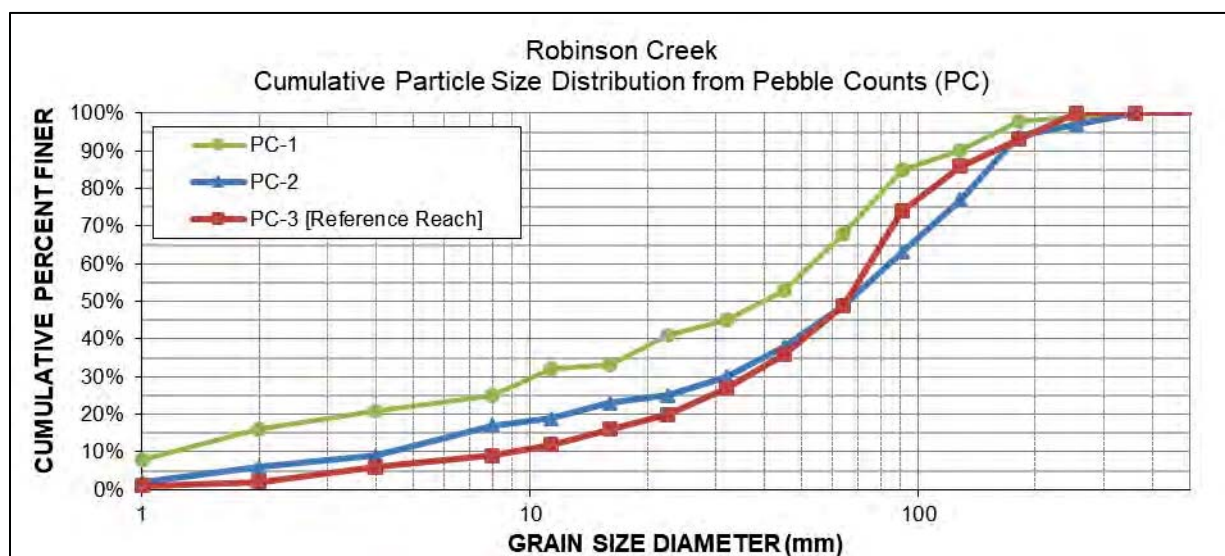


Figure 9. Gradation of streambed material from pebble counts in Robinson Creek upstream of Lambert Lane. PC-1 is closest to the bridge crossing.

2.9.3 Bankfull Capacity and Shear Stress in Reference Reach

The nine cross sections surveyed as part of the geomorphic assessment were added to the existing conditions HEC-RAS steady-state 1-D model (Appendix D) that was prepared by WRECO (2018). This model was then used to evaluate channel flow conveyance relative to geomorphic features within the reference reach, including bankfull flow. Model roughness coefficients for existing conditions matched the WRECO model, which is discussed in Section 4.1.1.

Water levels for cross section 3 within the reference reach are shown in Figure 10. Results indicate that the field indicators for bankfull correspond approximately with the 1.2-year flow. The right bench elevation becomes inundated at the 2-year return flow while the left bench inundates between a 2-year and 5-year flow. The infrequency of flows inundating the benches supports that they are likely due to recent incision within the reach. As previously noted, field evidence suggests the benches are remnants of the historical channel bed prior to an incision event.

Water velocity and channel shear stress for flows with 1- to 5-year return periods is shown in Figure 11. At 1.2-year bankfull flow of 126 cfs the cross-sectional average channel velocity is 3.9 ft/s and shear stress is 0.76 lb/ft². Bankfull flow is typically associated with initiation of bedload movement. Using a dimensionless Shields parameter of 0.052 for very coarse gravel (Julien, 1998), the median particle size, the estimated critical shear stress to initiate movement ranges between 0.54 and 1.12 lb/ft². This falls within the model-estimated shear stress at the 1.2-year flow, supporting the observed bankfull estimate.

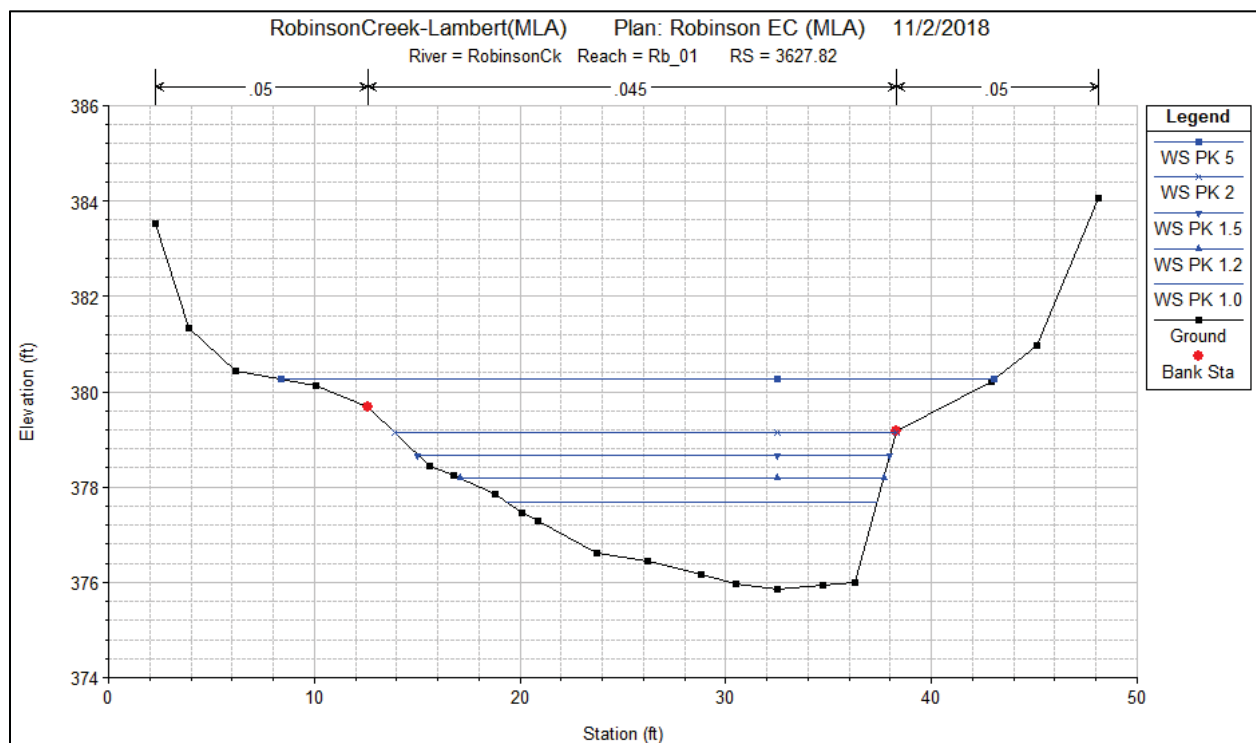


Figure 10. Existing condition HEC-RAS model results for the cross section XS3 in the selected reference reach. The bankfull field indicators correspond to the 1.2-year return flow and the benches inundate between a 2-year and 5 -year flow.

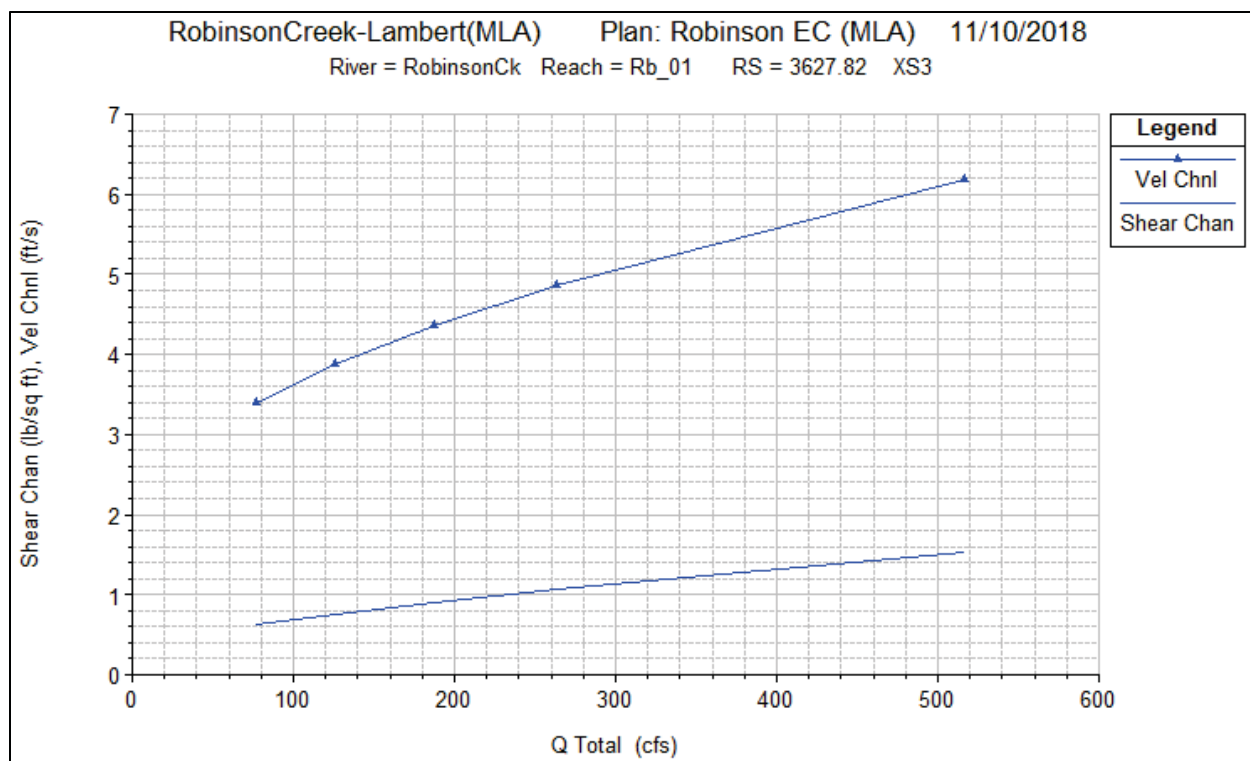


Figure 11. Water velocities and channel shear stress for cross section XS3 between the 1.01-year flow (77 cfs) and 5-year flow (517 cfs).

3 DESIGN CHANNEL LAYOUT AND GRADING

The channel design involved developing the appropriate channel profile and dimensions and then determining the appropriate bank protection measures and revegetation approach. Drawings for the channel restoration plan are provided in Appendix A.

3.1 Design Planform

The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved alignment with the channel by decreasing the sharpness of the meander bend. A constraint to realigning the channel was the preservation of large established trees along the right bank upstream and downstream of the crossing, including an 8-foot diameter heritage oak tree close to the existing right bank of the channel near station 29+60.

The proposed alignment moves the approach channel further to the right (looking downstream) and has a sinuosity of 1.2 (valley length to channel length).

The outside of the bends will need to be protected from scour. Additionally, local toe scour along the outside of the bends must be considered as part of the design.

3.2 Design Profile

The design profile for the stream channel was developed based on the current overall channel profile. Figure 6 show the proposed channel profile with a slope of 1.4%, which is slightly steeper than the overall profile of 1.19%. This is due to the shortening of the channel length by approximately 28 feet by reducing the sharpness of the meander bends. The steeper profile allows for the channel slope to relax as it releases the stored sediment from upstream.

3.3 Release of Upstream Aggraded Sediments

At the upstream limits of the project, upstream of the crossing, the graded channel will steepen to match the existing streambed. At this location the channel has aggraded as much as 1.8 feet due to the failed retaining wall across the channel and the flow constrictions created by the bridge. An estimated 220 cubic yards of sediment is anticipated to be released during the adjustment period. During the adjustment period these sediments will be released during high flows and may temporarily deposit within the project reach or within the channel bend downstream of the bridge.

3.4 Design Cross Sections

Nearly the entire project reach is on one of two bends. The design channel cross section shape and dimensions were based on the reference reach, which includes cross section XS3 on a bend. A narrower bottom width of 11.5 feet and an anticipated actively scoured channel width of 15 feet is proposed to accommodate a point bar and bench on the inside of the bend (Figure 12). Although bench width will vary and is expected to adjust with time, for design purposes a bench height of 3.8 feet and a side slope of 5:1 (H:V) was selected based on reference reach observations. Bank side slopes between 1.5:1 and 2:1 are proposed for the outside of the bends and for the slope at the back of the benches.

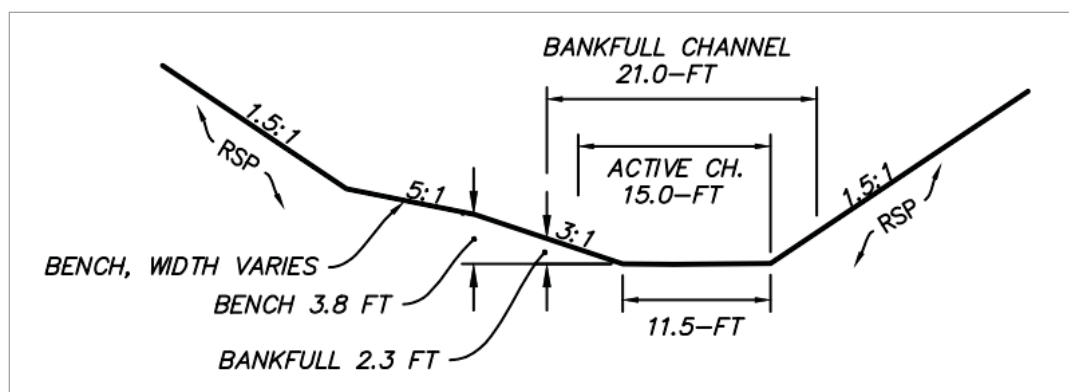


Figure 12. Typical channel geometry under the bridge for Robinson Creek at Lambert Lane Bridge replacement.

3.5 Streambed Material

The existing channel bed upstream and downstream of the culvert's influence is composed of cobbles, gravels, and fines. It is expected that native stream bed material would be stockpiled and reused in reconstruction of the channel bed and point bars. The coarser material within the project reach that more closely matches the gradation of PC3 in Figure 9 should be high-graded for this use. Finer sediments salvaged during excavation should be used for forming the point bars above bankfull elevation that are slated for planting.

3.6 Proposed Channel Grading

The approximate 350-foot long proposed channel was graded as a surface in AutoCAD Civil 3D. The final grading was developed through an iterative process guided in part by results from both the 1D and 2D steady state hydraulic models of proposed conditions. The grading is shown in Appendix A.

Channel grading upstream of the proposed bridge involved maintaining the existing mature trees along the right bank while minimizing the sharpness of the meander bend. The proposed point bar on the right side of the channel blends with the existing bench that supports these large trees between 29+60 and 31+40. The left bank downstream of 30+90 will be a vegetated riprap revetment intended to protect the roadway embankment from scour and erosion while guiding the flow around the sweeping bend.

As the channel approaches the bridge the channel bends towards the left. At the cross-over near station 29+60 the point bar transitions from the right bank to the left bank. Grading in the cross-over focused on maintaining flow conveyance areas similar to upstream and downstream to avoid a channel constriction. Downstream of the cross-over a vegetated riprap revetment will be required along both banks upstream of the bridge.

A point bar is maintained along the left bank as the channel bends to the left under the bridge between station 28+00 and 29+60. Riprap revetments will be placed against the bridge abutments. The riprap along the right bank is on the outside of the bend, and subject to high velocities and local scour.

Downstream of the bridge the left bank grading transitions to match the existing steep ground. Along the right bank the grading ties-out immediately upstream of an existing exposed root mass from a large oak tree along the bank.

4 HYDRAULIC ANALYSIS OF DESIGN CHANNEL

4.1 HEC-RAS One-Dimensional Hydraulic Analyses

The one-dimensional steady-state hydraulic model developed by WRECO (2018) using the HEC-RAS software (USACE, 2010) was updated for existing conditions. A separate HEC-RAS model was developed for the proposed channel grading associated with the bridge replacement. The model was used to evaluate existing hydraulic geometry of cross sections within the reference reach (see section 2.9.3) and proposed hydraulic conveyance associated with the 100-year flow for sizing riprap as part of rock slope protection (RSP) revetments.

4.1.1 Existing Conditions HEC-RAS Model Development

The WRECO (2018) existing conditions HEC-RAS model for the Lambert Lane bridge replacement project was derived from the project topographic surface provided by SHN. The model reach was 673 feet with 19 cross sections. The bridge routine was utilized for the existing crossing and an inline weir was used to simulate the collapsed concrete wall that is currently obstructing flow. Table 3 lists the Manning's roughness coefficients used in the existing and proposed conditions model.

Table 3. Roughness coefficients used for existing and proposed condition hydraulic modelling. Adapted from WRECO (2018).

Channel Description	Manning's Roughness Coefficient (n)
Concrete Retaining Wall	0.020
Low Flow Channel, Downstream of Existing/ Proposed Bridge Structure	0.040
Low Flow Channel	0.045
Channel Bank with Rock Slope Protection (no vegetation)	0.050
Channel Bank Hybrid Rock Slope Protection with Mature Vegetation (willow)*	0.100
Overbank Area with Modest Vegetation	0.050 to 0.080
Overbank Area with Dense Vegetation	0.100

MLA utilized the HEC-RAS model leaving it unchanged with the exception of extending the model length upstream and downstream by adding the nine MLA surveyed cross sections, all of which were located beyond of the existing model boundaries. Additionally, channel river stationing was adjusting to correspond to match the distance from the confluence with Anderson Creek, and therefore match the geomorphic analyses presented in Section 2. The updated existing conditions model extends a length of 1,564 feet.

The model was executed in mixed mode. Existing conditions HEC-RAS results are provided in Appendix D.

4.1.2 Proposed Conditions HEC-RAS Model Development

The proposed model domain extends 1,536 feet along Robinson Creek through the project area. A total of 26 cross sections were used to create the model. Eight of the cross sections were derived from the geomorphic channel sections surveyed by MLA, and the remaining cross sections were sampled from the proposed condition surface developed by MLA for the channel restoration design as shown in Appendix A

Model geometry was developed for as-built conditions. The proposed riprap revetments upstream and downstream of the bridge crossing are to be vegetated with live willow cuttings following Caltrans “hybrid revetment” design. Initially, the riprap revetment will have a relatively low Manning’s roughness of 0.050. This value was determined based on the additive Manning’s n method, as recommended in Caltrans (2014) *Hybrid Streambank Revetments: Vegetated Rock Slope Protection* manual. This will result in the highest water velocities impinging on the riprap, and should be used for sizing the riprap. Mature vegetation conditions following growth of the willow plantings was evaluated using the two-dimensional model and a Manning’s n of 0.100, as presented in Section 4.2.

Based on observed conditions and using the additive Manning’s n method, the Manning’s roughness coefficient for the channel was set at 0.045 for the main channel between the specified bank markers. For overbank areas, the Manning’s roughness coefficient of 0.07 was assigned to simulate the hydraulic obstructions created by brush and moderately dense vegetation along the channel and 0.05 for areas with vegetated RSP. Calculation of Manning’s n is provided in Appendix D. Bank markers were placed to provide average channel velocity within the main channel, including all proposed RSP bank treatments. The proposed bridge was not included in the model for channel design, as the clearance and freeboard are well above the proposed design water surface and the concrete abutments do not encroach on the channel area.

The model was run for the 50- and 100-year return flows of 1,320 and 1,760 cfs respectively. To account for potential channel aggradation and to check the design height of RSP, the high VAP condition was also modeled. This was done by applying a fixed sediment elevation by adding 2 feet to the proposed channel bed elevations.

Proposed conditions HEC-RAS was executed in mixed mode. Results are presented in Appendix D.

4.1.3 Results for Existing Conditions

The existing conditions model results were primarily used to evaluate hydraulic geometry, channel capacity, and channel shear stresses within the reference reach. This is discussed in section 2.9.3.

4.1.4 Results for Proposed Conditions

The HEC-RAS water surface profiles for the proposed condition is provided in Figure 13. The 100-year water surface at the bridge face is at elevation 374.67, which is greater than 9 feet below the bottom of the proposed bridge deck. Average channel velocities at the 100-year flow are generally between 7 and 9 ft/s in the channel at the bridge crossing, but spike to 11.6 ft/s at the downstream limit of the project (Figure 14). This is located immediately upstream of an expansion in the channel cross section associated with the downstream bank failure. The expansion causes a local drawdown in the water surface and spike in water velocities at 28+06.

4.1.5 Results for High VAP Profile Conditions

Flow conveyance for the high VAP profile condition was evaluated with the proposed conditions HEC-RAS model. This was accomplished by adding two feet of “sediment fill” to the bottom of each channel cross section. Results from this analysis were used to estimate water surfaces associated with the 50- and 100-year flows with high VAP profile conditions (Figure 15). The high VAP 100-year water surface at the bridge face is at elevation 375.50, which is 0.83 feet higher than under design conditions.

4.2 SRH Two-Dimensional Hydraulic Analysis

A two-dimensional model of existing and proposed conditions was developed using the USBR/FHWA Sedimentation River Hydraulics (SRH-2D) model (Bureau of Reclamation, 2008). The SRH-2D model is widely used for applications similar to this project. It provides good flexibility in creating and editing the two-dimensional mesh and provides good computational stability.

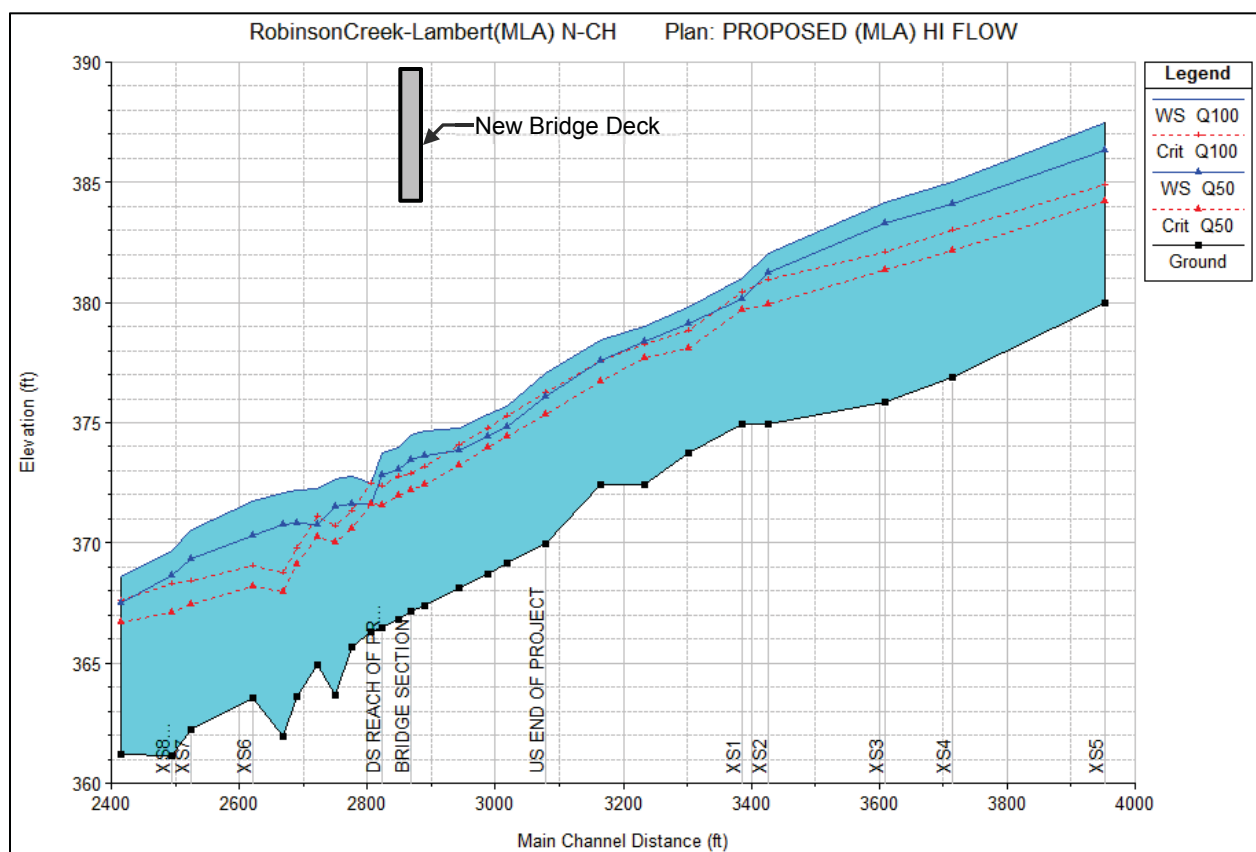


Figure 13. HEC-RAS proposed conditions water surface profiles of the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

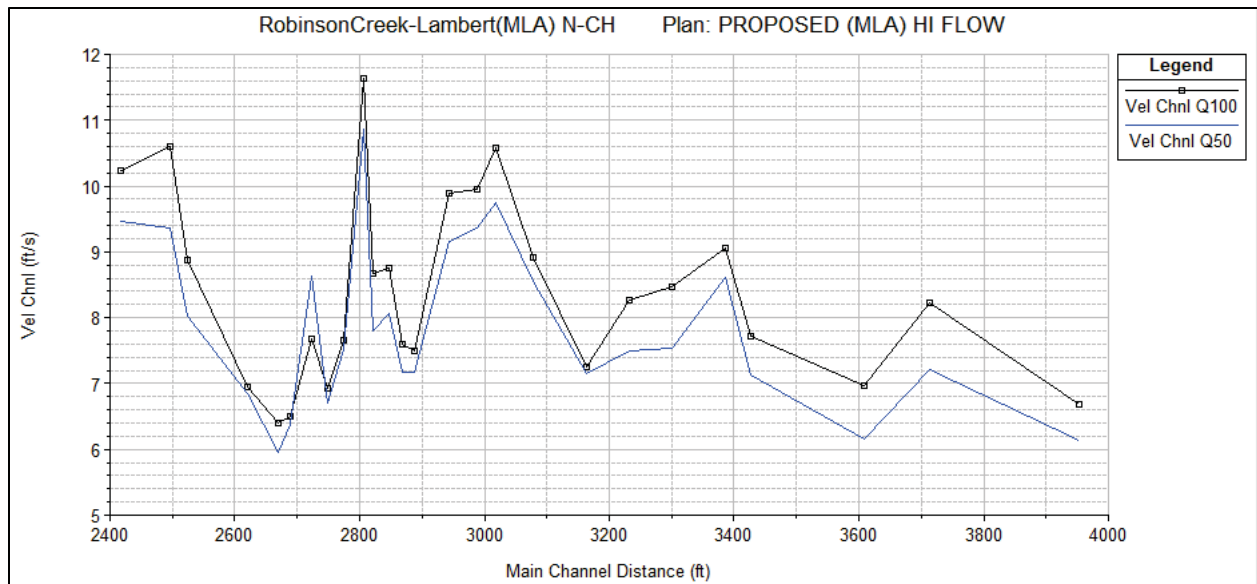


Figure 14. HEC-RAS proposed conditions channel velocity profiles for the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

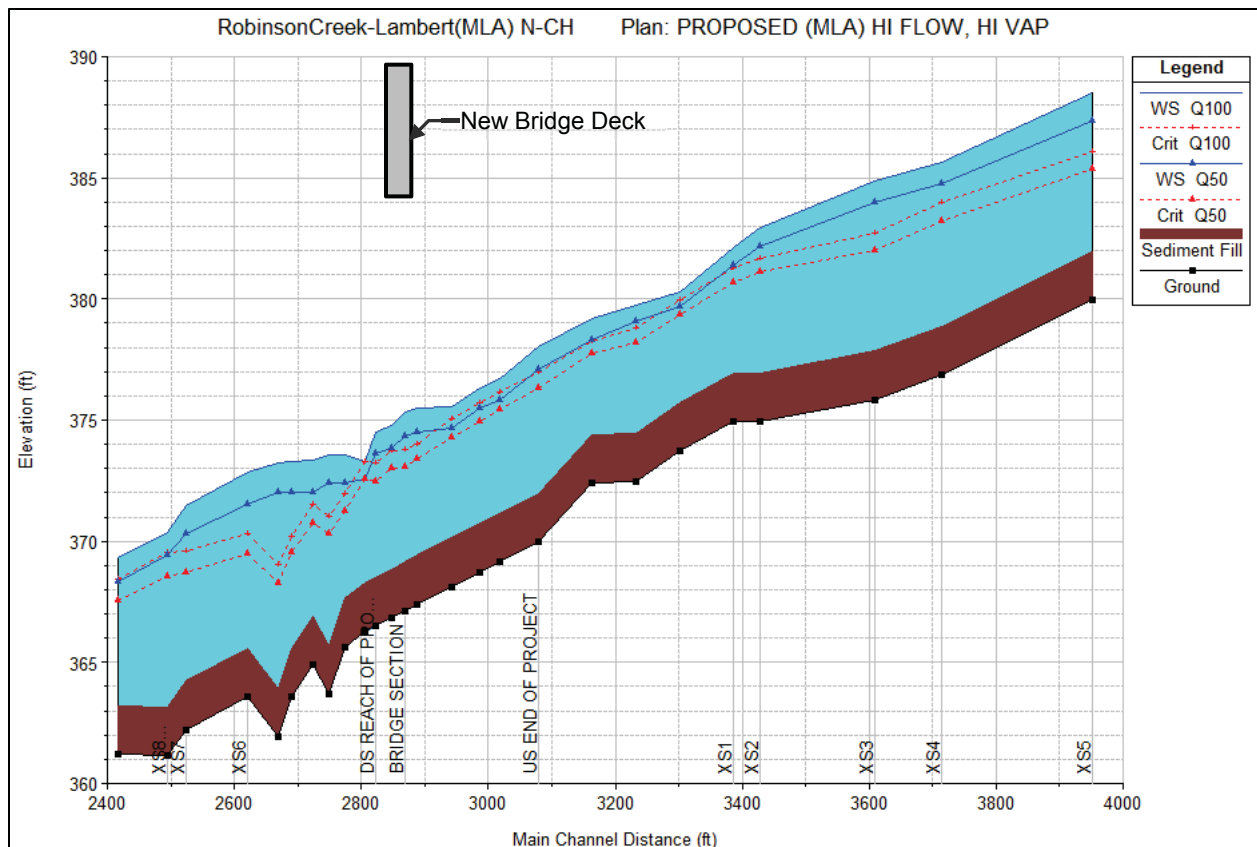


Figure 15. HEC-RAS high VAP conditions (2 feet of aggradation) with water surface profiles for the 50- and 100-year flows in Robinson Creek at Lambert Lane Crossing.

This analysis using SRH-2D focused on both bankfull flows and 100-year flow conditions, and was used to identify areas with high shear stress and velocities. These results were used to refine the channel grading to minimize abrupt hydraulic constrictions and areas of focused high velocities. The results were also used to set the top elevation for the RSP revetments. This was selected rather than the one-dimensional HEC-RAS model because of SRH-2D's ability to calculate super-elevation of flows along the outside of channel bends.

SRH-2D is a mesh-based model that solves the standard St. Venant's equations for gradually varying flow using finite-volume methods. The flexible mesh elements can be a combination of rectangular and triangular elements that vary in shape and size to accurately reflect the topography of the model domain. The model outputs include depth of flow, depth averaged velocity vectors (x and y direction), and shear stress for each wetted element in the mesh.

4.2.1 SRH2-D Model Development

The model domain for the Lambert Lane bridge replacement project included the 720 feet of surveyed channel that encompasses the project area as shown in Appendix E. The model domain extended on both sides of the channel up to the top of banks. The channel was modeled with flexible triangular elements with 3-foot sides, except where additional detail was necessary. The elevations of the element nodes were derived from the project's digital terrain model (DTM). For existing conditions, the DTM developed from the topographic surveys by SHN was used. For the existing and proposed conditions model, the SHN DTM was extended further downstream based on MLA survey points to include the entire bend in the channel and associated bank failure behind the Booneville Hotel. For proposed conditions the design surface was merged with the existing conditions DTM.

Manning's roughness coefficients were assigned to each mesh element. SRH-2D does not use contraction and expansion or eddy viscosity coefficients as part of the computations. Therefore, contraction and expansion losses need to be incorporated into the Manning's roughness values. Manning's roughness values were taken from Table 3. This includes a value of 0.100 for the hybrid RSP with mature vegetation and 0.08 for the riparian planting areas on the inside of the meander bends. These roughness values were calculated using methods recommended in Caltrans (2014), and as provided in Appendix E.

The downstream boundary condition was set based on HEC-RAS water surface elevations for cross section XS6, which is located at the downstream end of the SHR-2D model domain for both existing and proposed conditions.

4.2.2 SRH-2D Results

The SRH-2D results are provided in Appendix E. Figure 16 compares the water velocities and vectors for existing and proposed conditions. Existing condition results illustrate the channel constriction created by the existing bridge opening, with water velocity under the existing bridge exceeding 11 ft/s. The constriction raises water levels upstream of the bridge, creating slower velocities and widening the area of inundation during the 100-year flow.

In comparison, the proposed condition velocities are reduced under the bridge and the flow area remains relatively constant throughout the project reach. The highest velocities are at the upstream limit of the project grading, near station 31+50. This is the location that a small headcut is expected to occur as upstream stored sediments are released and transported downstream.

Downstream of the bridge crossing the proposed condition velocity distribution against the existing bank failure remain effectively unchanged from existing conditions. There is an area of high velocities at station 28+00, immediately downstream of the project grading. This is caused by an existing large oak tree on the bank, with its root mass protruding into the channel. Under existing conditions this is masked by the extremely high velocities discharging from under the bridge.

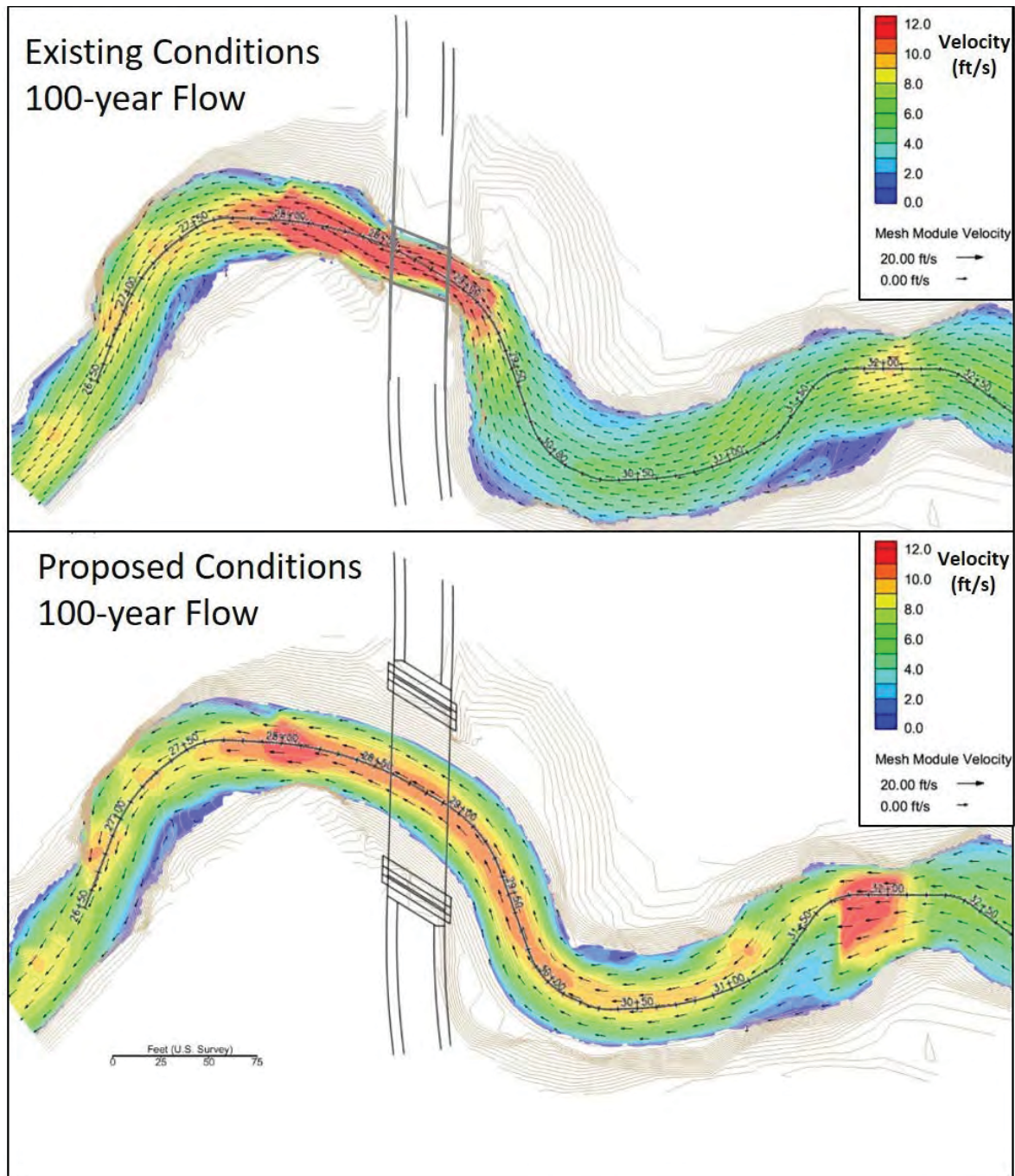


Figure 16. SRH-2D predicted water velocities associated with the 100-year flow of 1,750 cfs for existing and proposed.

5 DESIGN OF CHANNEL BANK REVETMENTS

Due to high water velocities within the channel and the steep side slopes required for the streambanks in the vicinity of the roadway and bridge, rock slope protection (RSP) will be necessary to form a stable streambank revetment. To provide channel shade and additional roughness along the streambanks to slow velocities, a *hybrid revetment* design consisting of vegetated RSP will be used following design guidance given in Caltrans Design Information Bulletin No. 87-01 (Caltrans, 2014). This uses standard guidelines for RSP sizing, thickness, and layering as described in the California Bank and Shore Rock Slope Protection Design manual (Caltrans, 2000).

5.1 RSP Sizing

RSP was sized for the 100-year flow condition of 1,760 cfs with as-built vegetation conditions. Three methods were used and results were compared: California Bank and Shore Protection Design, equation 1 (Caltrans, 2000), and USACE (1994) equation 3-3 and equation 3-5. The three methods yield a wide range in size class for RSP and are summarized in Appendix F. The USACE equation 3-3 resulted in the most conservative (i.e. largest rock class) and was selected based on professional judgement.

The USACE equation 3-3 for determining RSP size for channel bottom and side slopes uses depth averaged channel velocity. Velocity and depth for key locations in the project site were derived from the proposed conditions HEC-RAS model (post construction “as-built” conditions). This method is applicable to side slopes of 1.5H:1V or flatter. RSP placed along the outside of channel bends will experience increased forces from impinging flows. This method accounts for bendways using the ratio of the centerline radius of the bend to wetted width of the channel. In addition to velocity and side slope, this method is sensitive to the unit weight of stone, which generally varies from 150 to 175 pounds per cubic foot. For this application a unit weight (γ_s) of 165 pounds per cubic foot was used.

A minimum safety factor of 1.1 is recommended by USACE. For the Robinson Creek channel design, a safety factor of 2.0 has been applied due to the sharp meander, potential for impact from large floating debris, and risk to vital infrastructure.

Equation 3-3 yields a representative stone size for the D_{30} , for which 30 percent of the gradation is finer by weight and length. To determine the D_{50} , a relationship is presented that is based on the ratio of D_{84} to D_{15} that defines the gradation of material. Standardized gradations range from 1.4 to 2.2, where a higher ratio indicates a wider range of material size. A ratio of D_{84}/D_{15} of 1.6 was used for this analysis, which is consistent with Caltrans specifications for larger rock size classes.

Calculated stable rock sizes for streambank revetments in the project reach are provided in Table 4. Weights are calculated assuming a spherical shape for the rock and a unit weight of 165 lbs/ft³. Caltrans RSP classes are named by the D_{50} (median rock diameter). Table 4 lists the Caltrans RSP size classes and the corresponding FHWA classification that are closest to the stable D_{50} rock size for the specified location.

Computations for RSP sizing are presented in Appendix F.

Table 4. Calculated stable rock sizes for RSP along channel banks and applicable Caltrans and FHWA RSP size class. Sizing based on USACE (1994) equation 3-3.

Station	Location	Side Slope (H:V)	Stable Rock Size (D ₅₀)		
			Diameter (ft)	Weight (lbs)	Size Class FHWA (Caltrans)
30+78	Left Bank Approaching Bend	1.5:1	1.7	424	V (¼ Ton)
30+18	Left Bank Approaching Bend	1.5:1	2.6	1,518	VIII (1 Ton)
29+87	Lower Left Bank at Bend Apex	1.5:1	2.9	2,107	VIII (1 Ton)
	Upper Left Bank at Bend Apex	2:1	2.2	920	VII (½ Ton)
29+42	Both Banks at Bridge Approach	1.5:1	2.2	920	VII (½ Ton)
28+89	Right Bank, Upstream Bridge Face	1.5:1	1.3	190	IV (Light)
28+68	Right Bank Under Bridge	1.5:1	1.4	237	IV (Light)
28+48	Both Banks, Downstream Bridge Face	1.5:1	1.6	354	V (¼ Ton)

5.2 RSP Layers and Thickness

RSP should be placed in a layer with a thickness sufficient to remain stable and provide maximum protection against erosive forces. Rock that interlocks and minimizes voids will help ensure the stability of the RSP layer. Design equations are based on a minimum thickness of $1 \cdot D_{100}$, the maximum size in the size class. Caltrans methods for RSP design call for use of “California Layered RSP” (Caltrans, 2000), where up to three layers of rock make up the total RSP thickness. The design follows filtration theory where, from the inside to the outside, each layer is progressively larger so an inner layer will not pass through the voids of the next layer. The total RSP thickness is made up of a backing, inner and outside layer. In some cases, an inner layer is not required.

Caltrans standard RSP size classes are divided into two construction methods. Method “A” is for larger rock that is individually placed and Method “B” is for smaller rock where dumping is acceptable. Using the stable rock sizes calculated for locations given in Table 4, the RSP size class layers and thickness were developed following Caltrans (2000), and are provided in Table 5.

Standard Caltrans design includes RSP fabric at the interface of the native slope and the backing class. However in lieu of RSP fabric, the hybrid revetment uses a gravel filter to better support vegetation plantings. A Universal Gravel Filter Gradation is appropriate for the proposed RSP revetments. It consists of 6-inch minus gravel. For slopes steeper than 2.5H:1V rounded river-run material is not recommended for the gravel filter layer.

Table 5. RSP size class and thickness by station and location.

Station and Location	Side Slope (H:V)	Outer Layer		Backing Layer	
		RSP Class	Thickness (ft)	RSP Class	Thickness (ft)
<u>28+15 to 29+60</u> Under Bridge Both Banks	1.5:1	½ TON	3.4	Backing No. 1	1.8
<u>29+60 to 30+30</u> Outside Bend Lower Left Bank	1.5:1	1 TON	4.3	Light	2.5
Outside Bend Upper Left Bank	2:1	½ TON	3.4	Backing No. 1	1.8
<u>30+30 to 30+90</u> Upstream Approach Left Bank	1.5:1	¼ TON	3.3	Backing No.1	1.8

5.3 Toe Scour Analysis

Toe scour and undermining of RSP along streambanks is a common cause of failure. The proposed channel within the project reach will have a natural substrate bottom and includes two substantial meander bends. In meandering channels flow is impinged along the outside bend, increasing velocities and scour forces. In high flows the channel bed scours and then refills during the receding limb of the hydrograph. Toe protection can be provided by extending the toe of the RSP to a depth below the expected scour depth.

Caltrans (2014) and USACE (1998) reference methods developed in *Toe Scour Estimation in Stabilized Bendways* (Maynard 1996) as a way of predicting potential scour depth. The empirical equations were developed by synthesizing laboratory and field data for scour at bank toes around stream bends. The primary variables are the average depth in the main channel upstream of the bend, depth at the bend and centerline radius of the main channel bend. The depth of scour is the difference of the computed depth in the bend and the maximum depth as predicted by Equation 16.

Based on the radius of the channel bends a factor of safety of 1.19 was used, implying that 2% of measured scour could be 5% deeper (approximately 0.5 feet) than the predicted scour depth.

The scour analysis indicated that the toe of the RSP should be placed to a minimum depth of 3.0 feet below the channel bed. This scour depth is added to the depth the channel may degrade based on the low vertical adjustment potential (VAP) profile, which is approximately 4 feet lower than the design channel bed. This places the toe of the RSP a minimum of 7 feet below the design channel bed.

5.4 Design Height of RSP

Caltrans recommends the water depth during 50-year return flow for the design height of the RSP. Additional freeboard can be added to the design height based on site conditions and professional judgment. Additional consideration should be given to the potential for super-elevation at bends and the possibility of channel aggradation. In this case, results from the 2D model at the 100-year flow, which represents the matured vegetation condition of the hybrid RSP revetment was used to define the design water surface with super elevation at the bends. The final design height of the RSP was

then modified by adding the difference of the proposed water surface and the high VAP water surface as predicted by the HEC RAS model to account for potential aggradation.

Cross sections 30+78, 29+87 and 28+88 are on the straight section approaching the bend, on the right bend, and on the left bend at the bridge face. These locations represent the highest potential for scour and super elevation and were used to determine the design height of the RSP design. Table 6 lists the SHR-2D water surface at the hybrid riprap banks on the outside of the bends. The increase in water surface elevation at the high VAP conditions as compared to design conditions is based on the HEC-RAS results. This difference is added to the SRH-2D water surface elevation to arrive at the design elevation for the top of the RSP.

Table 6. Summary RSP top elevation based on 100-year water surface elevations (WSE) for proposed conditions with mature vegetation from 2D modelling plus increase in WSE due at high VAP profile due to potential aggradation.

Station and Location	SRH-2D WSE along Bank (feet)	Increase in WSE at High VAP	Design Elevation for RSP Top (feet)
28+88 Upstream Bridge Face	375.5	0.8 feet	376.3
29+87 Outside of Left Bend	377.3	1.0 feet	378.3
30+78 Straight Section Upstream of Bends	378.0	1.0 feet	379.0

5.5 Hybrid Revetment Design- Vegetated RSP

Incorporating vegetation into the streambank revetment has the beneficial effects of improving stream ecology, increasing soil strength and providing flow resistance, although it can be unpredictable over the long term (Caltrans 2014). Established vegetation will provide cover, shade the channel and provide nutrients to the stream. As root systems establish, they can support the banks by providing resistance to scour and bind the soils and rock placed along the bank.

Caltrans has developed recommendations for the use of a “hybrid revetment” that incorporates vegetation into rock slope protection to provide the benefits of stream side vegetation while managing its uncertainties. The intent is to balance the engineering benefit of armoring a bank while promoting ecological processes.

The hybrid RSP design consists of the standard RSP design as described above, with the addition of live willow staking that penetrates the rock layers and allows rooting into the native bank soils. Species most commonly used as live stakes are native willow and cottonwood trees. Plantings are placed either vertical or perpendicular to the slope face and must be long enough to extend through to the subbase and into moist soil. Placement of live stakes is done in conjunction with rock placement. To provide protection to the live stakes during rock placement, cuttings should be placed into perforated cardboard tubes that are embedded into the subgrade and extend through the layered RSP (Figure 17). Cardboard is preferred as it can degrade over time and not hinder the growth of the cuttings. Growing medium is placed within the cardboard tubes to provide direct soil

contact. Additionally, voids within the placed riprap should be filled with salvaged soil to further promote root growth within the layered RSP.

For Robinson Creek, it is assumed cutting shall be made from native willow species. Stakes may need to be as long as 12 feet and should be placed vertically to maximize their rooting depth, with the butt of the live stake at or near summer groundwater levels. The willow plantings will start at bankfull, 2.3 feet above the finished channel bed, and extend up the RSP revetment. To ensure good establishment, the live stakes should be irrigated for a minimum of two seasons.

Preliminary spacing of live willow stakes is assumed to be 5 feet on-center. Prior to final design a qualified landscape architect or botanist should be retained to provide recommendations for lateral spacing, live willow stake diameter range, embedment depths into subgrade and type of soil backfill for the tubes. They should also provide provisions for harvesting and storage of cutting stock and irrigation design.

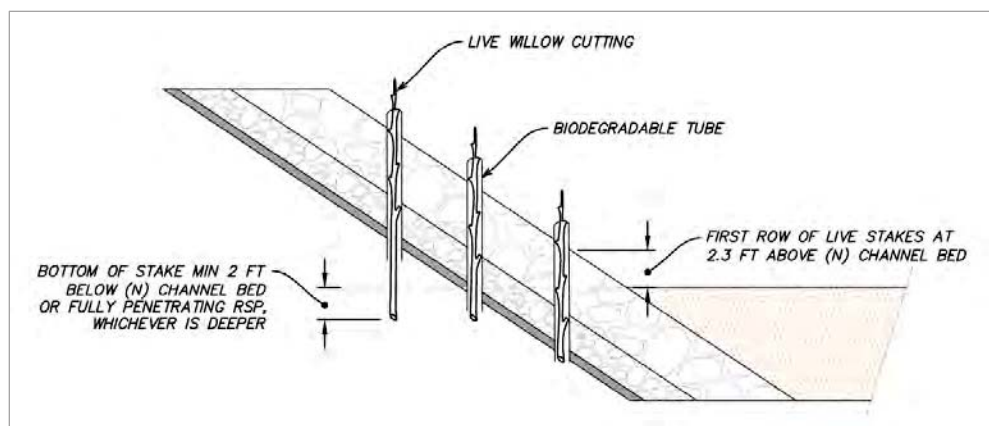


Figure 17. Typical live stake placement for hybrid RSP revetment.

5.6 RSP Design Sections

Three typical design sections were developed for the RSP bankline protection for the project (Figure 18):

1. Under the Bridge (Station 28+15 to 28+60)
2. Apex of the bend and along the roadway and bridge approach (Station 28+60 to 30+30)
3. Upstream edge of project at approach to bend Station (30+30 to 30+90)

Section 1 has 1.5:1 side slope and is located along the bend under the bridge. This reach has ½ Ton RSP (Class VII) application on both banks. The right bank is the outside bend and the left bank is the inside bend where a bench is expected to form in the wider channel. Roughly half of the RSP on the right bank will be outside the cover of the bridge deck and should utilize the Hybrid RSP discussed above.

Section 2 is located at the apex of the bend along the bridge approach currently protected by the retaining wall and RSP. The left bank will have 1-Ton RSP (Class VIII) application with a 1.5:1 slope at the toe and ½-ton RSP (Class VII) at a 2:1 slope along the upper bank. This reach should utilize Hybrid RSP. Compacted native backfill behind the RSP layers will be required where the new bank is pulled away from the existing road embankment. Above the RSP application backfill and planting should be applied to meet the existing ground.

Section 3 is located at the upstream end of the project reach and is the approach to the first bend. ¼-ton RSP (Class V) will be applied to the left bank at a 1.5:1 side slope and blend into the native bank. Hybrid RSP should be utilized. Existing RSP along this reach should be reused as practical.

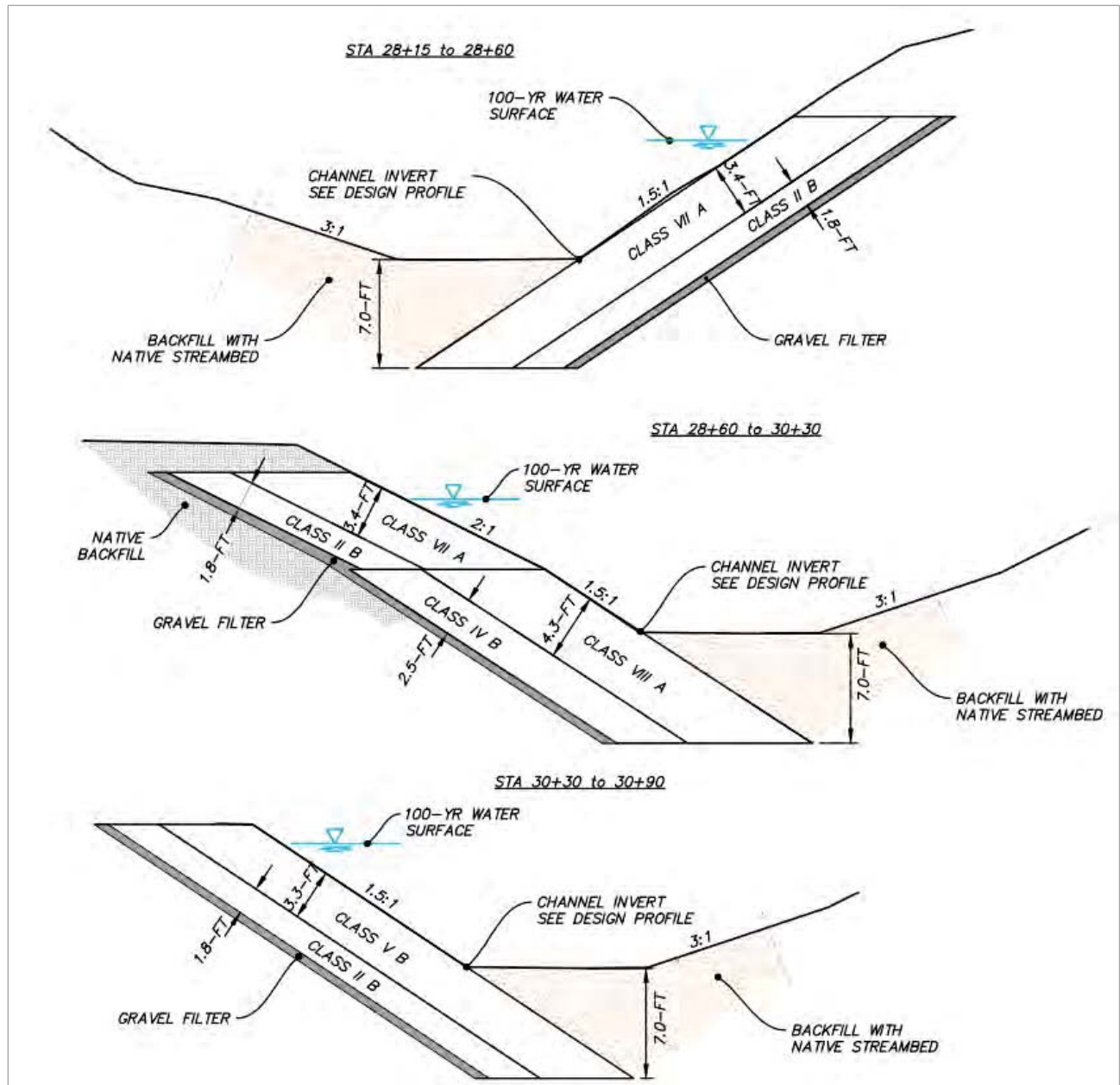


Figure 18. Typical sections for RSP placement along design channel on Robinson Creek at Lambert Lane.

5.7 Tree Removal and Additional Streamside Planting Areas

Based on the proposed channel grading shown in Appendix A, several trees will be removed. This includes a 30-inch tree (DBH) close to the bridge face, a 16-inch tree near the existing retaining wall, and an 8-inch and two 4-inch trees on the right bank. The species of these trees is not known, but if any are willows, they should be considered for use as live stakes for the hybrid revetment.

In addition to the plantings contained within the hybrid RSP revetment, native vegetation would be planted on the graded point bars on the inside of the channel bends. This includes on the right bank between station 29+50 and 31+10, and on the left bank immediately upstream and downstream of the bridge crossing. This vegetation should include native riparian tree species, as well as understory plants. Irrigation will likely be required for a minimum of two years to ensure survival.

In addition to the planting areas close to the channel, the project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace could be used to plant upland tree species, such as native oak trees. Prior to final design a qualified landscape architect or botanist should be retained to develop a planting plan.

5.8 Recommendation for Treatment of the downstream Bank Failure

The stream channel design allows for release of the stored sediments from the upstream channel. In total, approximately 220 cubic yards of streambed sediments may be released and transport downstream during this channel adjustment period. This is a relatively small amount of sediment for this stream. However, this released sediment has the potential to deposit between high flow events within the project reach and immediately downstream. Deposition could exacerbate the existing bank erosion downstream of the bridge, behind the Boonville Hotel. Given the condition of this failing bank, proximity of structures on top of this bank, and potential for channel adjustments associated with this project, efforts should be made to treat the bank failure using standard bioengineering bank revetment practices prior to, or in conjunction with, the Lambert Lane bridge replacement. The Mendocino County Resource Conservation District (RCD) has lead bank repairs using similar approaches in other location in lower Robinson Creek, and should be engaged about the potential to lead repair efforts for this bank failure.

6 REFERENCES

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Appendix A – Design Drawings

Appendix B - Geomorphic Field Data

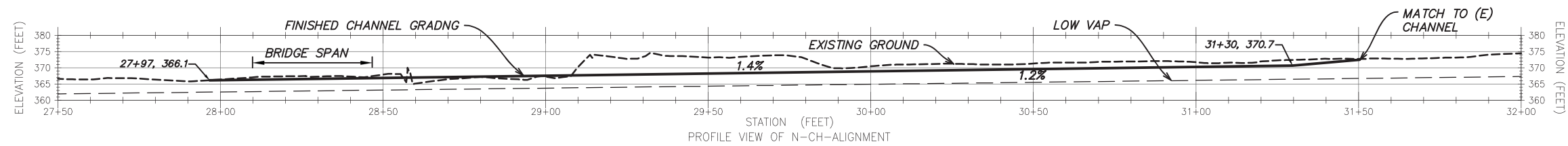
Appendix C – Hydrology

Appendix D - HEC RAS Results

Appendix E - SMS Results

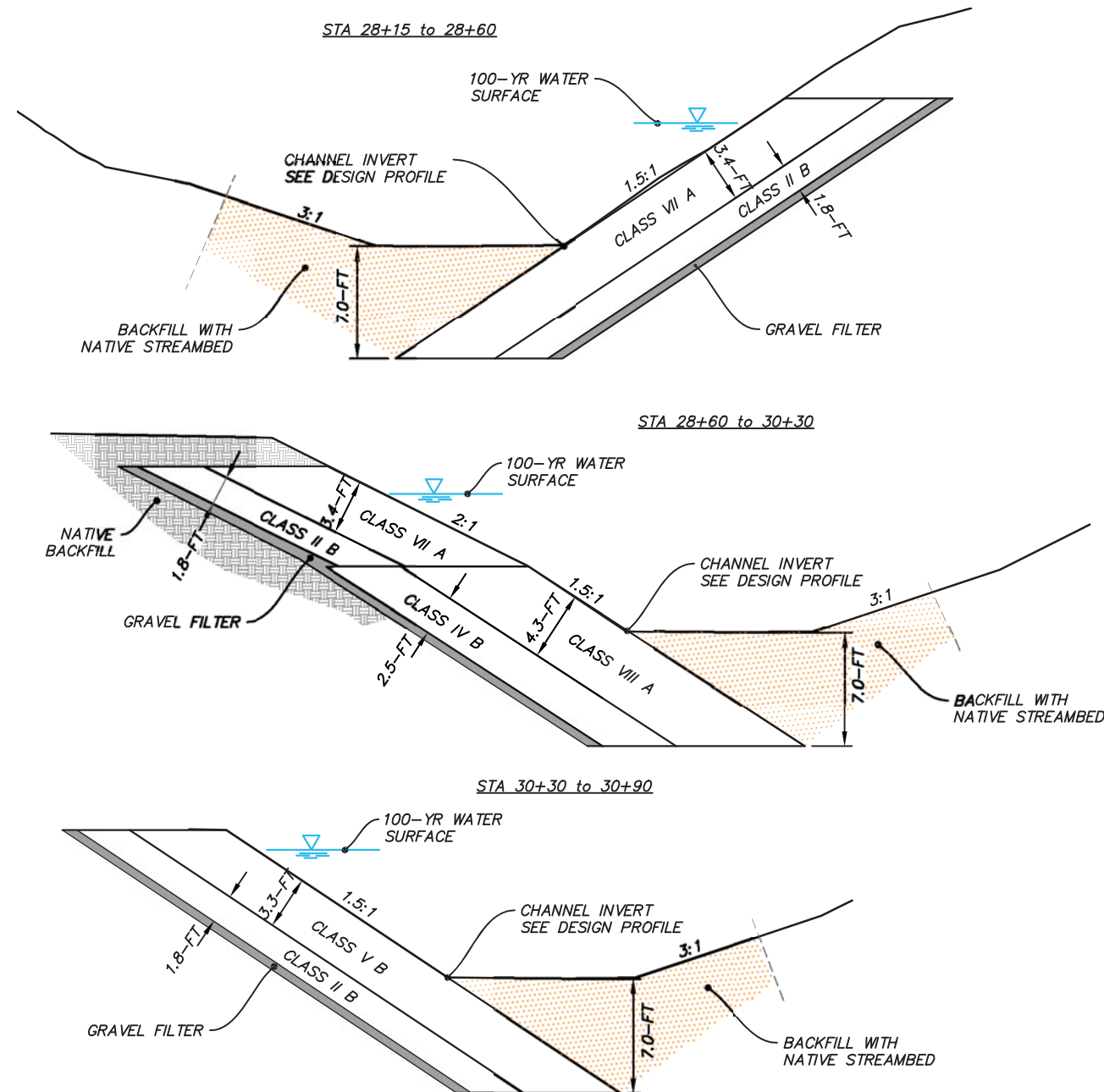
Appendix F – Rock Slope Protection Design

Appendix A – Design Drawings



2 CHANNEL PROFILE

HORIZONTAL AND VERTICAL SCALE 0 20' 40'
GRAPHIC SCALE



3 TYPICAL RSP SECTIONS

0 5' 10'
GRAPHIC SCALE

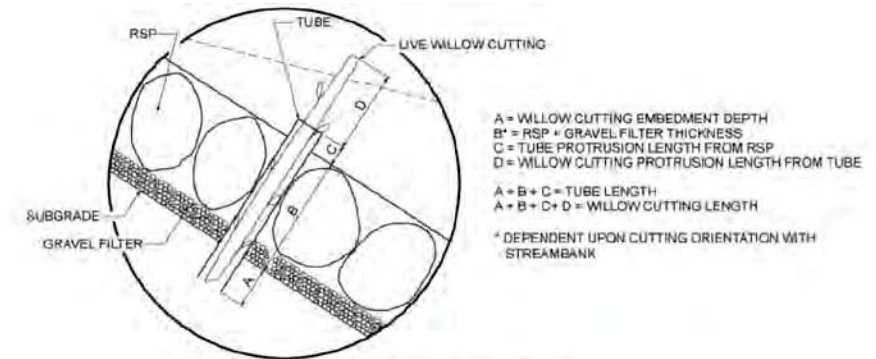
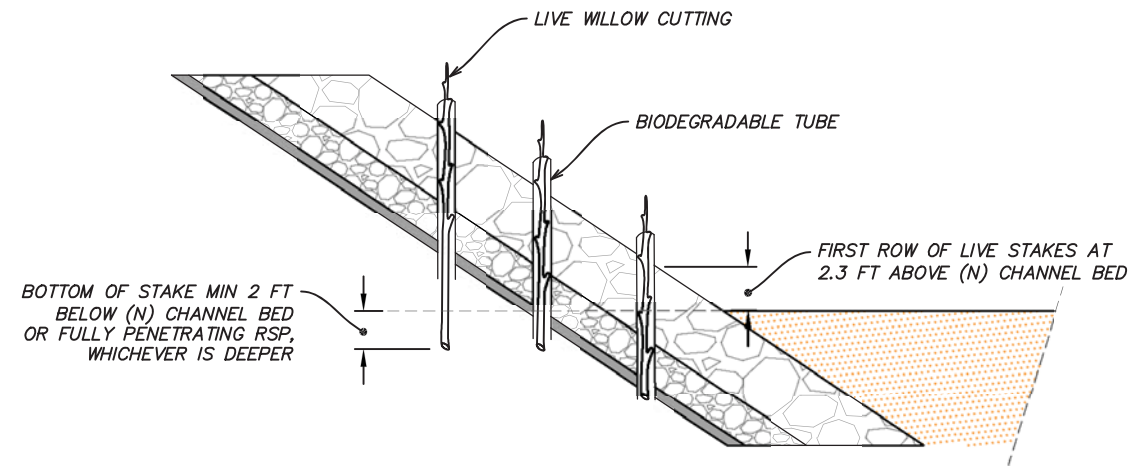
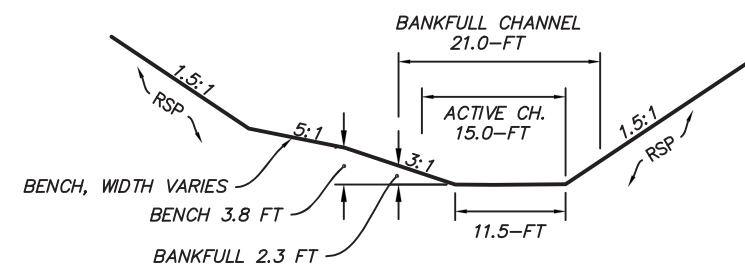


Figure 21- Live Cutting Detail

4 HYBRID RSP DETAIL

NTS



5 TYPICAL SECTION UNDER BRIDGE

NTS

Michael Love & Associates, Inc.
PO Box 4477 • Arcata, CA 95521 • (707) 822-2411

DRAFT

30% DESIGN
SUBMITTAL

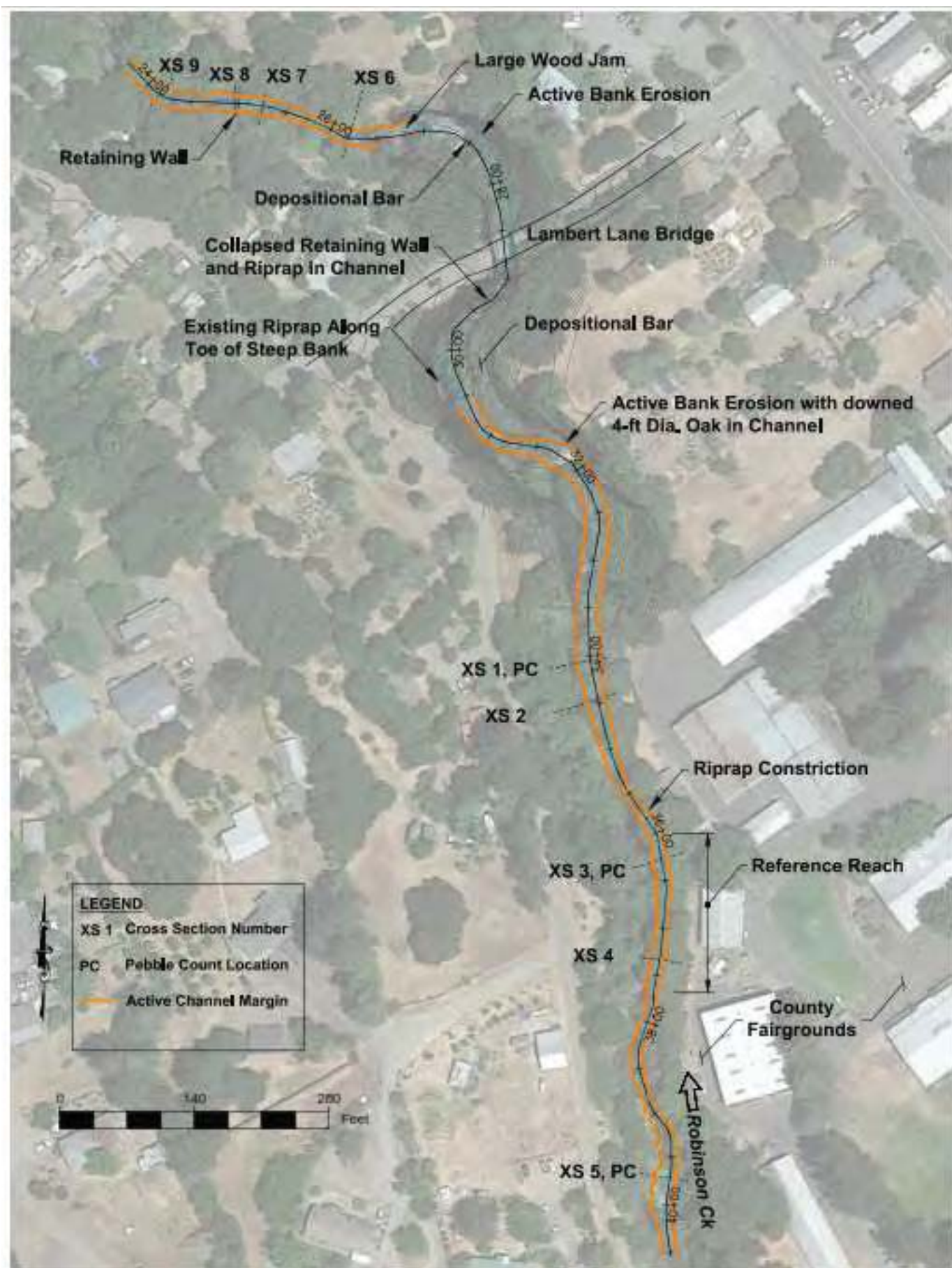
VERIFY SCALE
THIS BAR IS
ONE INCH LONG
AT FULL SCALE

MENDOCINO COUNTY DEPARTMENT OF TRANSPORTATION
ROBINSON CREEK AT LAMBERT LANE
BOONEVILLE, CA

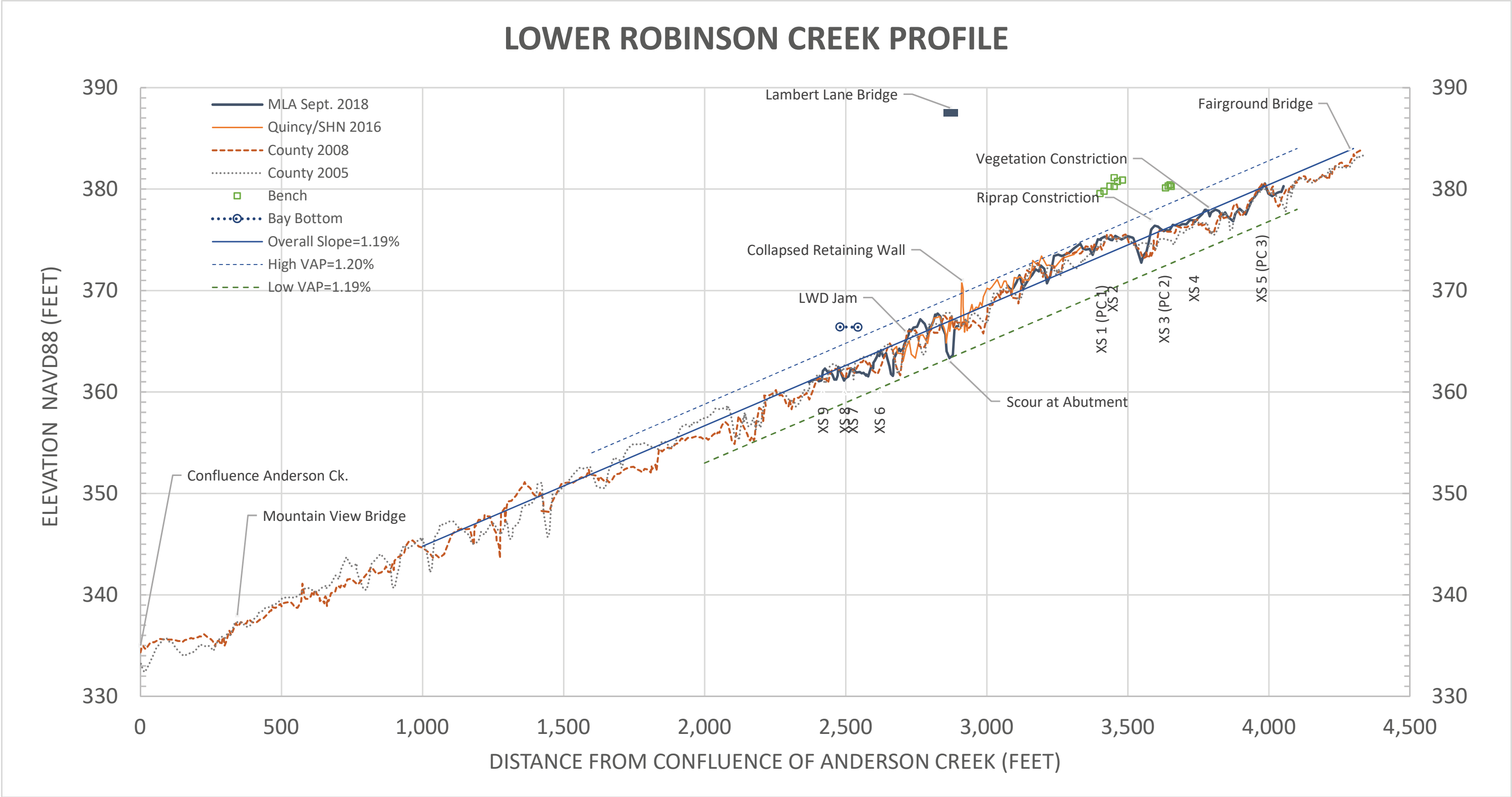
CHANNEL PROFILE AND
TYPICAL RSP REVETMENT

DATE
OCT. 2018
SUBMITTAL
30% DESIGN
DESIGN
AL, ML
DRAWN
LLANOS
SHEET
2 of 2

Appendix B - Geomorphic Field Data

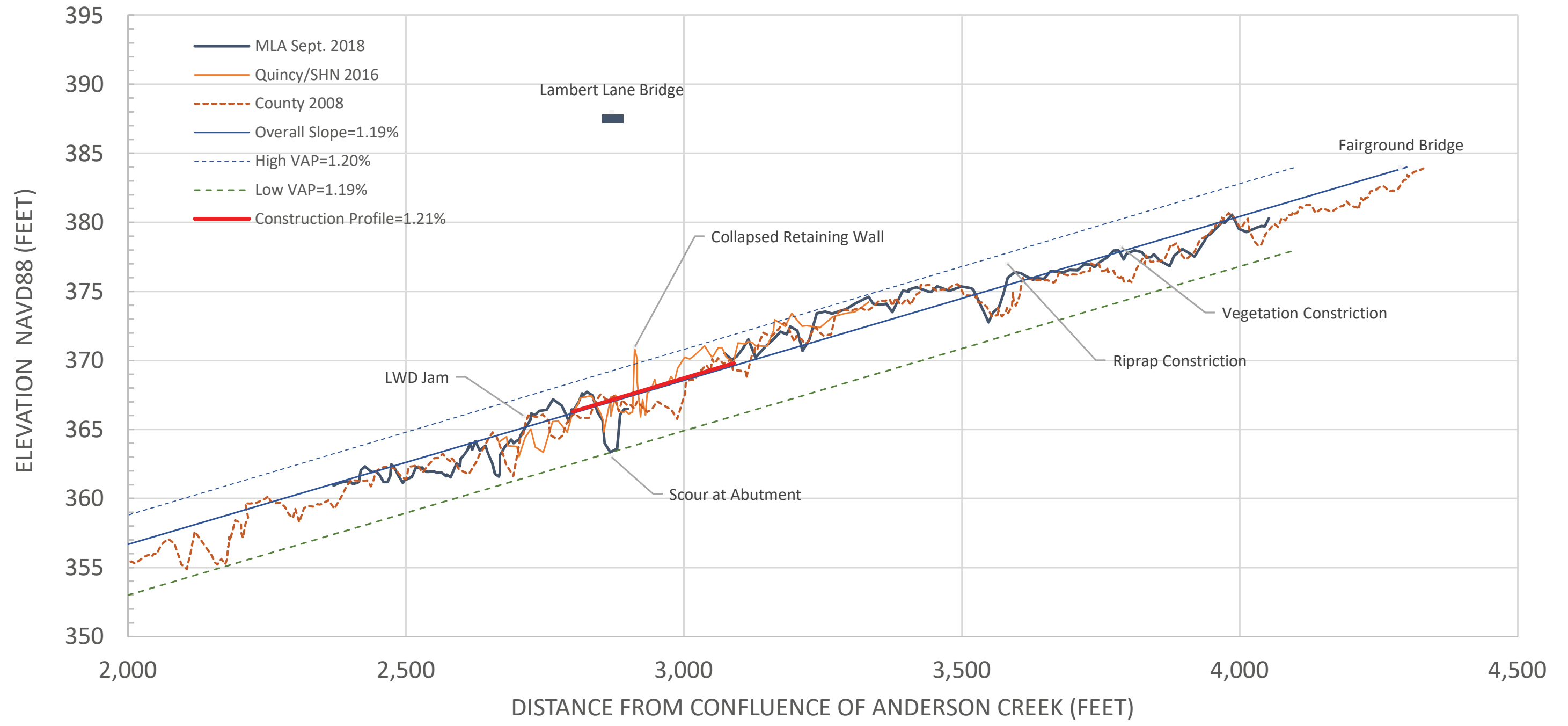


LOWER ROBINSON CREEK PROFILE



ROBINSON CREEK PROFILE

Project Reach (EC Alignment)



Robinson Creek Geomorphic Survey

September 12, 2018

Cross Section Data

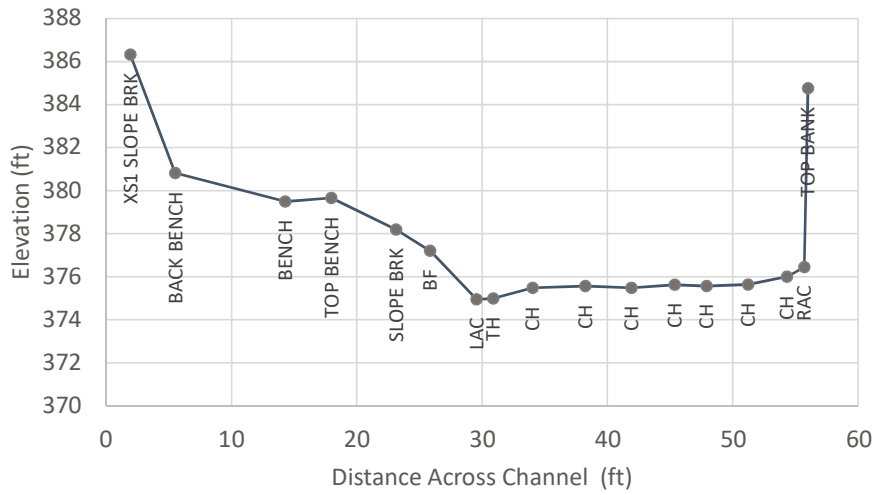
Upstream of Lambert Lane

Cross Section Location		BF Width (ft)	BF Depth (ft)		AC Width (ft)
XS 1	STA 34+05	29.9	2.2		26.2
XS 2	STA 34+45	25.0	2.7	2.3	19.5
XS 3	STA 36+27	21.4	2.4		15.4
XS 4	STA 37+33	24.8	2.2		13.3
XS 5	STA 39+72	31.7	2.1		24.8
Average:		26.6	2.3		19.8

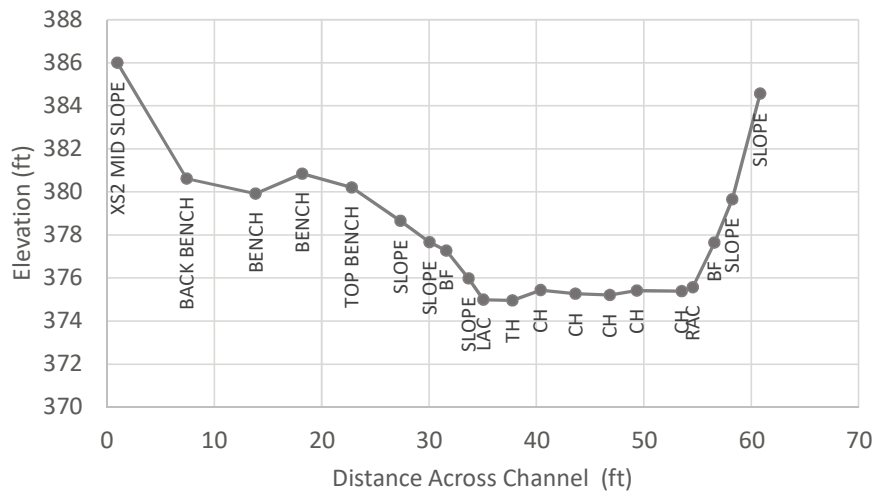
Downstream of Lambert Lane

Cross Section Location		BF Width (ft)	BF Depth (ft)		AC Width (ft)
XS 9	STA 24+20	23.7	1.8	2.1	17.0
XS 8	STA 24+95	19.6			18.1
XS 7	STA 25+25	25.0	2.3		19.7
XS 6	STA 26+20	28.8	2.6		19.6
Average:		24.3	2.2		18.6

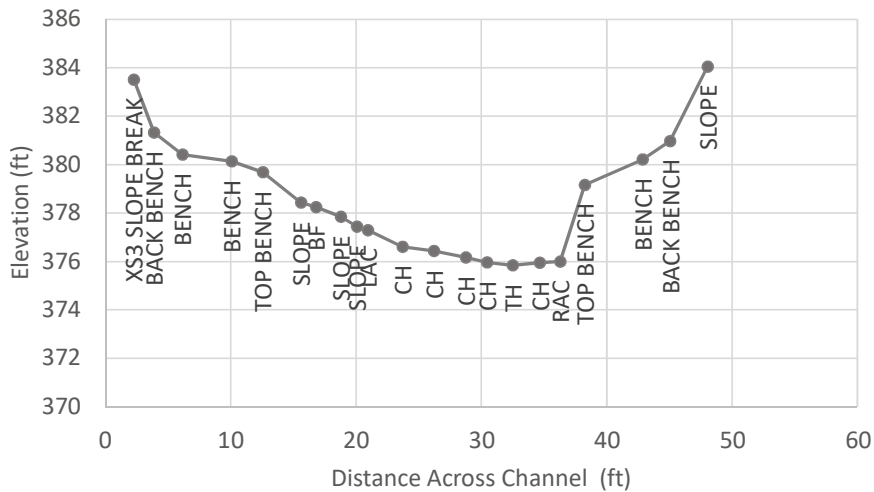
XS 1 - STA 34+05



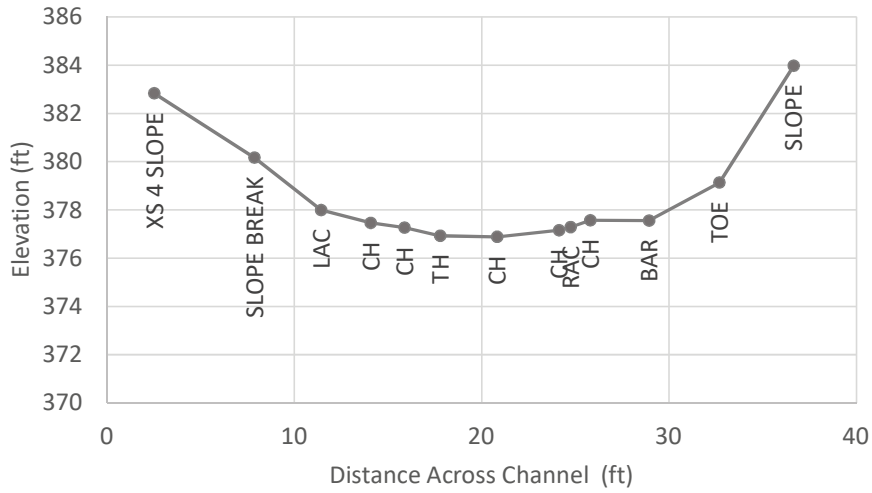
XS 2 - STA 34+45



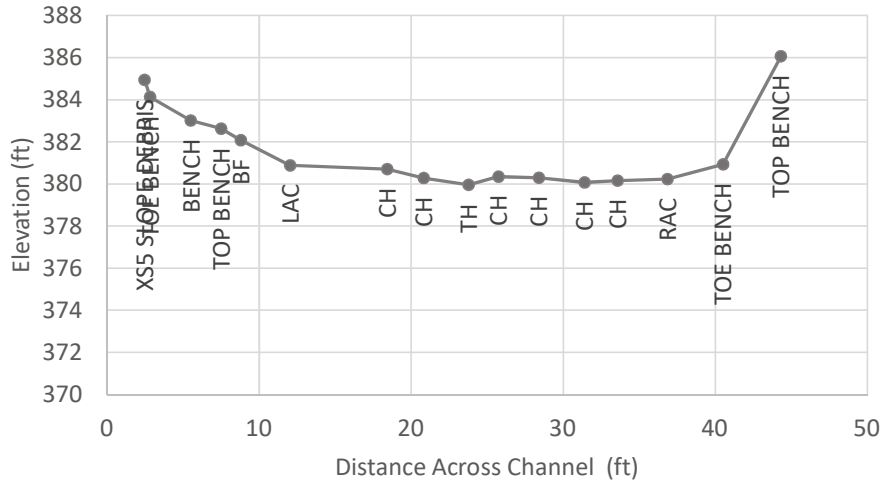
XS 3 - STA 36+27



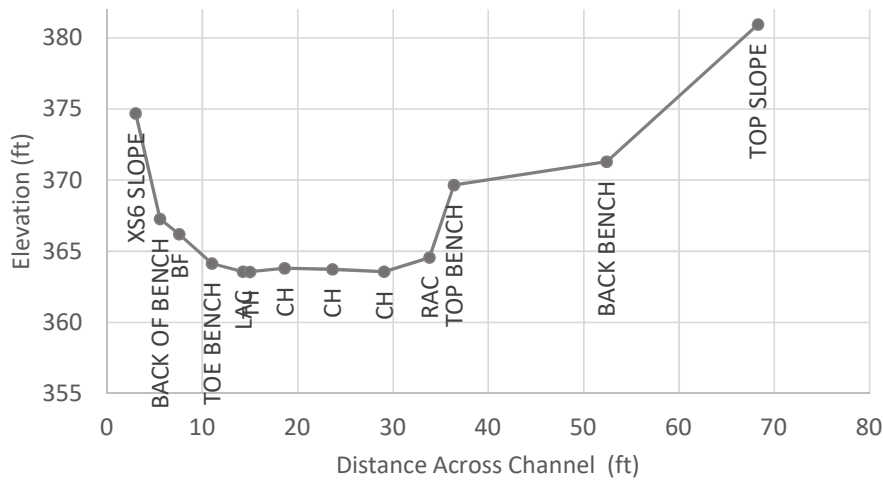
XS 4 - STA 37+33



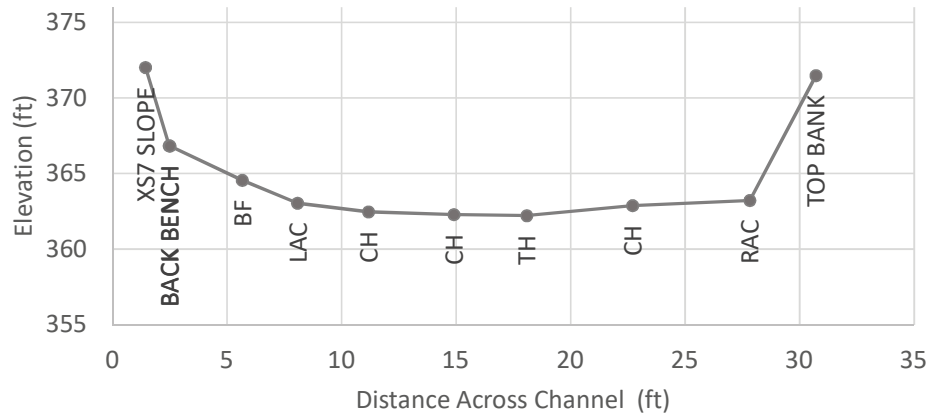
XS 5 - STA 39+72



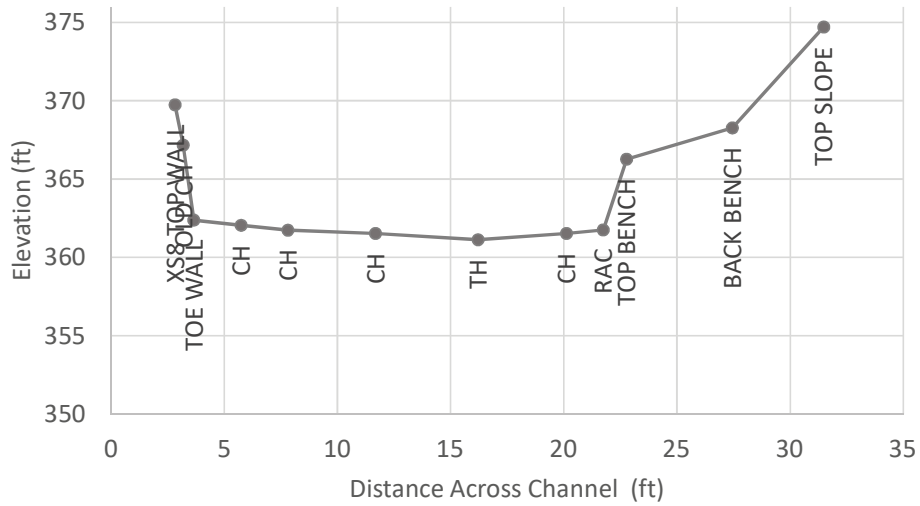
XS 6 - STA 26+20



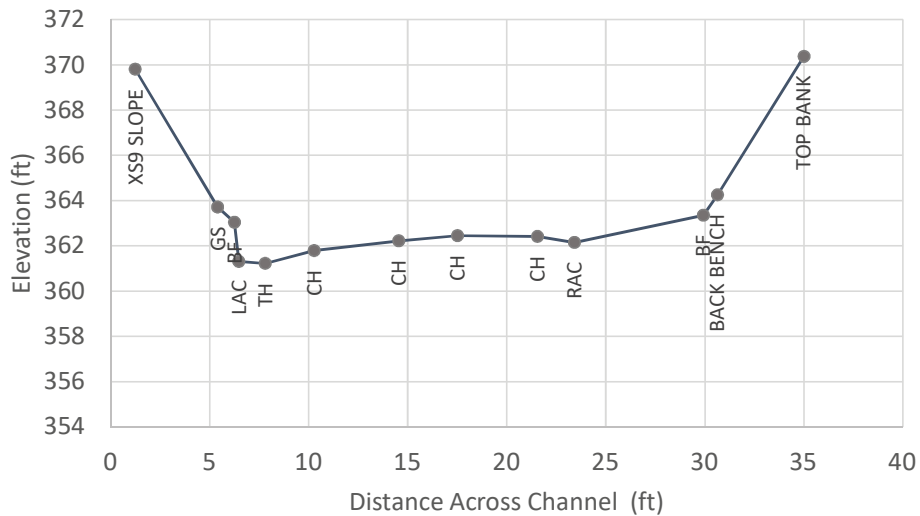
XS 7 - STA25+25



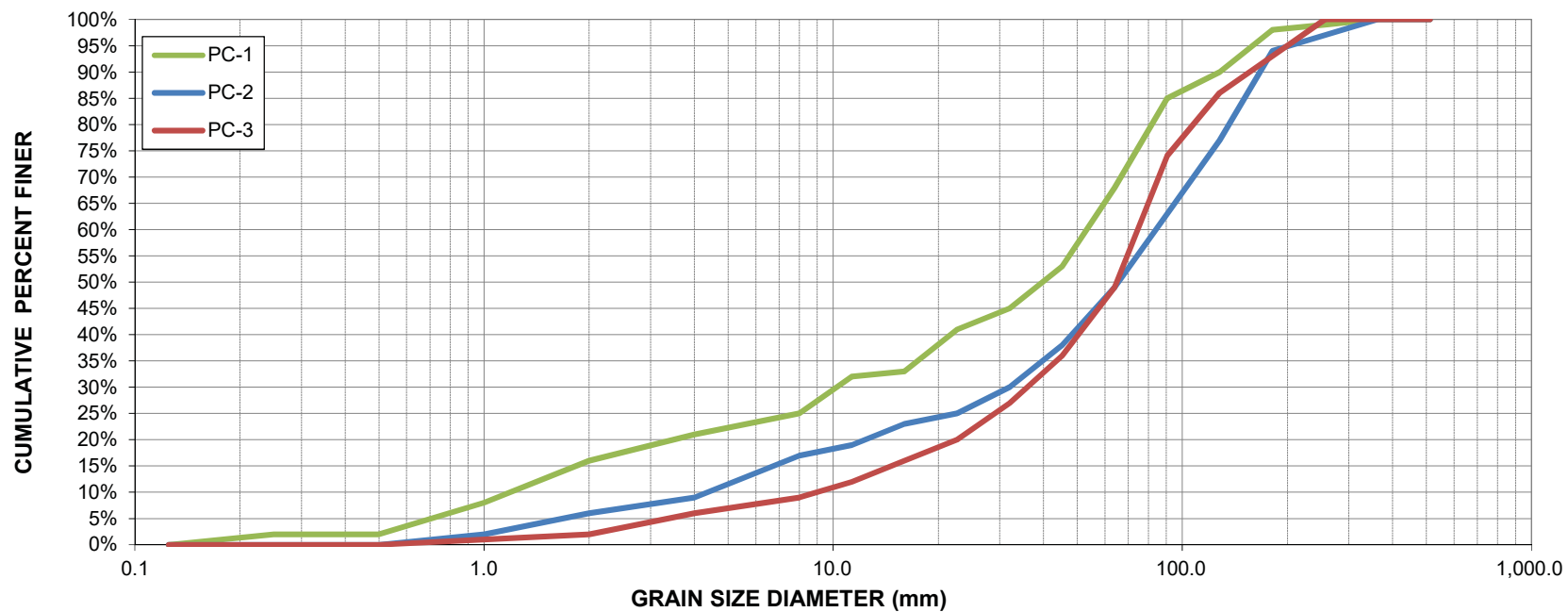
XS 8 - STA 24+95



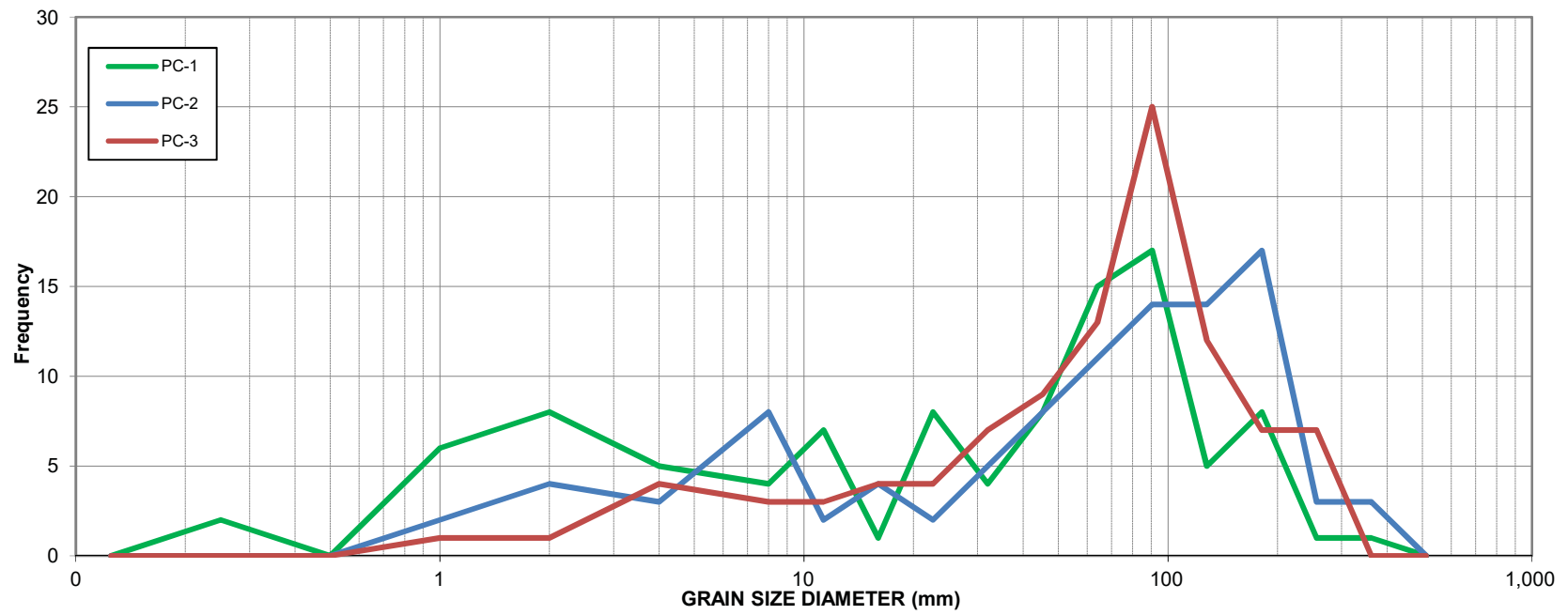
XS 9 - STA 24+20



Robinson Creek
Cumulative Particle Size Distribution from Pebble Counts (PC)



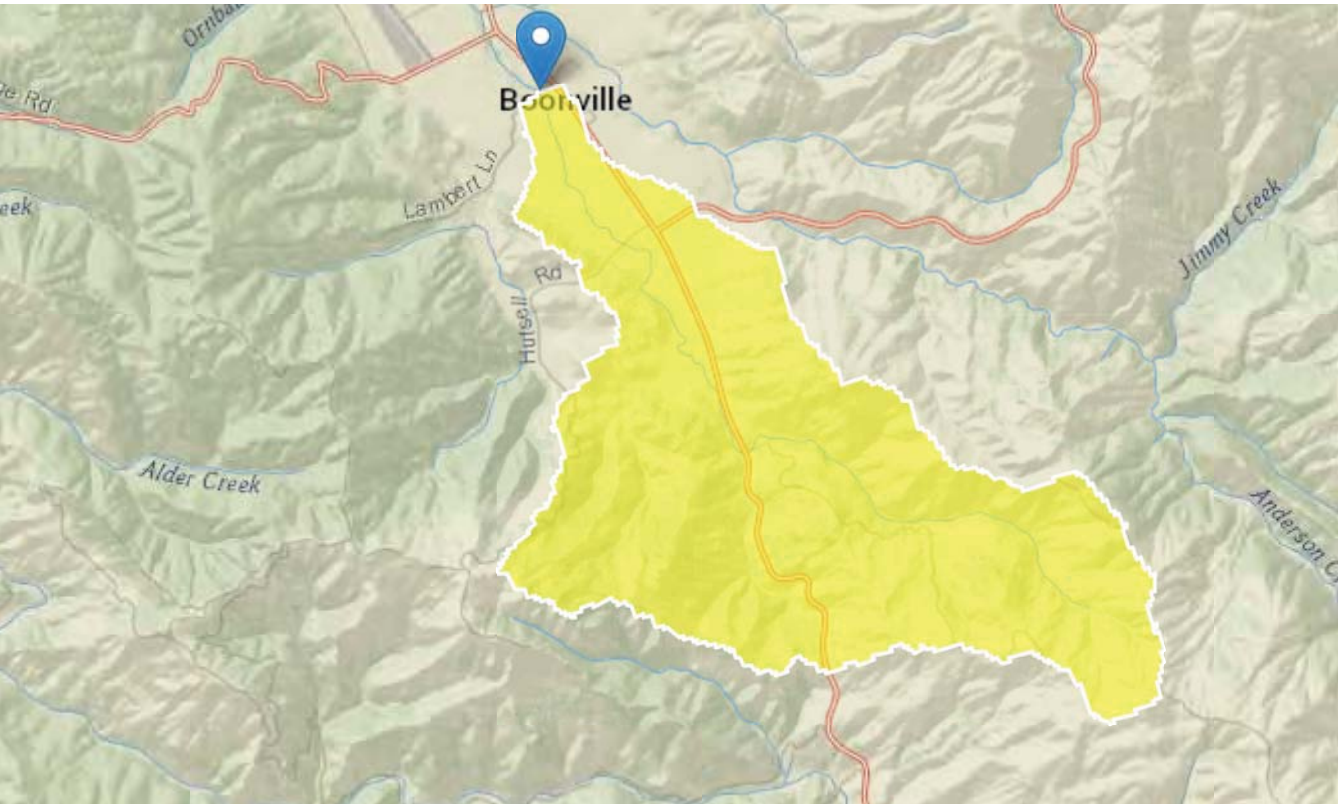
Robinson Creek
Grain Size Frequency from Pebble Count Measurements



Appendix C – Hydrology

Robinson Creek at Lambert Lane Boonville, CA

Region ID: CA
Workspace ID: CA20180907194531373000
Clicked Point (Latitude, Longitude): 39.00833, -123.36844
Time: 2018-09-07 12:45:47 -0700



Basin Characteristics			
Parameter Code	Parameter Description	Value	Unit
BASINPERIM	Perimeter of the drainage basin as defined in SIR 2004-5262	14.2	thousand feet
BSLDEM30M	Mean basin slope computed from 30 m DEM	23.2	percent
CENTROIDX	Basin centroid horizontal (x) location in state plane coordinates	-2314707.3	feet
CENTROIDY	Basin centroid vertical (y) location in state plane units	2108387.3	feet

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	4	square miles
EL6000	Percent of area above 6000 ft		percent
ELEV	Mean Basin Elevation	881	feet
ELEVMAX	Maximum basin elevation		feet
FOREST	Percentage of area covered by forest	18.5	percent
JANMAXTMP	Mean Maximum January Temperature	56.41	degrees F
JANMINTMP	Mean Minimum January Temperature	37.58	degrees F
LAKEAREA	Percentage of Lakes and Ponds		percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24		percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset		percent
LFPLENGTH	Length of longest flow path		miles
MINBELEV	Minimum basin elevation		feet
OUTLETELEV	Elevation of the stream outlet in thousands of feet above NAVD88.	375	feet
PRECIP	Mean Annual Precipitation	44.2	inches
RELIEF	Maximum - minimum elevation		feet
RELRELF	Basin relief divided by basin perimeter		feet per mi

Peak-Flow Statistics Parameters [2012 5113 Region 1 North Coast]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4	square miles	0.04	3200
PRECIP	Mean Annual Precipitation	44.2	inches	20	125

Peak-Flow Statistics Flow Report [2012 5113 Region 1 North Coast]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	PII	Plu	SEp
-----------	-------	------	-----	-----	-----

Statistic	Value	Unit	Pll	Plu	SEp
2 Year Peak Flood	264	ft ³ /s	108	645	58.6
5 Year Peak Flood	517	ft ³ /s	247	1080	47.4
10 Year Peak Flood	700	ft ³ /s	347	1410	44.2
25 Year Peak Flood	943	ft ³ /s	482	1850	42.7
50 Year Peak Flood	1130	ft ³ /s	576	2220	42.7
100 Year Peak Flood	1320	ft ³ /s	659	2660	44.3
200 Year Peak Flood	1510	ft ³ /s	748	3040	44.4
500 Year Peak Flood	1760	ft ³ /s	851	3630	46

Peak-Flow Statistics Citations

Gotvald, A.J., Barth, N.A., Veilleux, A.G., and Parrett, Charles, 2012, Methods for determining magnitude and frequency of floods in California, based on data through water year 2006: U.S. Geological Survey Scientific Investigations Report 2012-5113, 38 p., 1 pl. (<http://pubs.usgs.gov/sir/2012/5113/>)

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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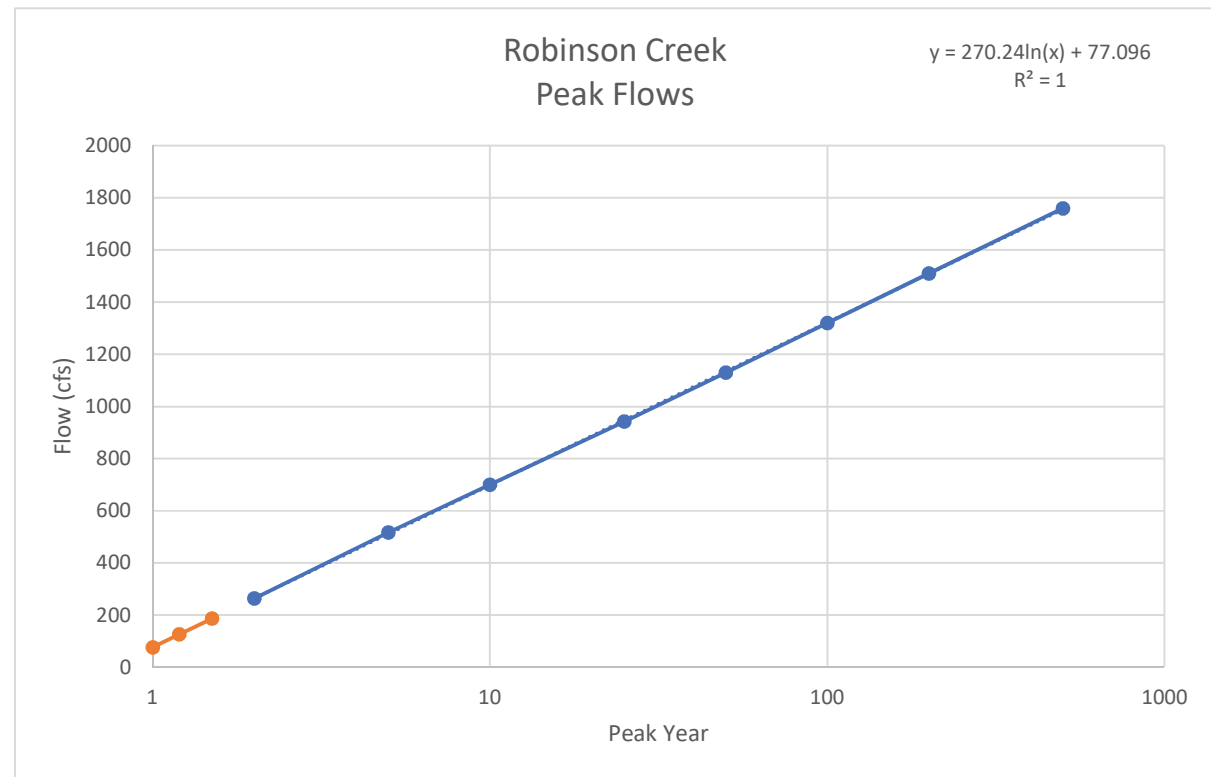
USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.2.1

Flood Frequency

Robinson Creek at Lambert Lane

DA (sq mi)= 4		
	PK (year)	Q (cfs)
Extrapolated	1	77
	1.2	126
	1.5	187
Streamstats	2	264
	5	517
	10	700
	25	943
	50	1130
	100	1320
	200	1510
	500	1760



Appendix D - HEC RAS Results

Manning's Roughness Calculations

Robinson Creek at Lambert Lane

CALTRANS. 2014. Hybrid Streambank Revetments: Vegetated Rock Slope Protection. State of California Department of Transportation Design Information Bulletin. DIB 87-0.1

$$n_c = (n_0 + n_1 + n_2 + n_3 + n_4) m_5$$

n_c = main channel effective roughness value

Post Project "As-Built Condition"

Hybrid RSP revetment after construction with newly planted vegetation

Main Channel Bed and Bank Surface Material	Reevaluated n_0 =	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1 =	0.005	Slightly Eroded banks or bed
Channel Cross Section Variation	n_2 =	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3 =	0.000	No obstructions
Main Channel Vegetation Density	Reevaluated n_4 =	0.005	Low vegetation Density
Channel Degree of Meandering	m_5 =	1.000	Sinuosity of 1.2

$$n_c = 0.043$$

Post Project "Full Grow Out Condition"

Hybrid RSP revetment with mature vegetation

Main Channel Bed and Bank Surface Material	Reevaluated n_0 =	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1 =	0.000	Smooth Banks
Channel Cross Section Variation	n_2 =	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3 =	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4 =	0.065	Dense Willows
Channel Degree of Meandering	m_5 =	1.000	Sinuosity of 1.2

$$n_c = 0.108$$

Channel Bed

Main Channel Bed and Bank Surface Material	Reevaluated n_0 =	0.028	Coarse Rock
Channel Degree of Irregularity	Reevaluated n_1 =	0.000	Smooth Banks
Channel Cross Section Variation	n_2 =	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3 =	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4 =	0.000	No vegetation in Channel
Channel Degree of Meandering	m_5 =	1.000	Sinuosity of 1.2

$$n_c = 0.043$$

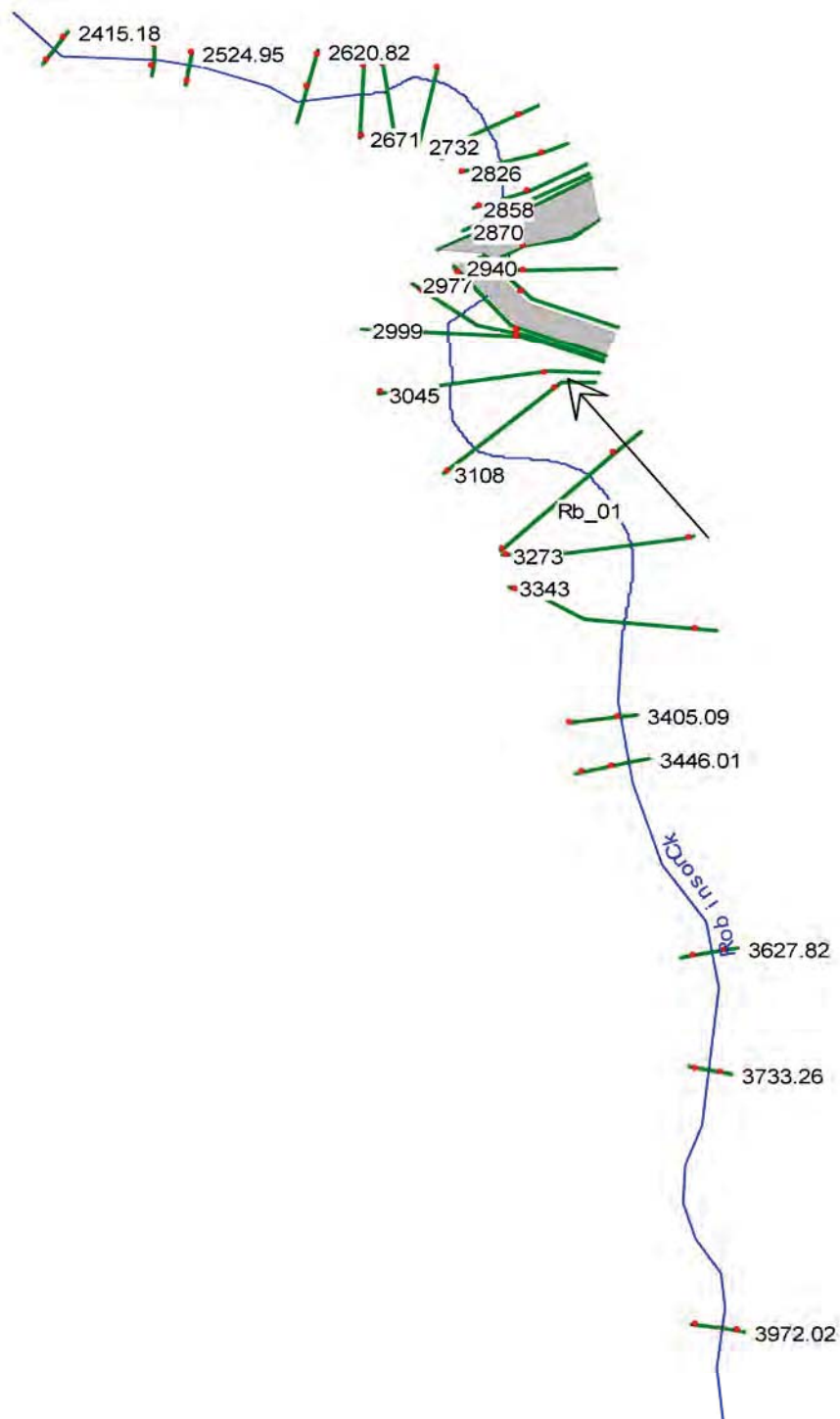
Native Planting Areas

Main Channel Bed and Bank Surface Material	Reevaluated n_0 =	0.02	Earth and sand
Channel Degree of Irregularity	Reevaluated n_1 =	0.005	Slightly eroded banks
Channel Cross Section Variation	n_2 =	0.005	Thalweg Alternates sides
Main Channel Relative Effect of Obstructions	n_3 =	0.010	Obstruction <15% of XS from debris
Main Channel Vegetation Density	Reevaluated n_4 =	0.040	Native Trees with wide spacing
Channel Degree of Meandering	m_5 =	1.000	Sinuosity of 1.2

$$n_c = 0.08$$

Robinson Creek at Lambert Lane Bridge

HEC-RAS Reults for Existing Channel

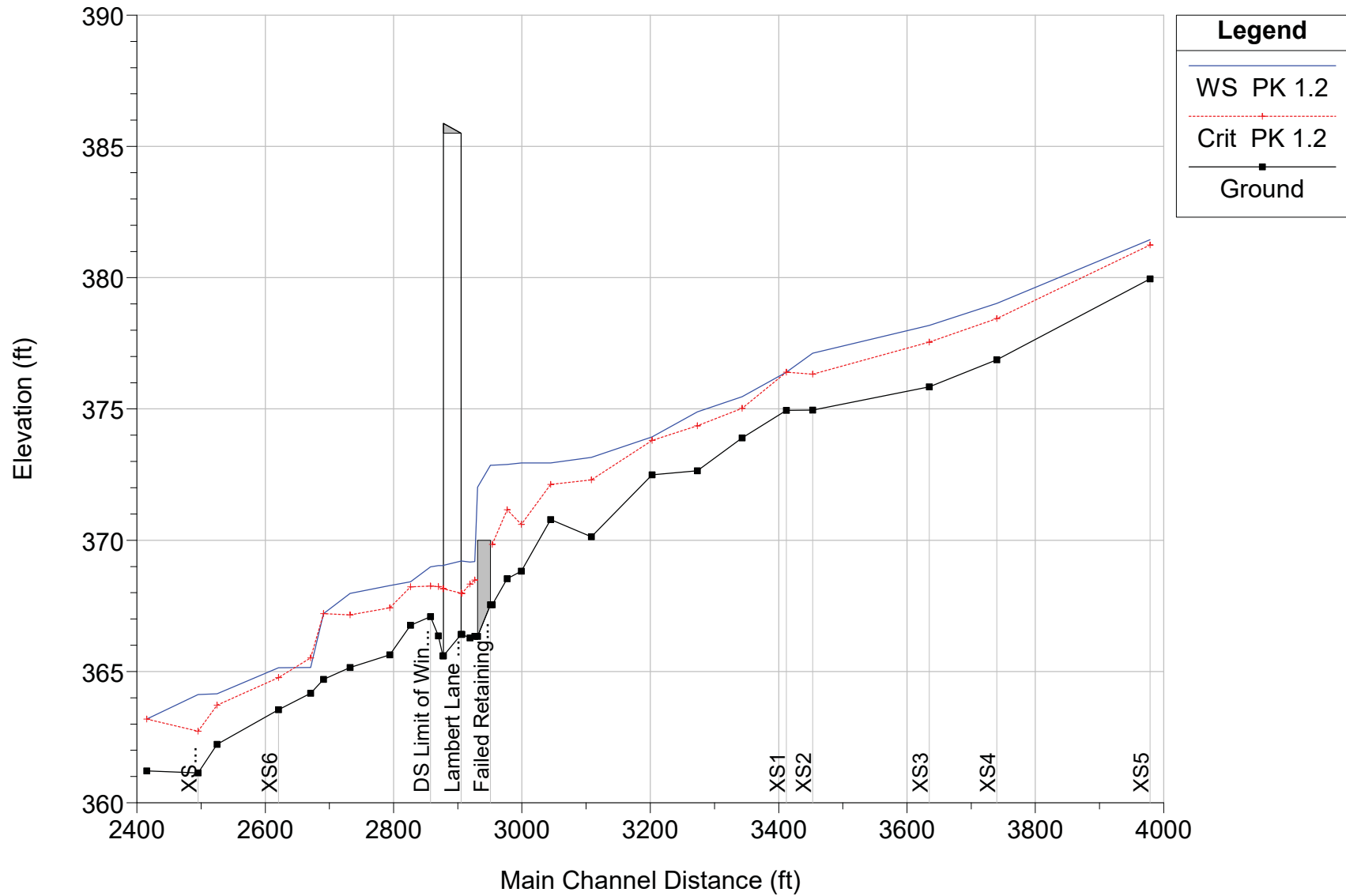


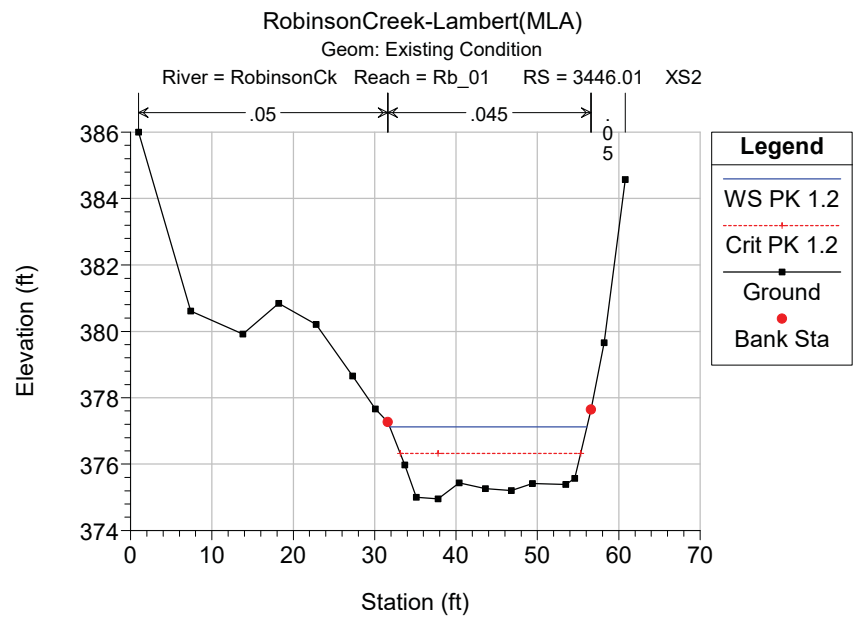
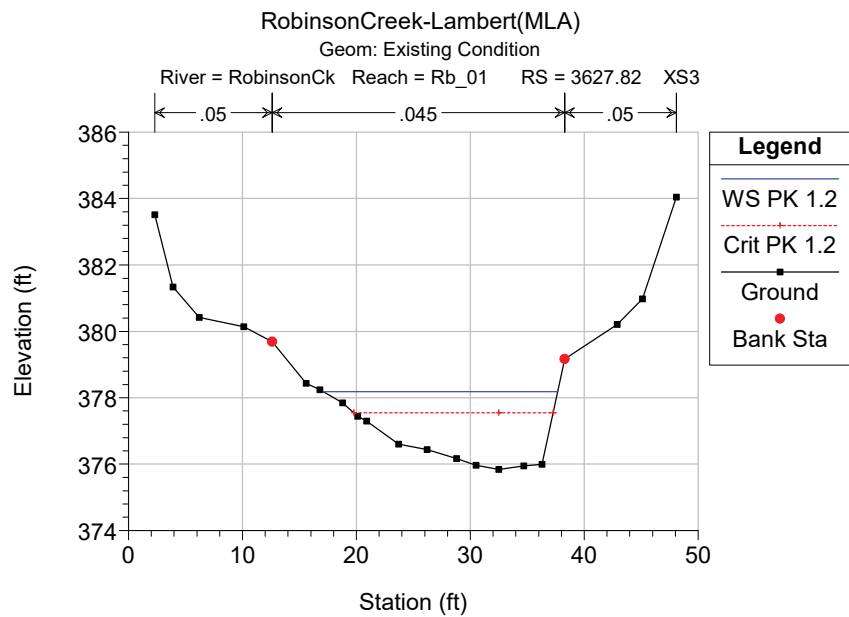
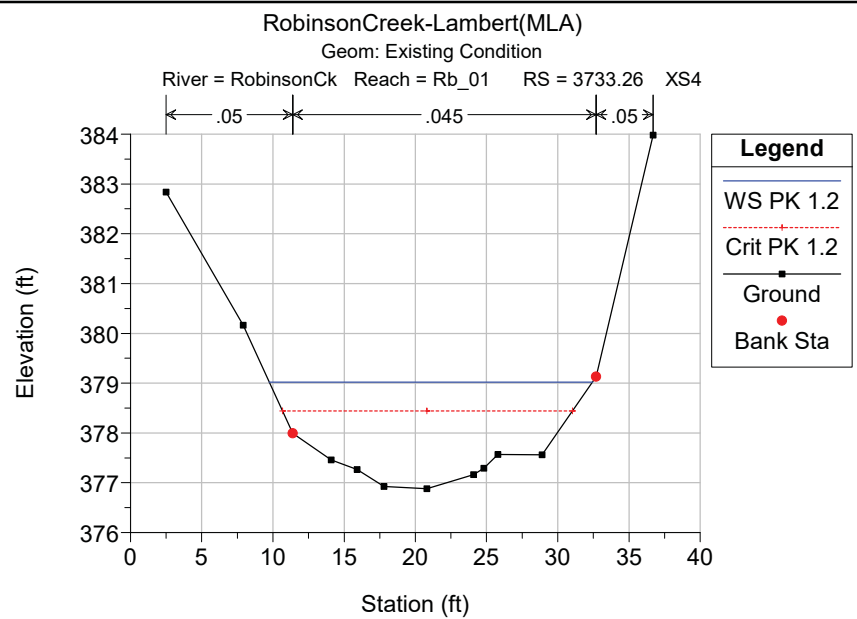
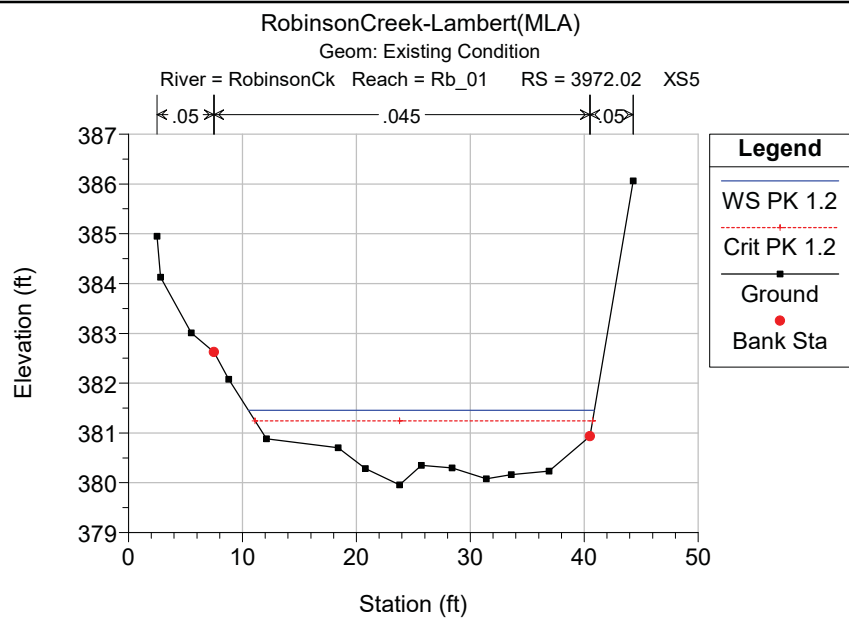
Robinson Creek at Lambert Lane Bridge
HEC-RAS Reults for Existing Channel

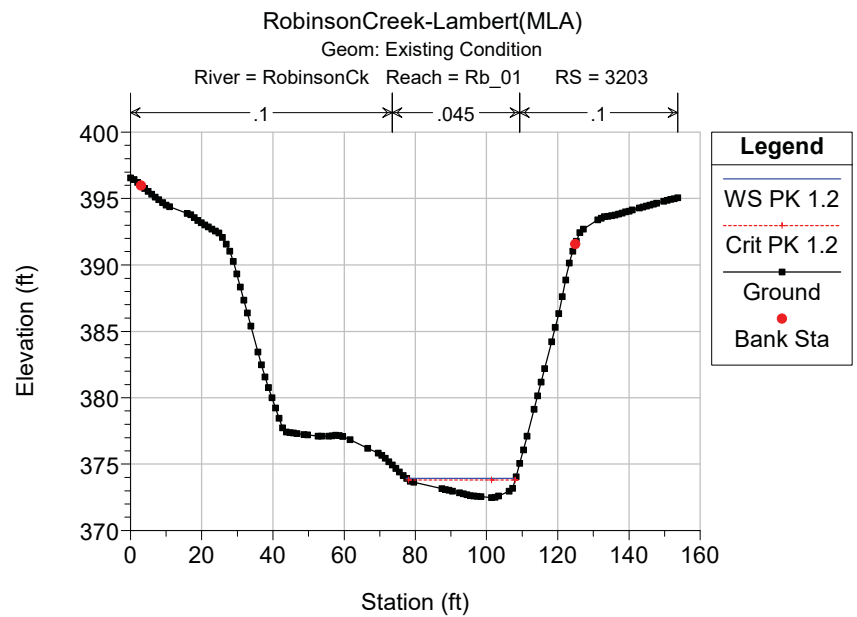
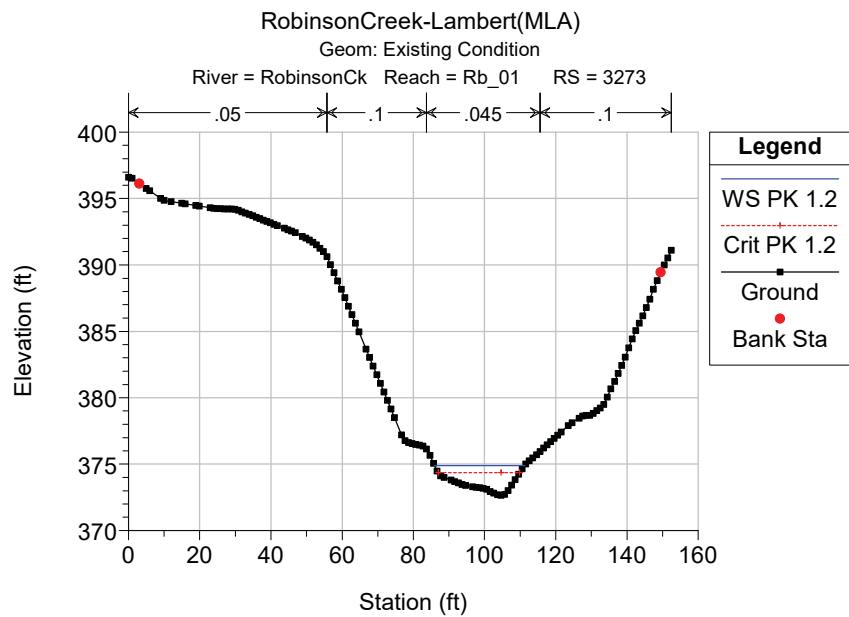
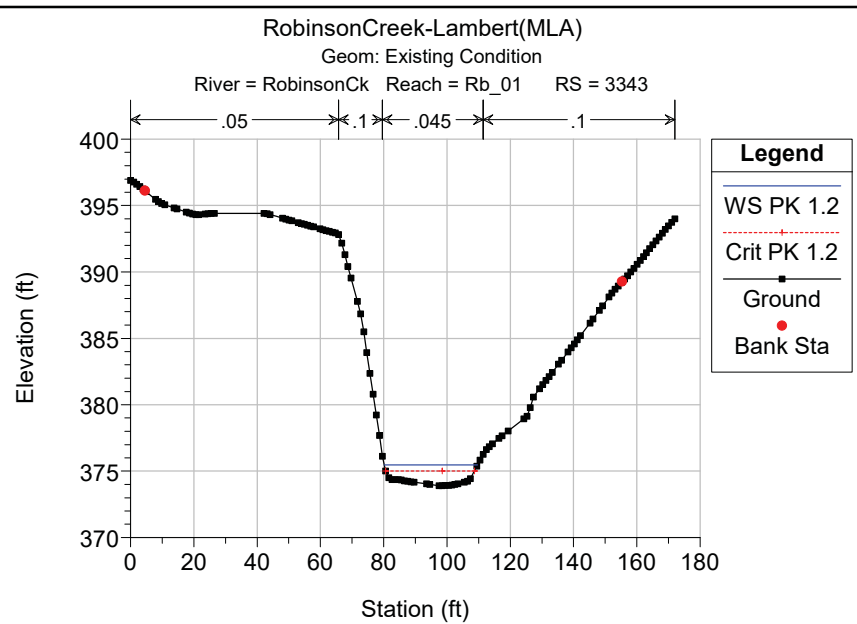
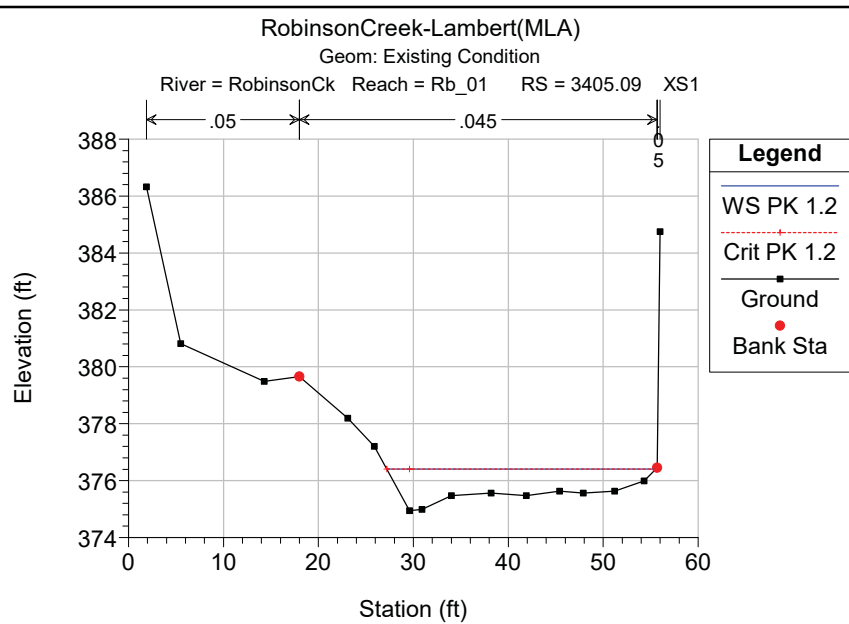
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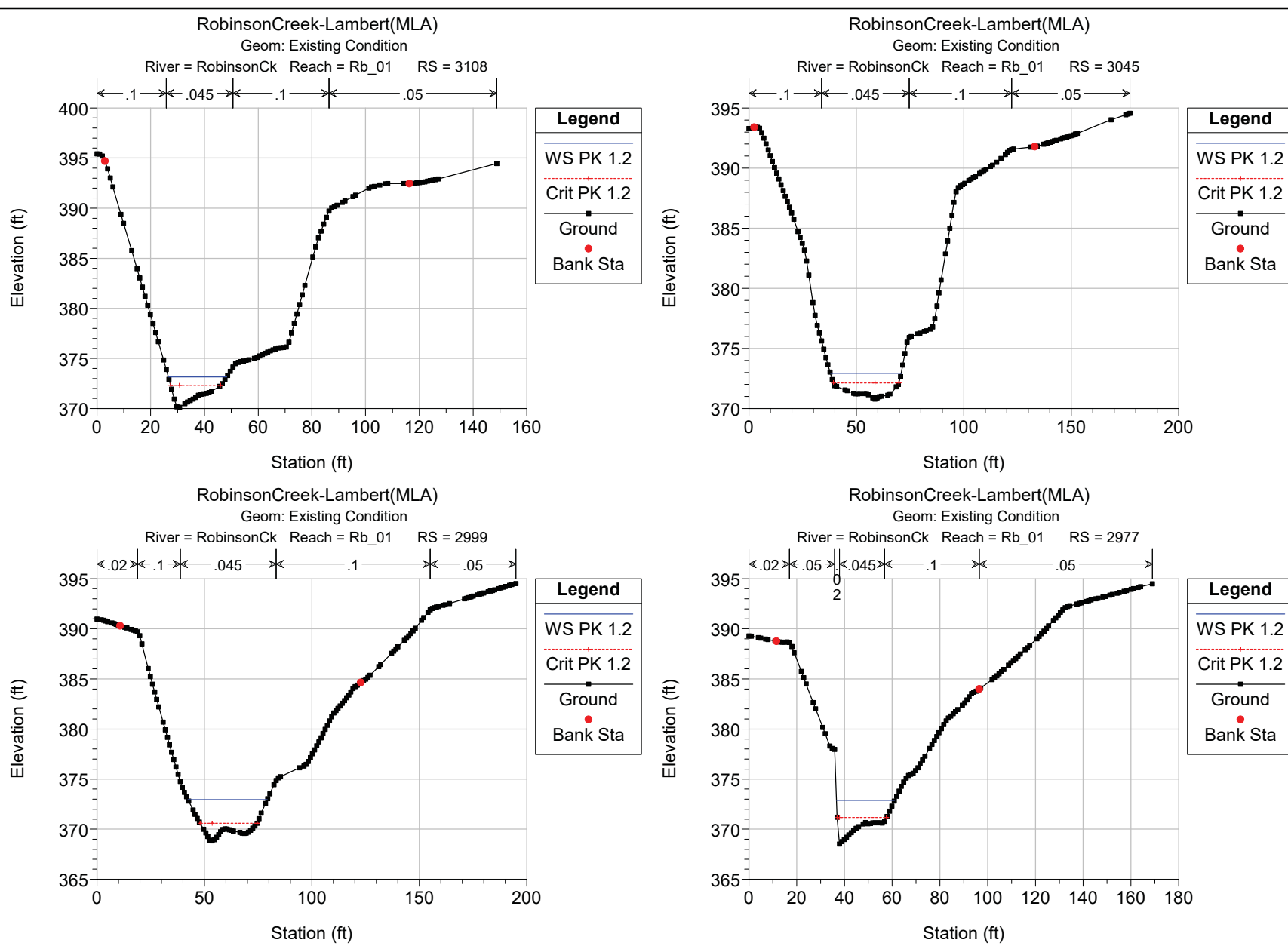
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3972.02		379.96	381.45	381.24	381.72	0.015676	4.15	30.47	30.36	0.73	1.49
3733.26		376.88	379.02	378.44	379.24	0.007335	3.77	33.94	22.7	0.53	2.14
3627.82		375.85	378.19	377.55	378.42	0.008272	3.89	32.43	20.59	0.55	2.34
3446.01		374.96	377.12	376.33	377.27	0.004788	3.1	40.59	24.26	0.42	2.16
3405.09		374.95	376.4	376.4	376.83	0.032602	5.26	23.95	28.35	1.01	1.45
3343.00		373.90	375.46	375.02	375.65	0.008308	3.44	36.65	29.42	0.54	1.56
3273.00		372.65	374.89	374.36	375.09	0.007769	3.57	35.3	25.33	0.53	2.24
3203.00		372.49	373.93	373.8	374.24	0.020368	4.43	28.41	30.74	0.81	1.44
3108.00		370.13	373.15	372.3	373.32	0.005267	3.32	37.92	21.7	0.44	3.02
3045.00		370.79	372.94	372.13	373.04	0.003381	2.51	50.25	32.94	0.36	2.15
2999.00		368.82	372.95	370.6	372.97	0.000435	1.29	98.02	36.87	0.14	4.13
2977.00		368.53	372.88	371.16	372.95	0.001988	2.08	60.5	24.36	0.23	4.35
2954.00		367.54	372.85	369.84	372.92	0.000951	2.03	62.09	17.01	0.19	5.31
2940.00	Inl Struct										0.00
2926.00		366.34	369.19	368.48	369.56	0.010128	4.94	25.53	11.87	0.59	2.85
2919.00		366.28	369.17	368.33	369.45	0.007328	4.24	29.71	14.3	0.52	2.89
2906.00		366.41	369.21	367.98	369.32	0.002047	2.68	47.01	21.23	0.32	2.80
2891.00	Bridge										0.00
2877.00		365.60	369.04	368.16	369.21	0.003938	3.38	37.3	20.63	0.44	3.44
2870.00		366.36	369.03	368.24	369.16	0.004169	2.88	43.78	26.39	0.39	2.67
2858.00		367.09	368.98	368.25	369.11	0.004583	2.79	45.1	31.55	0.41	1.89
2826.00		366.76	368.42	368.23	368.78	0.018333	4.79	26.28	22.98	0.79	1.66
2794.00		365.63	368.27	367.43	368.39	0.006085	2.78	45.28	31.93	0.41	2.64
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2620.82		363.55	365.15	364.77	365.39	0.010655	3.95	31.91	24.78	0.61	
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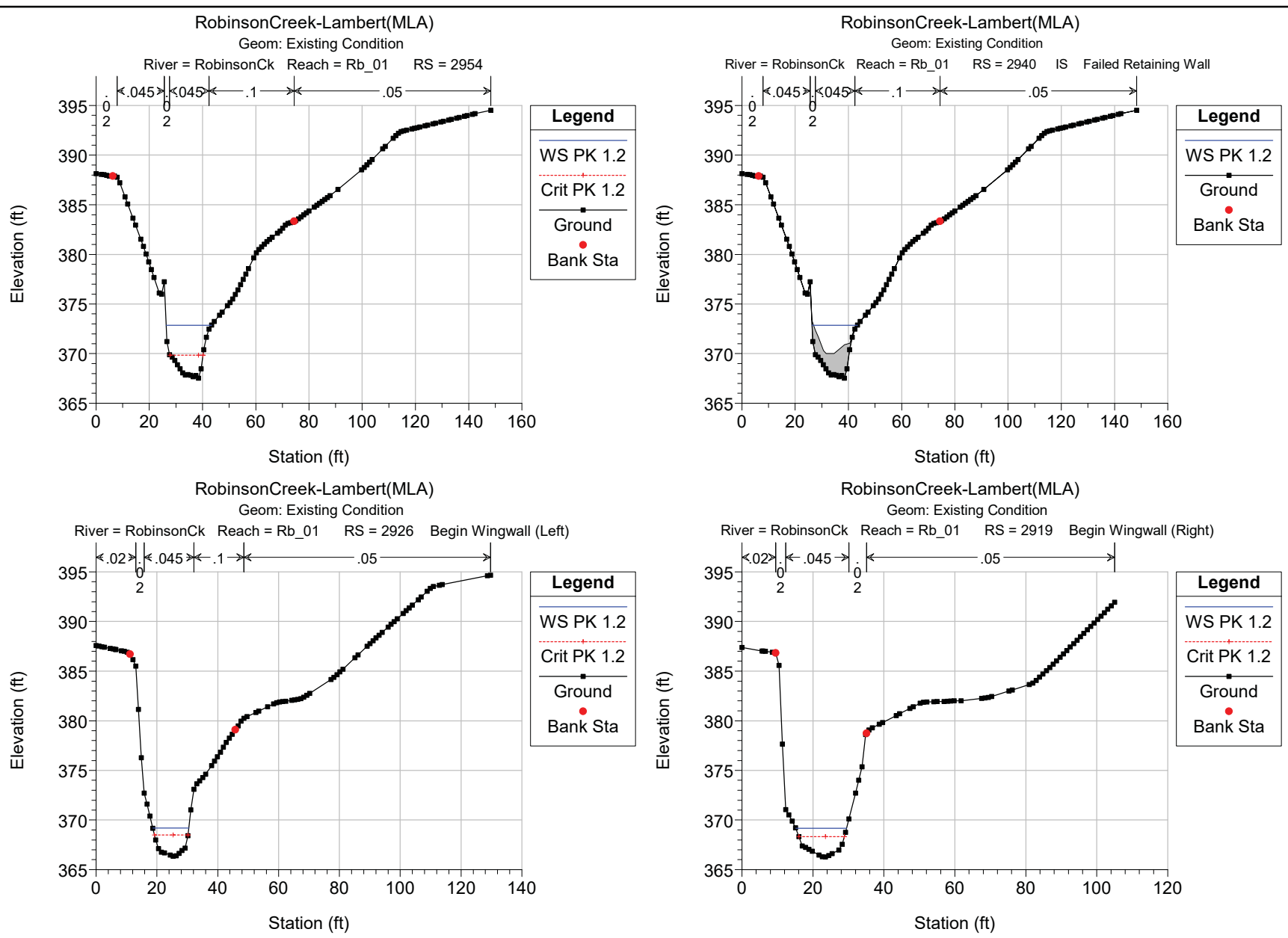
RobinsonCreek-Lambert(MLA)
Geom: Existing Condition







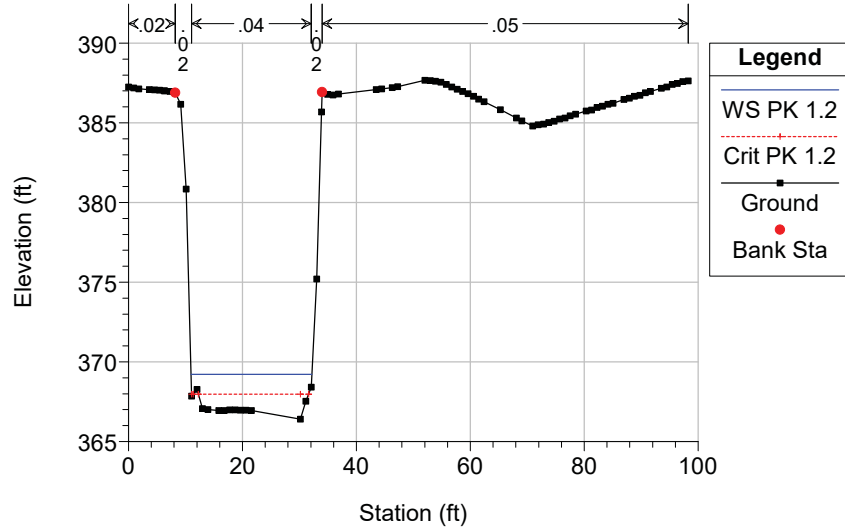




RobinsonCreek-Lambert(MLA)

Geom: Existing Condition

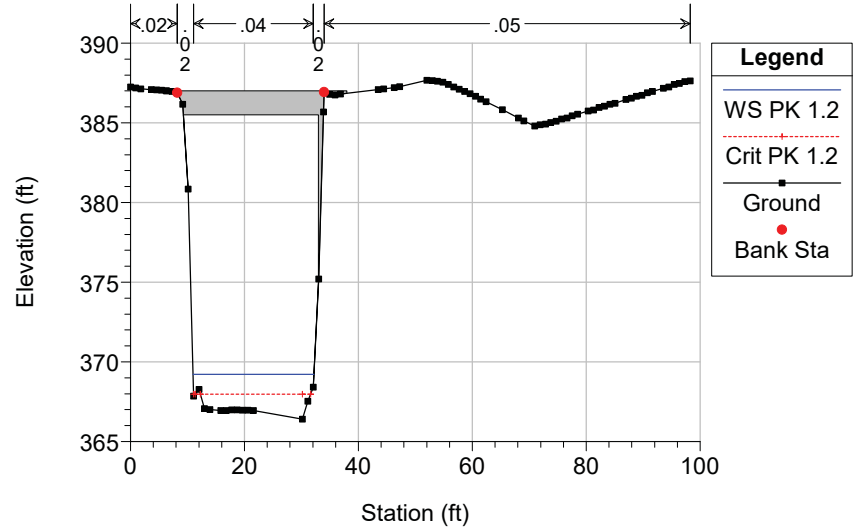
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RobinsonCreek-Lambert(MLA)

Geom: Existing Condition

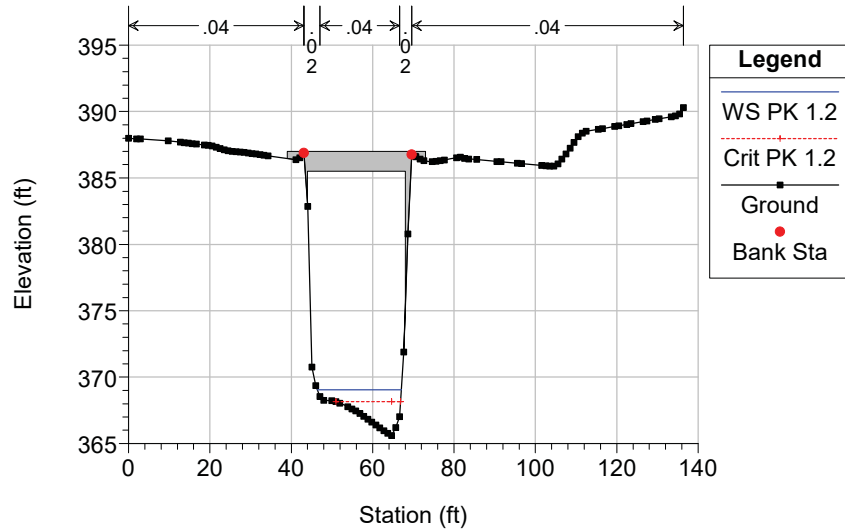
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RobinsonCreek-Lambert(MLA)

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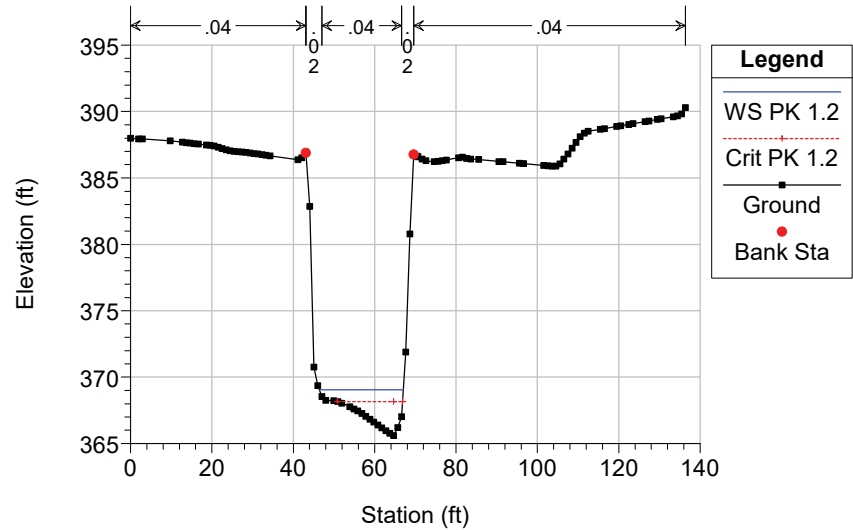
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RobinsonCreek-Lambert(MLA)

Geom: Existing Condition

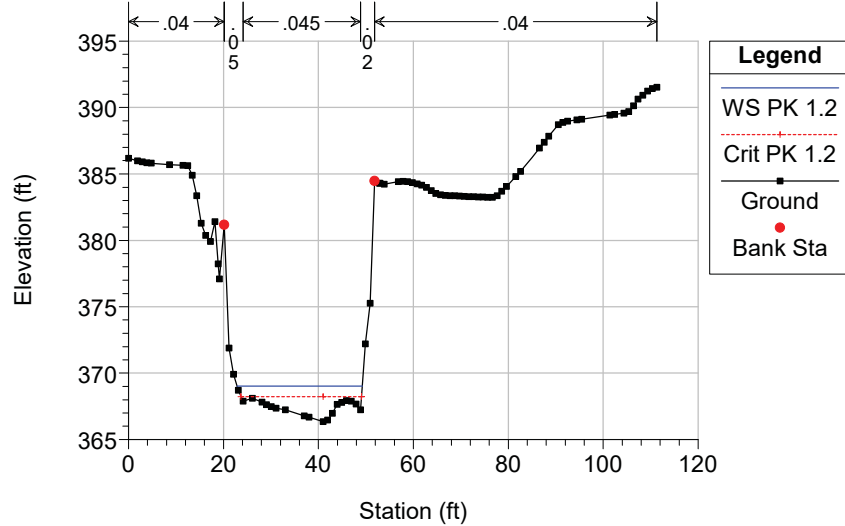
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RobinsonCreek-Lambert(MLA)

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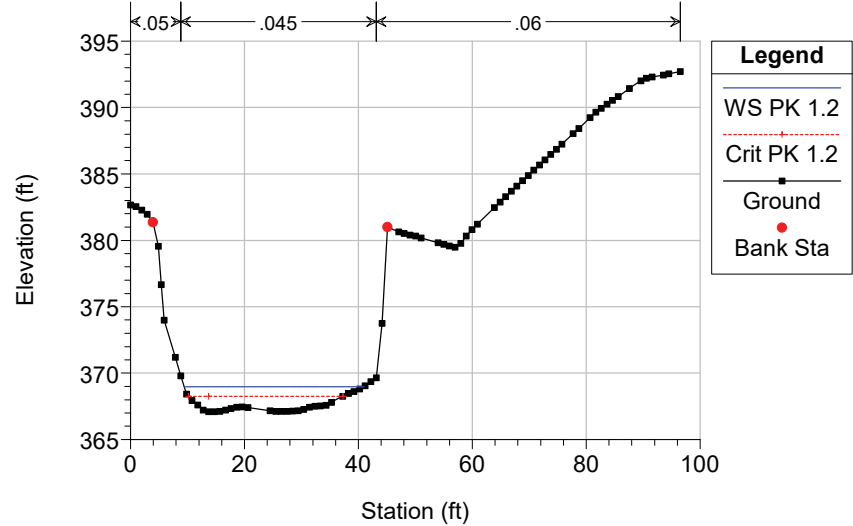
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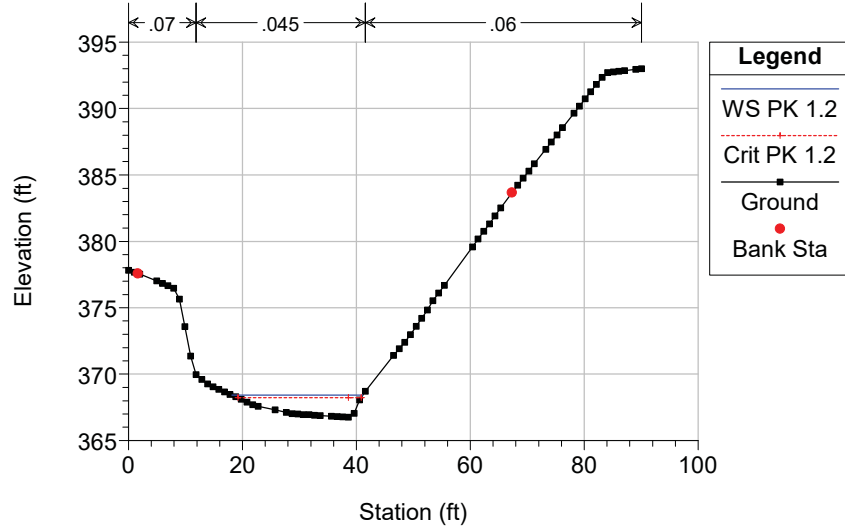
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RobinsonCreek-Lambert(MLA)

Geom: Existing Condition

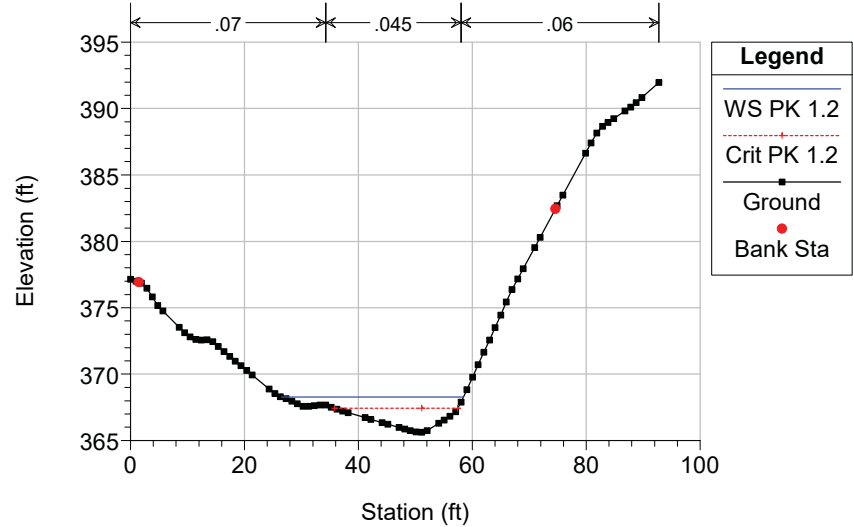
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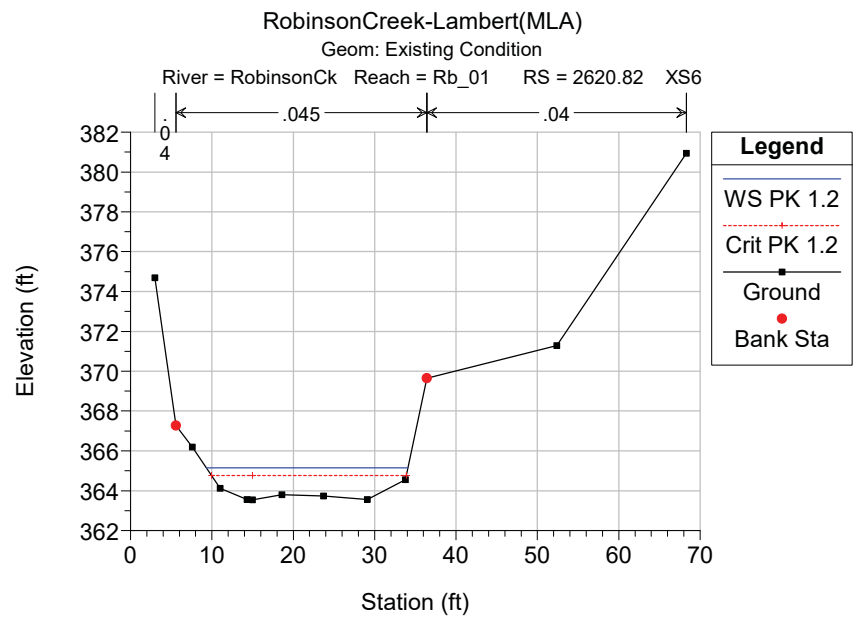
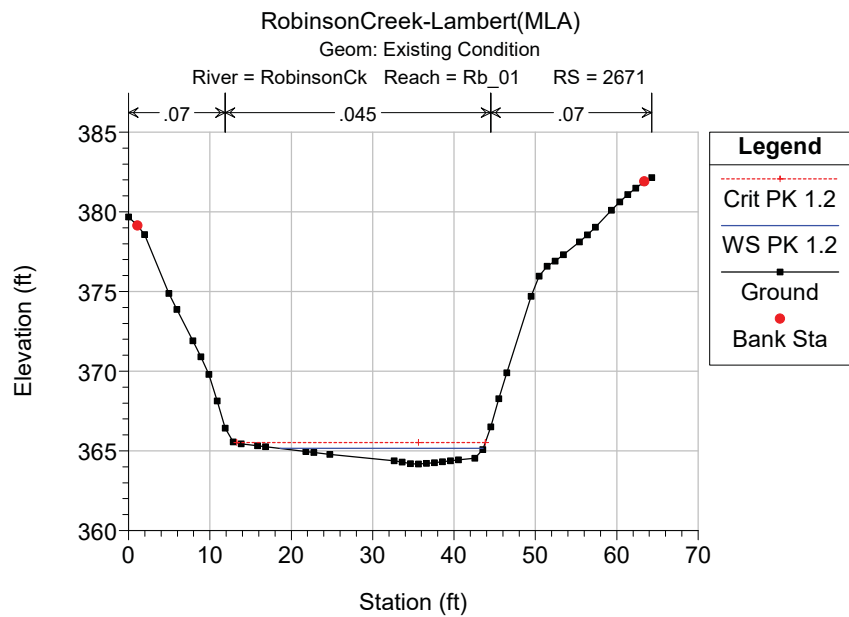
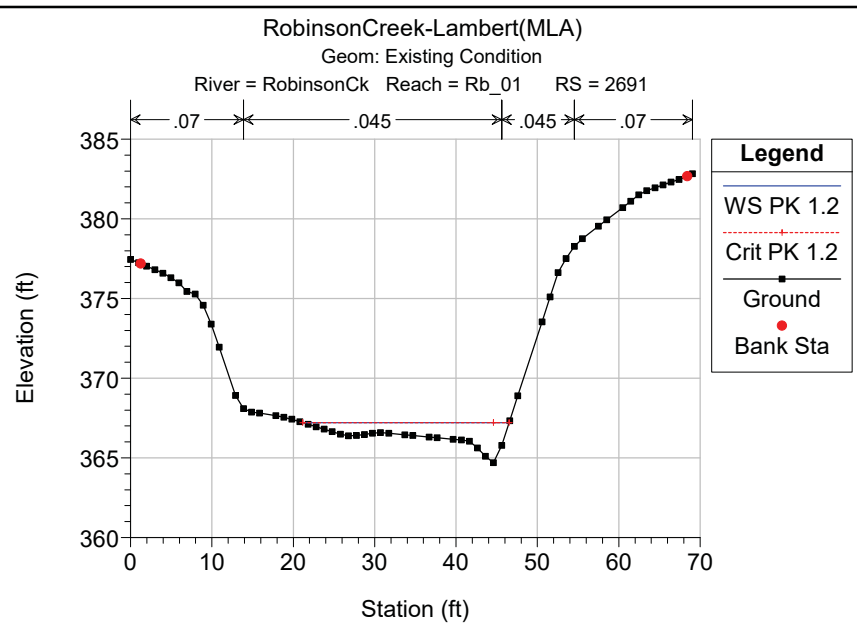
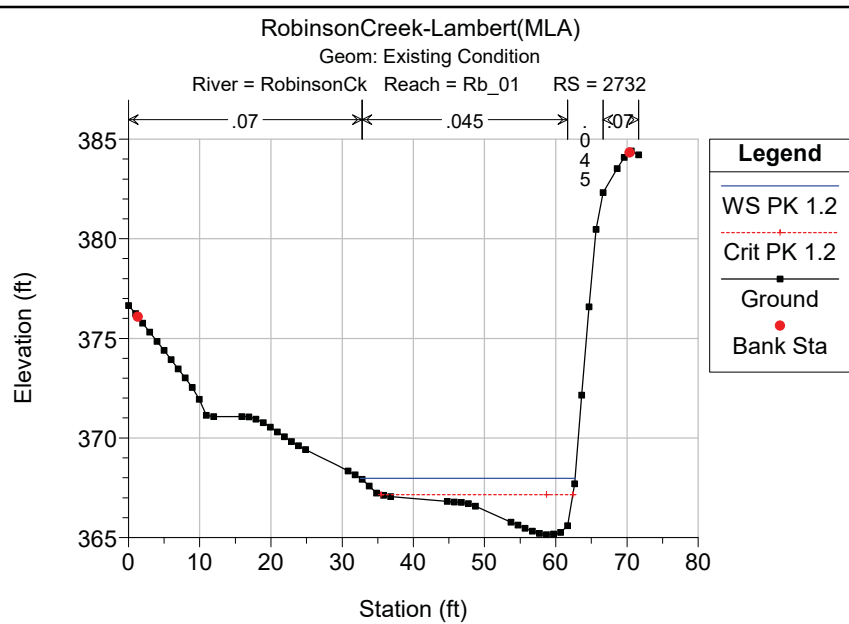


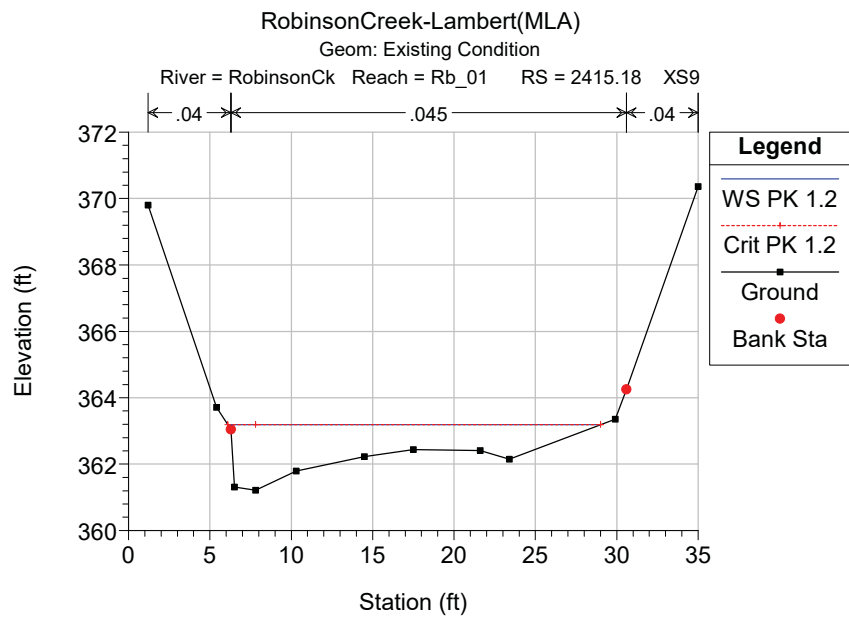
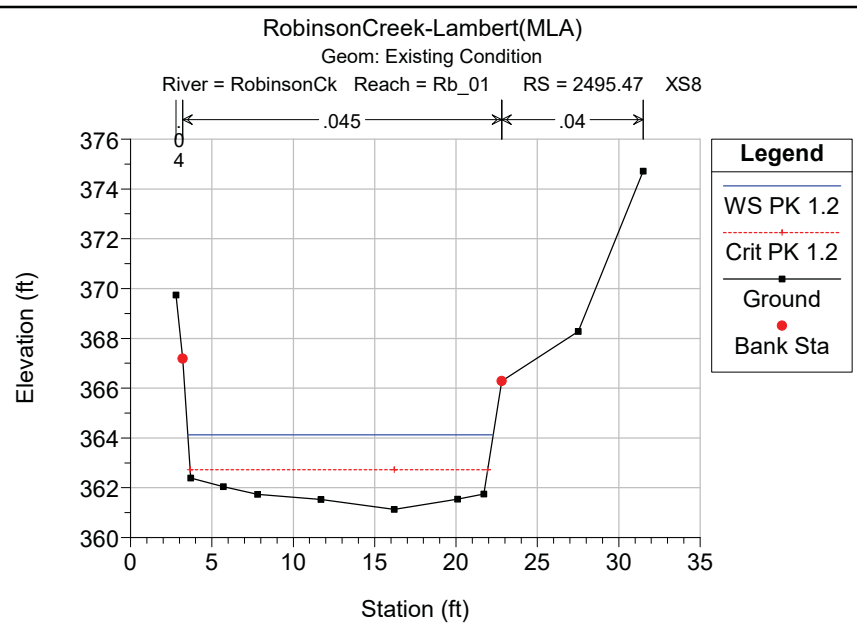
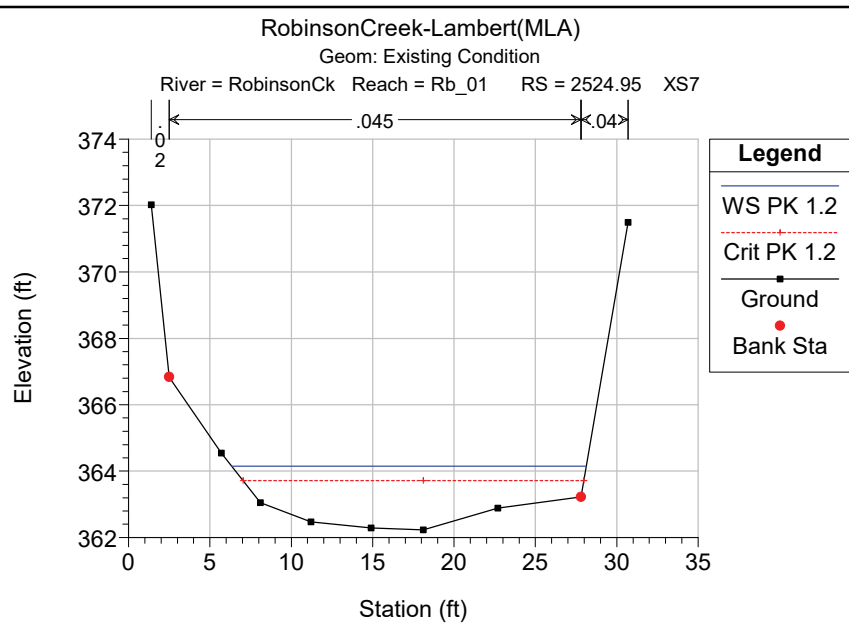
RobinsonCreek-Lambert(MLA)

Geom: Existing Condition

River = RobinsonCk Reach = Rb_01 RS = 2794







Robinson Creek Bridge Replacement of Lambert Lane

CDFW 1602 Application

Attachment 3: NMFS BO

- National Marine Fisheries Service



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

March 15, 2021

Refer to NMFS No: WCRO-2020-02970

Darrell Cardiff
Senior Environmental Planner
California Department of Transportation, District 1
P.O. Box 3700
Eureka, California 95502

Re: Endangered Species Act Section 7(a)(2) Biological Opinion; and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response for the
Lambert Lane Bridge Replacement project near the town of Boonville, California

Dear Mr. Cardiff:

Thank you for your letter of October 16, 2020, requesting initiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 et seq.) for the Lambert Lane Bridge Replacement project. This consultation was conducted in accordance with the 2019 revised regulations that implement section 7 of the ESA (50 CFR 402, 84 FR 45016). Also, thank you for your request for consultation pursuant to the essential fish habitat (EFH) provisions in Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)) for this action.

The enclosed biological opinion is based on our review of the California Department of Transportation's (Caltrans) and the County of Mendocino's (County) proposed project and describes NMFS' analysis of potential effects on threatened Northern California (NC) steelhead (*Oncorhynchus mykiss*) and designated critical habitat for this species in accordance with section 7 of the ESA. In addition, we include the potential affects to critical habitat for Central California Coast (CCC) coho salmon (*Oncorhynchus kisutch*) but omit inclusion of effects to species of CCC coho salmon because they have not been present in Robinson Creek (Navarro River watershed) for decades. For similar reasons, Coastal California (CC) Chinook salmon and their designated critical habitat is not included in this biological opinion due to the absence of this species in the Navarro River watershed. In the enclosed biological opinion, NMFS concludes the project is not likely to jeopardize the continued existence of NC steelhead; nor is it likely to adversely modify critical habitat for NC steelhead or CCC coho salmon. However, NMFS anticipates that take of NC steelhead may occur. An incidental take statement which applies to this project with non-discretionary terms and conditions is included with the enclosed opinion.

NMFS has reviewed the proposed project for potential effects on EFH and determined that the proposed project would adversely affect EFH for Pacific Coast Salmon, which are managed



under the Pacific Coast Salmon Fishery Management Plan. While the proposed action will result in adverse effects to EFH, the proposed project contains measures to minimize, mitigate, or otherwise offset the adverse effects; thus, no EFH Conservation Recommendations are included in this opinion.

Please contact Thomas Daugherty, North Central Coast Office in Santa Rosa, California at (707) 468-4057, or via email at Tom.Daugherty@noaa.gov if you have any questions concerning this section 7 and EFH consultation, or if you require additional information.

Sincerely,



Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Enclosure

cc: Christa Unger, Caltrans Eureka CA, Christa.Unger@dot.ca.gov
Copy to E-File: ARN 151422WCR2020SR00224

**Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion; and Magnuson-Stevens
Fishery Conservation and Management Act Essential Fish Habitat Response**

Lambert Lane Bridge Replacement Project

NMFS Consultation Number: WCRO-2020-02970
Action Agency: California Department of Transportation

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?	Is Action Likely to Adversely Affect Critical Habitat?	Is Action Likely to Destroy or Adversely Modify Critical Habitat?
NC steelhead (<i>Oncorhynchus mykiss</i>)	Threatened	Yes	No	Yes	No
CCC coho salmon (<i>Oncorhynchus kisutch</i>)	Endangered	No	No	Yes	No

Fishery Management Plan That Identifies EFH in the Project Area	Does Action Have an Adverse Effect on EFH?	Are EFH Conservation Recommendations Provided?
Pacific Coast Salmon	Yes	No

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: 
Alecia Van Atta
Assistant Regional Administrator
California Coastal Office

Date: March 15, 2021

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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

NOAA's National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.) and implementing regulations at 50 CFR 402, as amended.

We also completed an essential fish habitat (EFH) consultation on the proposed action, in accordance with section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801 et seq.) and implementing regulations at 50 CFR 600.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within two weeks at the NOAA Library Institutional Repository [<https://repository.library.noaa.gov/welcome>]. A complete record of this consultation is on file at the Santa Rosa California office.

1.2. Consultation History

Informal section 7 consultation for the Lambert Lane Bridge Replacement project (Project) proposed by the County and was initiated by the California Department of Transportation (Caltrans) on December 3, 2019, but was rescinded on January 31, 2020 (email correspondence, C. Unger, Caltrans, 2020). Information regarding archeological findings caused Caltrans to reevaluate the project alignment and resubmit the consultation request.

A Project focus meeting was held on July 9, 2020 with Caltrans Environmental, Gallaway Enterprises, Quincy Engineering Inc., and Mendocino County Department of Transportation. The purpose of the meeting was to discuss the incorporation of fish relocation into the biological assessment and changes in the Project impacts resulting from the cultural review. The result of this meeting was the position that dewatering the project area and fish relocation would be necessary, which would result in adverse effects to threatened Northern California (NC) steelhead.

On October 16, 2020 NMFS received an initiation package from Caltrans requesting formal consultation for the proposed project which included the BA and cover letter. NMFS reviewed the BA for sufficiency and accepted the initiation package on October 30, 2020 for formal interagency consultation.

1.3. Proposed Federal Action

Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (50 CFR 402.02). Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910). Under MSA, Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal Agency (50 CFR 600.910).] We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not cause additional effects beyond those that are from the action as described below.

1.3.1 Bridge Construction

The County and the Caltrans propose to replace the Lambert Lane Bridge, (No. 10C0146) which crosses Robinson Creek near the town of Boonville, California on the western edge of the Anderson Valley. Lambert Lane is the only public road access in and out of a residential and agricultural area. The existing bridge has been designated as ‘functionally obsolete and scour critical’ by Caltrans, qualifying it for rehabilitation or replacement under the federal Highway Bridge Program.

In winter of 2015, a retaining wall on the upstream side of the west approach washed out and collapsed into the creek causing the County to place revetment to prevent continued scouring and erosion. Under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface elevation drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife (CDFW) fish passage assessment guidelines (CDFG, 2002). During the winter of 2016/2017 scour further undermined the eastern abutment footing. The purpose of the Project is to replace the deficient bridge with a reliable structure to provide a safe crossing that meets current standards. Channel restoration will also take place as part of the Project and will include removing the collapsed retaining wall which will restore fish passage to the upstream reaches of Robinson Creek. In-channel work will also include protecting portions of the embankment slopes from erosion with hybrid RSP revetment, grading the stream channel to remove abrupt hydraulic changes, adding point bars along portions of the creek banks, and planting willows and trees as part of bank protection and restoration (Caltrans 2020). Where feasible, large woody debris (LWD) will be installed at specific locations within the Project to improve conditions for NC steelhead and offset temporary habitat loss. All construction activities within Robinson Creek will take place between June 15 and October 15 when surface flow is very low or subsurface.

The existing structure is 32 feet long and 26 feet wide with closed struttled abutments founded on spread footings on erodible alluvial material. The replacement bridge will have 9-foot lanes and 5-foot shoulders in each direction resulting in a wider structure which meets safety standards. Deep foundation systems, and drilled piles, will be required due to the presence of unconsolidated channel alluvium substrate. Pile type is Cast-In-Drilled-Hole (CIDH) piles. The foundation type for the retaining walls will be the same as for bridge abutments, which will have a structure depth of 4 feet 9 inches. A long span steel plate girder bridge will be constructed within the existing bridge alignment and can be fabricated in shorter lengths to facilitate

transport and then assembled on-site. This bridge replacement type will have a shorter construction time and will minimize impacts to the creek since it does not require falsework in the creek. Additionally, this long span bridge option provides the ability to improve the alignment of the creek to minimize future potential scour by increasing the channel opening and providing a softer and more gradual turn of the creek. Significant changes to the vertical profile are not anticipated as the existing and replacement bridge type provide adequate hydraulic freeboard. It is anticipated that temporary shoring will be required during bridge construction.

The preferred construction method will be to build a replacement bridge on the existing alignment and provide a temporary detour. Lambert Lane is the only public road access to approximately 30 parcels, requiring at least one lane of traffic open during construction. Due to the instability of the existing bridge, a temporary bridge is proposed to be erected offset from the existing bridge to pass traffic around bridge construction operations within the Project site. This temporary bridge will either be a Bailey bridge sourced from the County or a Contractor furnished temporary bridge structure.

1.3.2 Fish Relocation

If water is present in Robinson Creek on June 15th, the installation of a clear water diversion may be necessary. If required, the clear water diversion will be constructed of one appropriately sized culvert and cofferdams constructed of plastic sheeting and sand bags to allow flow to continue through the construction area. However, it is anticipated that only the deep scour under the bridge will hold water when construction begins. If removal of ponded or nuisance water is required it will be pumped and released in the creek bed beyond the downstream cofferdam. Water would be pumped only after all fish have been removed.

The County proposes to dewater a maximum of 250 feet of Robinson Creek, which would begin with block nets placed at each end of the area and qualified biologists would capture and relocate any native fish or other native aquatic species present in the reach to be dewatered. Once dewatering is implemented and flow is diverted through the construction area, a biologist would be present and any standing water would be checked for the presence of additional fish species. All fish located within the construction area immediately prior to or during dewatering will be captured by seine, dip net, and/or electrofisher and removed by qualified biologists pre-approved by NMFS. The fish will be placed in an aerated cooler or 5-gallon bucket of water from the habitat they were captured in and then be relocated within 30 minutes of capture to suitable habitat located near the action area. Dewatering and fish relocation will occur on June 15 and a dry work area may be maintained until October 15 when cofferdams and diversions will be removed. Project construction for bridge replacement and stream restoration work is anticipated to occur during one construction season. A fish relocation plan would be prepared and submitted to NMFS for approval at least two weeks prior to the start of construction.

1.3.3 Stream Channel Restoration

In addition to the bridge replacement, portions of the stream channel upstream and downstream of the bridge, and localized streambank scour downstream adjacent to the Boonville Hotel, will be stabilized and restored according to the Robinson Creek Channel Design for the Lambert

Lane Bridge Replacement Project prepared by Michael Love & Associates, Inc. (MLA) (2019). The channel restoration is intended to provide geomorphically stable channel geometry while protecting the roadway embankment and vulnerable streambanks. This will include hybrid RSP revetments where required due to risk of scour and lateral channel migration.

The existing bridge crossing is at the inflection of a tight meander bend and the channel alignment has been constrained by the roadway embankment. The proposed replacement bridge has a free span of approximately 91 feet, while the existing bridge span is only 32 feet. The increased span is in-part intended to facilitate an improved alignment with the channel by decreasing the sharpness of the meander bend. The channel grading proposes to seamlessly connect with the upstream and downstream channel profiles and the streambed should be composed of native material that is as mobile as bed material within the adjacent channel reaches. The approach relies on using the adjacent stream channel as a geomorphic reference for design of the crossing and channel bed. The approximate volume of streambed material to be stockpiled and placed back in the channel is 1,200 cubic yards. All this material will be salvaged streambed material from the project stream reach. No imported material will be brought in for this use.

In addition, the restoration will include removing the rubble and reconfiguring the RSP that covers the creek bottom, restoring the channel to a more natural condition and restoring fish passage to the upper reaches of Robinson Creek above the failed retaining wall. Channel restoration designs for the site will satisfy current fish passage standards, as described in California Department of Fish and Game (CDFG) (2009) and NMFS (2001) guidelines. Large woody debris (LWD) will be placed along the inside bend in the upstream right bank in two areas, and at one site downstream on the left bank. Trees removed for the construction will be used for the LWD placement, and will be a minimum of 15 feet long and have a 16-inch diameter at breast height (DBH).

Streambank restoration will use a hybrid revetment design incorporating vegetation into the RSP to improve stream ecology, increasing soil strength and providing flow resistance, providing cover, shade and nutrients to the stream. Root systems established will support the banks by providing resistance to scour and binding the soils and rock placed along the bank. The east bank will include 130 feet of hybrid revetment and the west bank will have 255 feet of bank protection under the bridge extending downstream. Areas directly under the bridge (approximately 50 feet) will have RSP with no planting. Hybrid revetment will include live native willow stakes and cottonwood trees.

Based on the proposed channel grading, 22 trees will be removed and native vegetation would be planted on the graded point bars on the inside of the channel bends. This vegetation will include native riparian tree species, as well as understory plants. In addition to the planting areas close to the channel, the Project will create a terrace behind the RSP adjacent to the road embankment at the southern bridge approach. This terrace will be used to plant upland tree species, such as native oaks. The County proposes to replant up to 355 trees, at a 16:1 ratio, in an effort to restore the creek and mitigate potential impacts to NC steelhead critical habitat. The plantings are proposed to be evaluated for 5 years to ensure an 80% survival rate; if the survival rate is not met, the area will be replanted.

1.3.4 Staging Areas, Rights of Way, and Utilities

The Project staging areas will include portions of the closed roadway at each end of the bridge and the area just southeast of the bridge. If this area is unavailable or not sufficient in size, there is an alternative area off-site at the County Fairgrounds that can also serve as a staging area. Right-of-way including slope easements, temporary construction easements, permanent maintenance easements, and permanent acquisitions will be required. There are existing overhead electrical and telephone utilities that will need to be relocated. Additionally, there is a storm water concrete pipe that outfalls into the creek that will need to be relocated.

1.3.5 Avoidance and Minimization Measures

Following are the major avoidance and minimization measures (AMMs) proposed, with a complete list of AMMs in the biological assessment for this project (Caltrans 2020).

- An erosion control plan that incorporates erosion control Best Management Practices (BMPs) shall be created and implemented prior to the wet season (i.e., November 1 – April 1) in order to avoid sediment from entering into aquatic habitat.
- BMPs shall be implemented that are necessary to minimize the risk of sedimentation, turbidity, and hazardous material spills. Applicable BMPs will include permanent and temporary erosion control measures, including use of straw bales, mulch or wattles, silt fences, filter fabric, and spill remediation material such as absorbent booms.
- All Project generated debris, building materials and rubbish from the stream and from areas where such materials could be washed into the stream following completion of Project activities shall be removed from the site. Debris, soil, silt, sand, rubbish, construction waste, cement or concrete or washings thereof, asphalt, paint, oil or other petroleum products or any other substances which could be hazardous to aquatic life shall be stored in secondary containment in the staging area.
- All fueling and/or equipment maintenance shall occur 100 feet from all water bodies. Any chemical spill within the active channel of aquatic habitat will be reported to NMFS, United States Fish and Wildlife Service, CDFW, and other appropriate resource agencies within 48 hours.
- Precautions to minimize turbidity/siltation during construction and post-construction periods shall be taken. Precautions shall include but are not limited to: best management erosion control practices to stabilize all exposed/disturbed areas within the project site to the greatest extent possible. Storm water pollution prevention plan measures will utilize applicable BMPs such as use of silt fences, straw bales, and other methods necessary to minimize storm water discharge associated with construction activities.
- A spill prevention plan and storm water pollution prevention plan shall be developed and implemented by the contractor. Spill prevention measures will include stockpiling absorbent

booms, staging hazardous materials at least 50 feet away from aquatic habitat, and maintaining and checking construction equipment to prevent fuel and lubrication leaks.

- No heavy equipment shall operate, or any excavation take place, in the portion of the stream where flowing water is present. Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily to prevent leaks of materials that could be deleterious to aquatic and terrestrial life or riparian habitat. If maintenance or refueling of vehicles or equipment must occur on-site, use a designated area and/or a secondary containment, located away from drainage courses to prevent the runoff of storm water and the runoff of spills. Place drip pans or absorbent materials under vehicles and equipment when not in use. Equipment shall be stored in areas that any possible contamination from the equipment would not flow or be washed back into the channel.
- Containment structures to control the placement of wet concrete and to prevent it from entering into the channel outside of those structures shall be constructed. Water that has been in contact with uncured concrete shall be contained in a sealed concrete washout facility or other impervious container and shall not be discharged within Robinson Creek.
- Nuisance ground water encountered during construction shall be pumped into upland areas where it will not reenter Robinson Creek or cause impacts downstream. Alternatively, nuisance or working water can be pumped into a baker tank, settling basin created in an upland area, or into a water truck to be used onsite for dust control.
- At all times when the Permittee is pouring or working with wet concrete there shall be a designated monitor to inspect containment structures and ensure that no concrete or other debris enters into the channel outside of those structures.
- Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations.
- All exposed/disturbed areas and access points within the stream left barren of vegetation as a result of the construction activities shall be restored using locally native grass and/or forb seeds, locally native grass plugs and/or a mix of quick growing sterile non-native grass with locally native grass/forb seeds.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species, or adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If

incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes non-discretionary reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of “jeopardize the continued existence of” a listed species, which is “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species” (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

This biological opinion relies on the definition of “destruction or adverse modification,” which “means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species” (50 CFR 402.02).

The designation(s) of critical habitat for (species) use(s) the term primary constituent element (PCE) or essential features. The 2016 critical habitat regulations (50 CFR 424.12) replaced this term with physical or biological features (PBFs). The shift in terminology does not change the approach used in conducting a “destruction or adverse modification” analysis, which is the same regardless of whether the original designation identified PCEs, PBFs, or essential features. In this biological opinion, we use the term PBF to mean PCE or essential feature, as appropriate for the specific critical habitat.

The 2019 regulations define effects of the action using the term “consequences” (50 CFR 402.02). As explained in the preamble to the regulations (84 FR 44977), that definition does not change the scope of our analysis and in this opinion we use the terms “effects” and “consequences” interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their habitat using an exposure-response approach.
- Evaluate cumulative effects.
- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species, or (2) directly or

indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.

- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that would be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" as described in 50 CFR 402.02. The opinion also examines the condition of critical habitat throughout the designated area, evaluates the conservation value of the various watersheds and coastal and marine environments that make up the designated area, and discusses the function of the PBFs that are essential for the conservation of the species. Species Description and Life History

The biological opinion analyses the effects of the federal action on the following Federally-listed species (Distinct Population Segment (DPS) or Evolutionary Significant Unit (ESU)) and designated critical habitat:

Threatened Northern California (NC) steelhead DPS (*Oncorhynchus mykiss*)

Threatened (71 FR 834, January 5, 2006)

Critical habitat (70 FR 52488, September 2, 2005);

Endangered Central California Coast (CCC) coho salmon ESU (*O. kisutch*)

Critical habitat designation (64 FR 24049; May 5, 1999).

Critical habitat is designated for CCC coho salmon in all accessible reaches throughout the ESU, however, CCC coho salmon are not currently known to inhabit the Robinson Creek watershed area of the Navarro River. NMFS determined the proposed action is not likely to affect individual endangered CCC coho salmon. Therefore, there is no further effects analysis in this biological opinion for individual CCC coho salmon as there are no expected effects to this species. CC Chinook salmon are not expected to be in Robinson Creek and have rarely been detected in the Navarro River watershed. Critical habitat is not designated for CC Chinook salmon in Robinson Creek so there is no further discussion in this biological opinion for this species or their critical habitat.

2.2.1. General Life History of Listed Species

2.2.1.1. Steelhead

Steelhead are the anadromous form of *O. mykiss*, spawning in freshwater and migrating to marine environments to grow and mature. Steelhead have a complex life history that requires

successful transition between life stages across a range of freshwater and marine habitats (*i.e.*, egg-to-fry emergence, juvenile rearing, smolt outmigration, ocean survival, and upstream migration and spawning). Steelhead exhibit a high degree of life history plasticity (Shapovalov and Taft 1954; Thrower et al. 2004; Satterthwaite et al. 2009). The occurrence and timing of these transitions are highly variable and generally driven by environmental conditions and resource availability (Satterthwaite et al. 2009; Sogard et al. 2012).

Steelhead are generally divided into two ecotypes based on timing and state of maturity when returning to freshwater: summer-run and winter-run. Summer-run steelhead return to natal streams in spring and early summer while they are still sexually immature and spend several months maturing before spawning in January and February (Nielson and Fountain 2006). Winter-run steelhead enter natal streams as mature adults with well-developed gonads. They typically immigrate between December and April and spawn shortly after reaching spawning grounds (Shapovalov and Taft 1954; Moyle et al. 2008).

Adult steelhead spawn in gravel substrates with low sedimentation and suitable flow velocities. Females lay eggs in redds, where they are quickly fertilized by males and covered. Egg survival depends on oxygenated water circulating through the gravel, facilitating gas exchange and waste removal. Adults usually select spawning sites in pool-riffle transition areas of streams with gravel cobble substrates between 0.6 to 10.2 centimeters (cm) in diameter and flow velocities from 40 - 91 cm per second (Bjornn and Reiser 1991). Eggs incubate in redds for approximately 25 to 35 days depending on water temperature (Shapovalov and Taft 1954). Incubation time depends on water temperature, with warmer temperatures leading to lower incubation periods due to increased metabolic rates. Eggs hatch as alevin and remain buried in redds for an additional two to three weeks until yolk-sac absorption is complete (Shapovalov and Taft 1954). Optimal conditions for embryonic development include water temperatures between 6 and 10°C, dissolved oxygen near saturation, and fine sediments less than 5% of substrate by volume (Bjornn and Reiser 1991; USEPA 2001).

Upon emerging from redds, juvenile steelhead occupy edgewater habitats where flow velocity is lower and cover aids in predator avoidance. Rearing juveniles feed on a variety of aquatic and terrestrial invertebrates. As they grow, juveniles move into deeper pool and riffle habitats where they continue to feed on invertebrates and have been observed feeding on younger juveniles (Chapman and Bjornn 1969; Everest and Chapman 1972). Juveniles can spend up to four years rearing in freshwater before migrating to the ocean as smolts, although they typically only spend one to two years in natal streams (Shapovalov and Taft 1954; Busby et al. 1996). Successful rearing depends on stream temperatures, flow velocities, and habitat availability. Preferred water temperature ranges from 12 to 19°C and sustained temperatures above 25°C are generally considered lethal (Smith and Li 1983; Busby et al. 1996). In Central California streams, juvenile steelhead are able to survive peak daily stream temperatures above 25°C for short periods when food is abundant (Smith and Li 1983). Response to stream temperatures can vary depending on the conditions to which individuals are acclimated, however, consistent exposure to high stream temperatures results in slower growth due to elevated metabolic rates and lower survival rates overall (Hokanson et al. 1977; Busby et al. 1996).

Juveniles undergo behavioral, morphological, and physiological changes in preparation for ocean entry, collectively called smoltification. Juveniles begin smoltification in freshwater and the process continues throughout downstream migration with some smolts using estuaries for further acclimation to saltwater prior to ocean entry (Reiser and Bjornn 1979). Juveniles typically will not smolt until reaching a minimum size of 160 mm (Burgner et al. 1992). Smoltification is cued by increasing photoperiod. Stream temperatures influence the rate of smoltification, with warmer temperatures leading to more rapid transition. Downstream migration of smolts typically occurs from April to June when temperature and stream flows increase. Preferred temperature for smoltification and outmigration is between 10 and 17°C with temperatures below 15°C considered optimal (Hokanson et al. 1977; Wurtsbaugh and Davis 1977; Zedonis and Newcomb 1997; Myrick and Cech 2005). In coastal systems with seasonal lagoons, smolts may take advantage of higher growth potential in productive lagoon habitats before ocean entry (Osterback et al. 2018).

Adult steelhead are known to be highly migratory during ocean residency but little is known of their habitat use and movements. They have been observed moving north and south along the continental shelf, presumably to areas of high productivity to feed (Barnhart 1986). Adults will typically spend one to two years in the ocean, feeding and growing in preparation for spawning (Shapovalov and Taft 1954; Busby et al. 1996). Upstream migration typically begins once winter rains commence and stream flows increase. For coastal systems with seasonal freshwater lagoons, winter storms are required to breach the sandbars and allow access to upstream spawning sites. Unlike most congeners, steelhead are iteroparous, meaning they can return to spawn multiple times. Adult steelhead may spawn up to four times in their lifetime, although spawning runs predominantly consist of first-time spawners (~59%) (Shapovalov and Taft 1954). The maximum life span of steelhead is estimated to be nine years (Moyle 2002).

2.2.1.2 Status of Listed Species

NMFS assesses four population viability¹ parameters to discern the status of the listed ESUs and DPSs and to assess each species ability to survive and recover. These population viability parameters are abundance, population growth rate, spatial structure, and diversity (McElhany et al. 2000). While there is insufficient data to evaluate these population viability parameters quantitatively, NMFS has used existing information to determine the general condition of the populations in the NC steelhead DPS and the factors responsible for the current status of these listed species.

The population viability parameters are used as surrogates for numbers, reproduction, and distribution, as defined in the regulatory definition of jeopardy (50 CFR 402.20). For example, abundance, population growth rate, and distribution are surrogates for numbers, reproduction, and distribution, respectively. The fourth parameter, diversity, is related to all three regulatory

¹ NMFS defines a viable salmonid population as “an independent population of any Pacific salmonid (genus *Oncorhynchus*) that has a negligible risk of extinction due to threats from demographic variation, local environmental variation, and genetic diversity changes over a 100-year time frame” (McElhany et al. 2000).

criteria. Numbers, reproduction, and distribution are all affected when genetic or life history variability is lost or constrained, resulting in reduced population resilience to environmental variation at local or landscape-level scales.

NC Steelhead

Historically, the NC steelhead DPS was comprised of 41 independent populations (19 functionally and 22 potentially independent) of winter run steelhead and 10 functionally independent populations of summer run steelhead (Bjorkstedt et al. 2005). Based on the limited data available (dam counts of portions of stocks in several rivers), NMFS' initial status review of NC steelhead (Busby et al. 1996) determined that population abundance was very low relative to historical estimates (1930s and 1960s dam counts), and recent trends were downward in most stocks. Overall, population numbers are severely reduced from pre-1960s levels, when approximately 198,000 adult steelhead migrated upstream to spawn in the major rivers supporting this Distinct Population Segment (DPS) (Busby et al. 1996, 65 FR 36074).

NMFS status reviews reached the same conclusion, and noted the poor amount of data available, especially for winter run steelhead (NMFS 1997, Good et al. 2005). The information available suggested that the population growth rate was adverse. It is known that dams on the Mad River and Eel River block large amounts of habitat historically used by NC steelhead (Busby et al. 1996). Hatchery practices in this DPS have exposed the wild population to genetic introgression and the potential for deleterious interactions between native stock and introduced steelhead. Historical hatchery practices at the Mad River hatchery are of particular concern, and included out-planting of non-native Mad River hatchery fish to other streams in the DPS and the production of non-native summer steelhead (65 FR 36074). The conclusion of an earlier status review by (Good et al. 2005) echoes that of previous reviews. Abundance and productivity in this DPS are of most concern, relative to NC steelhead spatial structure (distribution on the landscape) and diversity (level of genetic introgression).

NMFS evaluated the listing status of NC steelhead and proposed maintaining the threatened listing determination (71 FR 834) in 2006. A subsequent status review by Williams et al. (2011) reported a mixture of patterns in population trend information, with more populations showing declines than increases. Although little information was available to assess the status for most population in the NC steelhead DPS, overall Williams et al. (2011) found little evidence to suggest a change in status compared to the last status review by Good et al. (2005).

The most recent status review (Seghesio and Wilson 2016) found that information on steelhead populations in the NC steelhead DPS has improved considerably in the past 5 years, due to implementation of the CMP across a significant portion of the DPS. Nevertheless, significant gaps in information still remain, particularly in the Lower Interior and North Mountain Interior diversity strata, where there is very little information from which to assess status. Overall, the available data for winter-run populations—predominately in the North Coastal, North-Central Coastal, and Central Coastal strata—indicate that all populations are well below viability targets, most being between 5% and 13% of these goals. For the two Mendocino Coast populations with the longest time series, Pudding Creek and Noyo River, the 13-year trends have

been adverse and neutral, respectively (Spence 2016). However, the short-term (6-year) trend has been generally beneficial for all independent populations in the North-Central Coastal and Central Coastal strata, including the Noyo River and Pudding Creek (Spence 2016). Data from Van Arsdale Station likewise suggests that, although the long-term trend has been adverse, run sizes of natural-origin steelhead have stabilized or are increasing (Spence 2016). Thus, we have no strong evidence to indicate conditions for winter-run populations in the DPS have worsened appreciably since the status review by (Seghesio and Wilson 2016).

Most populations for which there are population estimates available remain well below viability targets; however, the short-term increases observed for many populations, despite the occurrence of a prolonged drought in northern California, suggests this DPS is not at immediate risk of extinction (Seghesio and Wilson 2016).

CCC Coho Salmon and NC Steelhead Critical Habitat

In designating critical habitat, NMFS considers, among other things, the following requirements of the species: 1) space for individual and population growth, and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding, reproduction, or rearing offspring; and, generally; and 5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of this species (50 CFR 424.12(b)). In addition to these factors, NMFS also focuses on physical and biological features, or PBFs, and/or essential habitat types within the designated area that are essential to conserving the species and that may require special management considerations or protection.

PBFs for NC steelhead and CCC coho salmon critical habitat, and their associated essential features within freshwater include:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;
2. Freshwater rearing sites with:
 - a. water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;
 - b. water quality and forage supporting juvenile development; and
 - c. natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks;
3. freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

Generally for NC steelhead and CCC coho salmon critical habitat the following essential habitat types were identified: 1) juvenile summer and winter rearing areas; 2) juvenile migration corridors; 3) areas for growth and development to adulthood; 4) adult migration corridors; and 5) spawning areas. Within these areas, essential features of critical habitat include adequate: 1)

substrate, 2) water quality, 3) water quantity, 4) water temperature, 5) water velocity, 6) cover/shelter, 7) food, 8) riparian vegetation, 9) space, and 10) safe passage conditions (64 FR 24029).

The condition of NC steelhead and CCC coho salmon critical habitat, specifically its ability to provide for their conservation, has been degraded from conditions known to support viable salmonid populations. NMFS has determined that currently depressed population conditions are, in part, the result of the following human-induced factors affecting critical habitat: logging, agriculture, mining, urbanization, stream channelization, dams, wetland loss, and water withdrawals (including unscreened diversions for irrigation). Impacts of concern include altered stream bank and channel morphology, elevated water temperature, lost spawning and rearing habitat, habitat fragmentation, impaired gravel and wood recruitment from upstream sources, degraded water quality, lost riparian vegetation, and increased erosion into streams from upland areas (Weitkamp et al. 1995; Busby et al. 1996; 64 FR 24049; 70 FR 37160; 70 FR 52488). Diversion and storage of river and stream flow has dramatically altered the natural hydrologic cycle in many of the streams within the ESU. Altered flow regimes can delay or preclude migration, dewater aquatic habitat, and strand fish in disconnected pools, while unscreened diversions can entrain juvenile fish.

2.2.1.3. Additional Threats to CCC Coho Salmon, NC Steelhead and their Critical Habitat

Global climate change presents an additional potential threat to salmonids and their critical habitats. Impacts from global climate change are already occurring in California. For example, average annual air temperatures, heat extremes, and sea level have all increased in California over the last century (Kadir et al. 2013). Snow melt from the Sierra Nevada Mountains has declined (Kadir et al. 2013). However, total annual precipitation amounts have shown no discernable change (Kadir et al. 2013). Listed salmonids may have already experienced some detrimental impacts from climate change. NMFS believes the impacts on listed salmonids to date are likely fairly minor because natural, and local, climate factors likely still drive most of the climatic conditions steelhead experience, and many of these factors have much less influence on steelhead abundance and distribution than human disturbance across the landscape.

The threat to listed salmonids from global climate change will increase in the future. Modeling of climate change impacts in California suggests that average summer air temperatures are expected to continue to increase (Lindley et al. 2007; Moser et al. 2012). Heat waves are expected to occur more often, and heat wave temperatures are likely to be higher (Hayhoe et al. 2004, Moser et al. 2012; Kadir et al. 2013). Total precipitation in California may decline; critically dry years may increase (Lindley et al. 2007; Schneider 2007; Moser et al. 2012). Wildfires are expected to increase in frequency and magnitude (Westerling et al. 2011, Moser et al. 2012).

For Northern California, most models project heavier and warmer precipitation. Extreme wet and dry periods are projected, increasing the risk of both flooding and droughts (OEHHA 2018). Estimates show that snowmelt contribution to runoff in the Sacramento/San Joaquin Delta may decrease by about 20 percent per decade over the next century (Cloern et al. 2011). Many of

these changes are likely to further degrade listed salmonid habitat by, for example, reducing stream flows during the summer and raising summer water temperatures. Estuaries may also experience changes detrimental to salmonids. Estuarine productivity is likely to change based on changes in freshwater flows, nutrient cycling, and sediment amounts (Scavia et al. 2002, Ruggiero et al. 2010). In marine environments, ecosystems and habitats important to juvenile and adult salmonids are likely to experience changes in temperatures, circulation, water chemistry, and food supplies (Brewer and Barry 2008; Feely 2004; Osgood 2008; Turley 2008; Abdul-Aziz et al. 2011; Doney et al. 2012). The projections described above are for the mid to late 21st Century. In shorter time frames, climate conditions not caused by the human addition of carbon dioxide to the atmosphere are more likely to predominate (Cox and Stephenson 2007; Santer et al. 2011).

2.3. Action Area

“Action area” means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The Action Area for the proposed Project includes 3.6 acres of area on the east and west Robinson Creek where construction will occur and an open staging area located south of the bridge where equipment will be stored and staged. Stream restoration and bank stabilization proposed approximately in a 400 foot stream reach that spans above and below the new bridge is included in the action area. We also include 1,000 feet below the bridge to account for affects that may result to salmonids or habitat from the proposed instream restoration actions.

2.4. Environmental Baseline

The “environmental baseline” refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency’s discretion to modify are part of the environmental baseline (50 CFR 402.02).

2.4.1 Status of Listed Species and Critical Habitat in the Action Area

The action area is stream reach within Robinson Creek, which is located near the town of Boonville, California in an area known as Anderson Valley. Robinson Creek is a tributary within the Rancheria Creek sub basin located in the south western area of the Navarro River watershed. Land in this area is used for industrial timber production, non-industrial timber production, grazing, and rural residences. Field and row crop acreage is limited to a few locations. In 2000, vineyard acreage was noted as increasing, particularly in the upper parts of the drainage (CRWQCB 2000) which is still the case today.

Specific fisheries data is scarce regarding salmonid presence and abundance for this tributary. A stream survey conducted by California Department of Fish and Game (CDFG) in June 1970 found the presence of juvenile steelhead, suboptimal stream temperature of 76°F, and very low stream flow of 0.1 cubic feet per second (CDFG 1970). These poor salmonid habitat conditions continue to persist with various Navarro River watershed studies referencing poor conditions of suboptimal stream temperatures, intermittent or dry channel reaches and poor habitat conditions (Entrix et al. 1998). Stream temperature are reported as unsuitable for coho salmon in Robinson Creek (Entrix et al. 1998). Although poor stream conditions currently exist in Robinson Creek, juvenile and adult steelhead have been observed there in the past few years (P. Madigan, personal communication 2021).

Surface flow in tributary streams the Anderson Valley area is low or absent due to water diversions and groundwater extraction, from residential, commercial, and agricultural uses, which can lower water tables and reduce base flow contributions. Rainfall in this area of the Navarro River watershed averages 44 inches per year (MLA 2019). During the summer low-flow period, tributary streams have reduced the available pool habitat, increased stream temperatures, and may have completely dry the channels (Entrix 1998). Streamflow monitoring performed by the Mendocino County Water Agency and the State Water Resources Control Board, Division of Water Rights indicate that segments of Anderson Creek, which Robinson Creek is a tributary, can go dry for brief periods due to pumping (Entrix 1998 as cited in CRWQCB 2000). Winter flow conditions range from 264 cfs during a 2-year flood event to 1320 cfs for a 100 year event (MLA 2019).

Salmonid fish passage is also poor within the action area stream due to a failed retaining wall which is proposed for restoration as part of the Lambert Lane Bridge replacement project. The upstream side of the west approach washed out and collapsed into the creek causing Mendocino County to place revetment to prevent continued scouring and erosion. Under current conditions, the failed retaining wall and associated riprap creates a 3-foot water surface drop, which is a barrier to adult and juvenile steelhead during low flow conditions (Caltrans 2020).

Changes in geomorphic conditions within Robinson Creek and downstream Anderson Creek have been noted for decades. This area which has been under development and undergone land use changes since it was discovered by European settlers in 1852 (Brown 1981). Channel incision (lowering of the channel bed) and channel bank erosion along Robinson Creek was noted as a significant source of sediment production within the 1998 Navarro River Watershed Restoration Plan (Entrix et al. 1998). Incision has caused scour and undermining of bridge foundations, leading to the replacement of the SR 128 crossing of Anderson Creek immediately upstream of the confluence of Robinson Creek and replacement of the Mountain View Road bridge crossing over Robinson Creek, downstream of Lambert Lane. Also, channel widening associated with incision processes has caused severe bank erosion, threatening adjoining structures and resulting in loss of mature riparian vegetation throughout lower Robinson Creek (Caltrans 2020).

The action area, represents a small fraction (.25 miles) of the 387 miles of potential steelhead habitat for the Navarro River steelhead population. The current conditions for salmonids in the

project area are very poor during the summer months with minimal or intermittent surface flow, failing streambanks and reduced riparian canopy to maintain stream temperature. This reach provides minimal spawning and rearing habitat for steelhead in the winter and spring, with very limited steelhead rearing habitat due to low flow or dry conditions. Summer rearing habitat is not expected to recover in this area in the foreseeable future due to groundwater diversions and other rural water use that has developed since the late 1850s. The Multi-Species Recovery Plan (NMFS 2016) identifies actions to reduce stream diversions through off channel storage and water conservation for grazing, vineyard production and rural residential development.

Given that streamflow and temperatures for salmonids the action area is currently stressed during the hot summer months, we also rely on information from section 2.2.4 with respect to the broader climatic variables influencing the current condition of habitat in the action area. Variables such as air temperature, wind patterns, and precipitation are likely influencing localized environmental conditions, such as water temperature, stream flow, and food availability. These local environmental conditions can affect the biology of listed species and the functioning of critical habitat and its value for conservation. The combination of climate change effects and effects of past and current human activities on local environmental conditions further reduce the current condition of available habitat for steelhead in Robinson Creek.

2.4.2 Previous Section 7 Consultations in the Action Area

With respect to the specific proposed project, there are no known previous Section 7 consultations or Section 10 permits have occurred within the action area. Section 7 interagency consultation was conducted with NOAA Fisheries and the U.S. Army Corps of Engineers for bank stabilization actions in lower Robinson Creek in the last 10 years.

2.5. Effects of the Action

Under the ESA, “effects of the action” are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered 50 CFR 402.17(a) and (b).

Construction activities will require vegetation removal, installation of a temporary bridge structure, demolition of the existing bridge, pile drilling and construction of the new bridge, placement of RSP, and stream restoration. These activities, both during and the post-project completion may affect NC steelhead and their designated critical habitat, as well as critical habitat designated for CCC coho salmon. The following may result from construction activities: unintentional direct injury or mortality during fish collection, relocations, and dewatering activities; temporary loss of benthic habitat; reductions in riparian vegetation and cover, impacts to water quality and temporary impacts to channel bed morphology. In addition, post project in-channel sediment transport could cause temporary behavioral effects to NC steelhead in the action area.

2.5.1 Bridge Construction and Staging

The proposed project will expand the roadway approaches, areas along the creek where the new abutments will be placed, and the slightly widened bridge footprint. Placement of a temporary bridge, construction of the new bridge, and staging area are expected to cause disturbance of the action area in the bridge area of 3.6 acres. Cast-In-Drilled-Hole (CIDH) piles used for the foundation type and retaining walls has the potential impact nearby stream habitat. Impacts from general bridge construction activities are expected to be avoided because the stream channel will be dry due to dewatering and fish relocation proposed from June 15 to October 15. In addition, other AMMs that will be implemented during the project as described above (Section 1.3.5) including a Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPPC) will be implemented to maintain water quality within Robinson Creek. Given the proposed plans to conduct work in the dry channel, and protect water quality, the activities that are proposed for staging and bridge construction are not expected to result in adverse effects to ESA listed salmonids or critical habitat.

2.5.2 Vegetation Removal

Vegetation removal will be conducted to make room for the temporary bridge, new bridge construction, hybrid bank revetment and channel grading. Removal of riparian trees and vegetation trimming could cause impacts to shade and reduction to potential wood recruitment that may enter the stream channel over time. Riparian vegetation helps maintain stream habitat conditions necessary for salmonid growth, survival, and reproduction. Riparian vegetation disturbance and removal can degrade these ecosystem functions and impair stream habitat. Removal of riparian vegetation increases stream exposure to solar radiation, leading to increases in stream temperature (Poole and Berman 2001).

A total of 19 trees will be removed to accommodate the construction, bank revetment and instream grading and restoration. Nine trees are larger than 12 inches at diameter breast height (dbh) and 11 trees less than 12 inches dbh will be removed. Loss of the larger riparian trees is expected to result in minor changes in shade that may result in some increase solar radiation to the wetted channel. Minor impacts from riparian removal will likely to be mitigated within 2 to 5 years with the proposed revegetation of the project area. Minor increases in solar radiation to the wetted channel are not expected to cause unsuitable stream temperatures in the action area due to dry channel conditions that exist during the summer months.

The removal of larger riparian trees is expected to reduce the potential for LWD recruitment, which may reduce habitat quality in the action area. The County proposes to place larger trees that are removed at the site into the channel to mitigate for the loss of LWD that could be recruited to the channel. Overall reduction in habitat quality is expected to be minor with the placement of LWD in channel to maintain cover and pool development in the future. This minor reduction in habitat quality may cause individual fish to seek alternative areas where suitable areas exists nearby, such that the reduction in tree recruitment is not expected to reduce or limit the survival of individual steelhead utilizing the action area.

AMMs applied during implementation, and site restoration are expected to substantially reduce the impact of riparian vegetation removal that could affect salmonid habitat. Planting of 220 understory trees and 10 upland trees on graded point bars and one terrace area are expected to mitigate for the loss of riparian trees removed as a result of this project. One hundred and twenty five willow and cottonwoods planted on the hybrid bank revetment are also expected to improve the riparian condition within Robinson Creek over time. The project site will also be monitored for five years following construction to ensure the success of revegetation efforts to restore areas impacted from removal of riparian revegetation. Thus, impacts of reduced shade and cover from removal of riparian vegetation are expected to be short term (one to two years) and not result in significant changes in rearing and migratory behavior of individual salmonids in the action area.

2.5.3 Dewatering and Fish Relocation

To facilitate the construction and instream work, a portion of the Robinson Creek may need to be dewatered. As discussed above, depending on the water-year and rainfall patterns the action area may have surface flow on June 15 when instream construction is proposed to begin. Before and during dewatering of the construction site, juvenile salmonids will be captured by a qualified biologist using one or more of the following methods: dip net, seine, thrown net, block net, minnow trap, and electrofishing. Collected salmonids will be relocated to an appropriate stream reach in the Navarro River watershed to minimize impacts to captured fish, and to fish that are already residing at the release site. Since construction is scheduled to occur will occur during the summer low-flow period, these activities will avoid emigrating smolts that generally migrate in the spring and will be completed prior to adult fish arrival in the late fall. Only juvenile steelhead are expected to be in the action area during the dewatering and relocation actions.

Fish collection and relocation activities pose a risk of injury or mortality to rearing juvenile salmonids. Any fish collecting gear, whether passive (Hubert 1996) or active (Hayes 1983) has some associated risk to fish, including stress, disease transmission, injury, or death. The amount of unintentional injury and mortality attributable to fish capture varies widely, depending on the method used, the ambient conditions, and the expertise and experience of the field crew. Since fish relocation activities will be conducted by qualified fisheries biologists following NMFS electrofishing guidelines (NMFS 2000), injury and mortality of juvenile salmonids during capture and relocation is expected to be minimized. Based on prior experience with current relocation techniques and protocols likely to be used to conduct the fish relocation, unintentional mortality of juvenile NC steelhead expected from capture and handling procedures is not likely to exceed 3 percent.

Relocated fish may also have to compete with other fish causing increased competition for available resources such as food and habitat. Responses to crowding by salmonids include self-thinning, resulting in emigration and reduced salmonid abundance with increased individual body size within the group, and/or increased competition (Keeley 2003). Some of the fish released at the relocation sites may choose not to remain in these areas and move either upstream or downstream to areas that have more vacant habitat and a lower density of fish. As each fish moves, competition remains either localized to a small area or quickly diminishes as fish

disperse. In some instances, relocated fish may endure some short-term stress from crowding at the relocation sites. Such stress is not likely to be sufficient to reduce their individual fitness or performance. Although sites selected for relocation fish will be pre-approved by NMFS, they should have similar water temperatures as the capture sites, and should have adequate habitat to allow for survival of transported fish and fish already present. NMFS cannot accurately estimate the number of fish likely to be affected by competition, but does not expect this short-term stress to reduce the individual performance or survival of juvenile salmonids, or impact the watershed population of these species based on the small stream area that will likely be affected and the relatively small number of salmonids likely to be relocated.

Applying applicable AMMs to fish collection, relocation, and dewatering activities is expected to appreciably reduce the effects of project actions on juvenile salmonids. Specifically, fish collection and relocation activities conducted by NMFS-approved fisheries biologists will ensure proper equipment operation and application of NMFS guidelines thereby minimizing injury and mortality to juvenile salmonids. Restricting the work window to June 15 through October 15 will limit the effects to stream rearing juvenile salmonids. By implementing applying AMMs, NMFS anticipates that injury and mortality of juvenile steelhead will effectively be minimized in the action area.

2.5.4 Bank Revetment and Stream Restoration

The applicant proposes to place large rip-rap (i.e. boulders) over the exposed streambank, while utilizing hybrid revetment techniques of planting willow and cottonwood sprig plantings through the riprap and restoring stream grade to improve fish passage within the action area. In order to place the rip-rap armoring onto the streambank, heavy machinery will dig within the streambank and excavate a toe trench for placing RSP and LWD. The proposed disturbance of the site will likely dislodge previously armored and sequestered inter-gravel fine sediment and allowing it to be mobilized and transported downstream when the action area re-waters the following fall. Grading of the stream channel will disturb the current channel and further expose fine and coarse sediment to transport when high flow events occur in late fall and winter.

Studies of sediment effects from culvert construction determined that the level of sediment accumulation within the streambed returned to control levels between 358 to 1,442 meters downstream of the culvert (LaChance et al. 2008). Compared to the sediment impact of a culvert replacement, which often involve disturbing a significant volume of road fill, the excavation of the area of mixed grain size substrate at the toe of the stabilized slope (400 feet of toe trench and stream grading) proposed by this project will likely result in a moderate turbidity response during the first fall rain events. Thus, sediment effects from the proposed bank stabilization are channel grading are expected to extend downstream a distance downstream approximately 1,000 feet (308 meters) close to the lower range presented by LaChance et al. (2008). Sediment effects moving downstream could affect steelhead or habitat conditions within Robinson Creek.

Turbidity pulses during the first fall rains may slightly degrade the value of critical habitat in the action area, but are expected to temporary and short lived. Based on the size of the area disturbed and stream and bank substrate conditions, NMFS expects turbidity during the first fall

rains to last for only a few hours, given the proposed measures by the applicant to minimize sediment delivery from the site. AMMs are expected to reduce the duration, and quantity of fine sediment deposited downstream from the revetment areas, and is unlikely to have a substantial impact on spawning, rearing, or migration habitat in the action area. Fine sediment generated from the channel grading is discussed below.

By design, streambank stabilization projects prevent lateral channel migration, effectively forcing streams into a simplified linear configuration that, without the ability to move laterally, instead erode and deepen vertically (Leopold et al. 1968; Dunn and Leopold 1978). The resulting “incised” channel fails to create and maintain aquatic and riparian habitat through lateral migration, and can instead impair groundwater/stream flow connectivity and repress floodplain and riparian habitat function. The resulting simplified stream reach typically produces limited macroinvertebrate prey and poor functional habitat for rearing juvenile salmonids (Florsheim et al. 2008). Because bank stabilization utilizing rip-rap is typically designed to withstand high streamflow caused by large storm events, the rip-rap structure, and by extension the impacts to instream habitat, are in effect everlasting, harming future fish habitat, altered geomorphic and hydraulic processes can propagate spatially both upstream and downstream of hardened bank structures, dependent upon site- and structure-specific characteristics (Henderson 1986 and Arnaud-Fassetta et al. 2005, as cited in Florsheim et al. 2008), meaning that “bank stabilization often begets more bank stabilization.” Finally, rip-rap as a stabilization material immediately and permanently replaces a natural earthen streambank, which can provide complex fish habitat (e.g., undercut banks, submerged rootwads, etc.) (Fischenich and Copeland 2001), with a relatively simple, homogenous streambank structure less suitable for juvenile salmon and steelhead (Fischenich 2003).

The revetment proposed in the stream reach around the Robinson Creek Bridge is by design likely to result in simplified habitat conditions for salmonids as described above. Approximately 400 feet of streambank will be treated with large RSP up to 1 ton in size. A hybrid method with willow planted within the RSP will minimize shear stress and flow velocities along the revetment areas with the most shear stress (Caltrans 2020). Channel size and form has been modeled by Mike Love and Associates (MLA 2019) to construct a revetment that reduces shear stress within the project reach and mimics the existing channel bank full width, gradient, and inset flood terraces. A two dimensional model was utilized to set the top of the RSP revetment to accommodate the 100 year flow of 1320 cfs through the project reach. The proposed condition velocities modeled indicate a reduction under the bridge and the flow area remains relatively constant throughout the project reach. One area above the bridge is expected to have post project flow velocities sufficient to transport streambed sediments that have previously aggraded upstream of the bridge site. MLA (2019) estimates 220 cubic yards of sediment transport through the project reach and downstream in Robinson Creek. This sediment is expected to move during winter flow events and redistribute as part of downstream gravel bar formations. Movement of approximately 220 cubic yards of material has the potential to sort into spawning habitat that adult steelhead can use for spawning or potentially aggrade in a manner that could exacerbate bank erosion downstream. Based on stream modeling work for this reach by MLA (2019), Caltrans (2020) suggests that the 220 yards is a relatively small amount of material given the size of the existing Robinson Creek channel, but could affect an existing bank site located behind the Boonville Hotel just downstream of the project site. Caltrans and the County have

proposed to extend the bank revetment and protection to the existing bank failure to further minimize erosion and effects downstream.

The installation of LWD structures within the project reach below the ordinary high water level in order to improve habitat complexity and thwart future channel incision, is expected to minimize some effects of habitat simplification along the RSP treated bank. Nevertheless, stabilizing a 400 feet of the streambank (includes both banks) with RSP will reduce overall habitat quality into the future. Spawning habitat, and migration habitat for adult steelhead and juveniles is not expected to be significantly affected as these life stages will move unimpeded through the site. Summer rearing habitat which is currently degraded due to limited surface flow is expected to remain in a simplified degraded condition. To minimize effects to rearing habitat within the action area the County proposes to install LWD structures and place boulders to create low velocity rearing habitat for adult and juvenile use. The RSP component of this project will likely compromise the value of available critical habitat in the action area for steelhead rearing by reducing natural development of undercut banks, but will be minimized by LWD and boulder placement within the action area.

Instream grading within the 400 foot project reach is proposed to restore fish passage by removing a failed retaining wall that has resulted in a 3-foot water surface drop, which classifies the current conditions as a barrier to adult and juvenile steelhead based on California Department of Fish and Wildlife fish passage assessment guidelines (CDFG, 2002). Channel restoration designs for the site meet current fish passage standards, as described in CDFG (2009) and NMFS (2001). Grading the channel and removal of the fish migration impediment at the project site will improve passage to approximately 0.8 miles of designated critical habitat in upper Robinson Creek.

The grading of the stream channel to restore the channel geometry and gradient for fish passage is expected to result in about 220 cubic yards of coarse sediment transport downstream (Caltrans 2020). As discussed above, this sediment is expected to move downstream and route through Robinson Creek with onset of winter high flow events. Both, beneficial and negative effects could result from this sediment transport, including effects to spawning areas and bank erosion. Given that the amount of material (i.e., 220 cubic yards) is relatively small for the stream channel, we expect the overall effects to be minor and temporary as it routes through the system during winter high flow events. Overall, the grading and redesign of the channel including point bars, riparian tree planting is expected to minimize impacts to salmonid habitat at the project site and improve anadromous fish passage to critical habitat in upper Robinson Creek.

Upon completion of instream work and bridge construction, AMMs will be implemented to reduce sediment runoff from disturbed work areas and to revegetate the site. Implementation of Stormwater Pollution Prevention Plan (SWPPP) and Spill Prevention Control and Countermeasures Plan (SPPC) are expected to maintain water quality within Robinson Creek during the project and at the conclusion of project activities. These AMMs, such as silt fence and/or fiber rolls that will be placed at bridge abutments, excavation areas, and any other locations where work could result in loose sediment possibly entering the creek. The silt fence/fiber rolls would be maintained and kept in place for the duration of the project. Any sediment or debris captured by the fence/rolls will be removed before the fence/rolls are

removed. Additional erosion, sediment, and material stockpile AMMSs would be implemented to disturbed areas in order to avoid runoff to the stream channel. With these measures in place, NMFS does not expect that measureable or significant erosion from the construction site will occur.

Although the proposed project addresses the potential run-off from the construction of the new bridge, post construction storm water AMMs were not proposed as part of the project to address water quality concerns associated with road projects as detailed by numerous sources such as the California State Water Resources Control Board (CSWRCB). The CSWRCB has issued a storm water permit for Caltrans, which includes background information from a recent publication that identifies a degradation product of tires as the causal factor in salmonid mortalities at concentrations of less than a part per billion (Tian et al., 2020). This contaminant is widely used by multiple tire manufacturers and the tire shreds that produce it have been found to be ubiquitous where both rural and urban roadways drain into waterways (Sutton et al., 2019). Previous published work first focused on identifying the issue and determining the cause of observed mortalities of adult coho salmon in the wild (Scholz et al., 2011) and then showed mortality to juvenile coho salmon in laboratory settings (Chow et al., 2019). More recent examinations of juvenile steelhead and Chinook salmon by NMFS Northwest Fisheries Science Center and partners also indicates mortality of up to 40% for steelhead and up to 10% for Chinook (Tian et al., 2020). The presence of steelhead will likely coincide with the rainy season that may bring them into contact with contaminants from the bridge and roadway. Therefore, run-off from the bridge deck and the road approaches to the new bridge are likely to deliver tire shreds to stream channel and result in adverse effects to salmonids within the action area. Mortality of steelhead is expected to be low due to the rural setting and low traffic use at the Lambert Lane Bridge and may be minimized with proper road drainage at the site.

2.5.5 Critical Habitat Effects

The action area is designated critical habitat for NC steelhead, and CCC coho salmon. Generally speaking, PBFs of critical habitat for both steelhead and salmon found within the action area include sites for migration, spawning, and rearing (see section 2.4). Effects of the Project on designated critical habitat include temporary disturbance to the streambed, bank, and flow from dewatering; temporary disturbance to waterways from bank revetment construction; temporary and permanent loss of riparian vegetation, temporary loss of habitat from proposed dewatering activities, temporary effects from sediment transport, and beneficial effects to anadromous fish passage.

Regarding effects to critical habitat from project site dewatering, for the same reasons described above for juvenile salmonids, adverse effects to NC steelhead and critical habitat PBFs are expected to be temporary, insignificant, and will recover relatively quickly (one to two months) after the project site is re-watered. Similarly, for reasons described above for juvenile salmonids, turbidity levels from suspended sediment are expected temporary and have minor effects to the value of critical habitat in the action area. Based on the size of the area to be dewatered (250 linear feet) for the instream construction activities, there will be a reduction in available wetted habitat over the proposed June 15 to October 15 construction window. NC steelhead, and CCC coho salmon critical habitat will be unavailable as a summer rearing habitat. The action area is

dry during most years, and provides marginal habitat during the summer months for NC steelhead, therefore this temporary loss of wetted habitat is not expected to result in a significant impact to the amount available critical habitat for steelhead in Robinson Creek.

Minor impacts to LWD recruitment and shade are expected to reduce habitat quality in the action area. Loss of LWD from removal of streambanks will reduce the potential for removed trees to recruit to the channel and provide habitat in the future. The loss of this LWD recruitment is not expected to significantly reduce cover or habitat forming roughness elements in Robinson Creek. Revegetation proposed by the County is expected to provide similar shade to the action area within 2-5 years of project completion. Channel grading is expected to result in improved passage conditions for adult and juvenile steelhead, but may cause minor changes in turbidity and habitat conditions from sediment transport as it routes through Robinson Creek. Bank revetment work to protect the new bridge is expected to result in simplification of habitat along the action area reach within 400 feet of Robinson Creek. Although these effects are likely to be long term due the nature of RSP structures, the hybrid RSP methods, riparian planting, LWD and boulder placement are expected to minimize the loss of PBFs within the action area.

2.6. Cumulative Effects

“Cumulative effects” are those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation (50 CFR 402.02 and 402.17(a)). Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area’s future environmental conditions caused by global climate change that are properly part of the environmental baseline vs. cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described in the environmental baseline (Section 2.4).

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in our assessment of the risk posed to species and critical habitat as a result of implementing the proposed action. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species and critical habitat (Section 2.2), to formulate the agency’s biological opinion as to whether the proposed action is likely to: (1) Reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution; or (2) appreciably diminish the value of designated or proposed critical habitat as a whole for the conservation of the species.

NC steelhead status remains as threatened (Seghesio and Wilson 2016) due to the continuing threats that face this species including poor ocean conditions, drought and reduced freshwater

habitat quality. The most current status review for this species shows no strong evidence to indicate conditions for winter-run populations in the DPS have worsened appreciably since the status review by (Seghesio and Wilson 2016). The temporary and minor loss of steelhead habitat along the Robinson Creek is unlikely to reduce the overall abundance of the Navarro River steelhead population in the NC steelhead DPS.

The reduction in habitat quality within the action area is expected to reduce available rearing habitat in a relatively small area in Robinson Creek. The proposed project is not expected to limit the number of steelhead utilizing Robinson Creek, given the current population abundance in the Navarro River, and that few individual juvenile fish utilize Robinson Creek during the summer when this project will occur. A small number of steelhead inhabiting the action area may experience a reduced likelihood of survival prior to reaching the smolt lifestage and migrating to sea, primarily due to reduced fitness and growth brought on by project construction and loss of wetted habitat. However, the anticipated loss of a small number of juvenile steelhead is unlikely to appreciably impact the future survival and recovery at the DPS scale since adequate quantities of habitat remain within the tributary reaches of the Navarro River from which the lost production can be regained.

Global climate change presents another real threat to the long-term persistence of NC steelhead, especially when combined with the current depressed population status and human caused impacts. Regional (i.e., North America) climate projections for the mid to late 21st Century expect more variable and extreme inter-annual weather patterns, with a gradual warming pattern in general across California and the Pacific Northwest. However, extrapolating these general forecasts to our smaller action area is difficult, given local nuances in geography and other weather-influencing factors. Water temperatures may rise somewhat in the action area due to climate change over the next several decades, reinforcing the likelihood of reduced carrying capacity in the action area due to the increased frequency of droughts in California.

The proposed action will degrade PBFs and essential habitat types in the action area, namely those related to juvenile rearing. The project will also improve migration conditions to habitat in the upper 0.8 miles of Robinson Creek, which is expected to improve survival of steelhead utilizing this tributary. When considering the overall effects of the proposed action, when added to the environmental baseline, cumulative effects, and species status, are not expected to appreciably reduce the quality and function of critical habitat at the larger CCC coho salmon ESU or NC steelhead DPS, given the small area being degraded compared to the quality and quantity of habitat within the Navarro River watershed. Thus, the proposed action will not impair the ability of critical habitat to play its intended conservation role of supporting populations of CCC coho salmon, and NC steelhead at the ESU and DPS levels.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species and critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to jeopardize the continued existence of NC steelhead and or destroy or adversely modify its designated critical habitat.

After reviewing and analyzing the current status of the critical habitat, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS' biological opinion that the proposed action is not likely to destroy or adversely modify CCC coho salmon designated critical habitat.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). "Incidental take" is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Take of listed juvenile NC steelhead may occur during fish relocation and dewatering in a 250 linear foot reach at the project site between June 15 and October 15. The number of NC steelhead that may be incidentally taken during dewatering activities is expected to be small, and limited to the pre-smolt and young-of-year juvenile life stage. NMFS expects that no more than 3 percent of juvenile steelhead within the 250 linear foot dewatering area of Robinson Creek will be injured, harmed, or killed during fish relocation and dewatering activities. If more than 3 percent of the total number juvenile steelhead captured are harmed or killed, incidental take will have been exceeded.

In addition, low numbers of NC steelhead within the action area may be incidentally taken due to stormwater run-off delivered to Robinson Creek from the new bridge and the road approaches to the bridge. Mortalities associated with Stormwater runoff is unquantifiable, but are expected to low due to low traffic use associated with the rural setting of the project.

2.9.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

2.9.3. Reasonable and Prudent Measures

“Reasonable and prudent measures” are nondiscretionary measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of NC steelhead:

1. undertake measures to ensure that injury and mortality to salmonids resulting from fish relocation and dewatering activities is low;
2. undertake measures to minimize harm to salmonids from construction of the project and degradation of aquatic habitat;
3. implement measures to reduce direct delivery of run-off from road approaches and the bridge deck to Robinson Creek;
4. prepare and submit plans and reports regarding the effects of fish relocation, and post-construction revegetation performance.

2.9.4. Terms and Conditions

The terms and conditions described below are non-discretionary, and Caltrans or any applicant must comply with them in order to implement the RPMs (50 CFR 402.14). Caltrans or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
 - a. The Caltrans/County shall retain a qualified biologist with expertise in the areas of anadromous salmonid biology, including handling, collecting, and relocating salmonids; salmonid/habitat relationships; and biological monitoring of salmonids. The applicant shall ensure that all fisheries biologists working on this project be qualified to conduct fish collections in a manner which minimizes all potential risks to ESA-listed salmonids. Electrofishing, if used, shall be performed by a qualified biologist and conducted according to the *NOAA Fisheries Guidelines for Electrofishing Waters Containing Salmonids Listed under the Endangered Species Act, June 2000*. See: <http://www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/upload/electro2000.pdf>.

- b. The fisheries biologist shall monitor the construction site during placement and removal of cofferdams, and channel diversions, to ensure that any adverse effects to salmonids are minimized. The biologist shall be on site during all dewatering events in anadromous fish streams to ensure that all ESA-listed salmonids are captured, handled, and relocated safely. During fish relocation activities the fisheries biologist shall contact NMFS North Coast Branch staff at (707) 575-6050, if mortality of federally listed salmonids exceeds 3 percent of the total for each species collected, at which time NMFS will stipulate measures to reduce the take of salmonids.
- c. If ESA-listed fish are handled, it shall be with extreme care and they shall be kept in water to the maximum extent possible during rescue activities. All captured fish shall be kept in cool, shaded, aerated water protected from excessive noise, jostling, or overcrowding any time they are not in the stream and fish shall not be removed from this water except when released. To avoid predation the biologist shall have at least two containers and segregate young-of-year salmonids from larger age-classes and other potential aquatic predators. Captured salmonids will be relocated as soon as possible to a suitable instream location (pre-approved by NMFS) where suitable habitat conditions are present to allow for survival of transported fish and fish already present.
- d. Non-native fish that are captured during fish relocation activities shall not be relocated to anadromous streams, or areas where they could access anadromous habitat.

2. The following terms and conditions implement reasonable and prudent measure 2:

- a. Caltrans/County will allow any NMFS employee(s) or any other person(s) designated by NMFS to accompany field personnel to visit the project site during activities described in this opinion.
- b. Any pumps used to divert live stream flow will be screened and maintained throughout the construction period to comply with NMFS' Fish Screening Criteria for Anadromous Salmonids (2000).
- c. Construction equipment used within the river channel will be checked each day prior to work within the river channel (top of bank to top of bank) and, if necessary, action will be taken to prevent fluid leaks. If leaks occur during work in the channel, Caltrans or their contractors will contain the spill and remove the affected soils.
- d. Once construction is completed, all project-introduced material must be removed, leaving the river as it was before construction. Excess materials will be disposed of at an appropriate disposal site. Minor grading to return the channel to pre-project form can be performed if necessary.

3. The following terms and conditions implement reasonable and prudent measure 3:
 - a. Caltrans/County must implement measures to minimize road generated run-off to Robinson Creek by diverting road surface flow to vegetated areas between the road and the stream channel.
 - b. Measures should be implemented to reduce run-off from the bridge deck to Robinson Creek.
 - c. Any structures such as relief ditches, grading to direct flow, other diversion structures must receive regular long term maintenance, with a focus on early fall to reduce run-off from the first rains that cause materials from the summer months to enter the stream channel.
4. The following terms and conditions implement reasonable and prudent measure 4:
 - a. **Project Construction and Fish Relocation Report** – Caltrans must provide a written report to NMFS by January 15 of the year following construction. The report must be submitted to NMFS' North-Central Coast Office, Attention: North Coast Branch Chief, 777 Sonoma Avenue, Room 325, Santa Rosa, California, 95404-6528. The report must contain, at minimum, the following information:
 - i. **Construction related activities** – The report(s) must include the dates construction began and was completed; a discussion of any unanticipated effects or unanticipated levels of effects on salmonids, including a description of any and all measures taken to minimize those unanticipated effects and a statement as to whether or not the unanticipated effects had any effect on ESA-listed fish; the number of salmonids killed or injured during the project action; and photographs taken before, during , and after the activity from photo reference points.
 - ii. **Fish relocation** – The report(s) must include a description of the location from which fish were removed and the release site(s) including photographs; the date and time of the relocation effort; a description of the equipment and methods used to collect, hold, and transport salmonids; if an electrofisher was used for fish collection, a copy of the logbook must be included; the number of fish relocated by species; the number of fish injured or killed by species and a brief narrative of the circumstances surrounding ESA-listed fish injuries or mortalities; and a description of any problems which may have arisen during the relocation activities and a statement as to whether or not the activities had any unforeseen effects.
 - b. **Post-Project Annual Monitoring Reports** – Annual Project reports will be sent to the address above in 3a, and must include the following contents:
 - i. **Post-Construction Vegetation Monitoring and Reporting** – Caltrans must develop and submit for NMFS' review, a plan to assess the success of the revegetation of the site. A draft of the revegetation monitoring plan

must be submitted to NMFS (address specified in 3a above) for review and approval 30 days prior to the beginning of project construction (i.e., must be submitted May 15, which is 30 days before the proposed June 15, 2021 start date). Reports documenting post-project conditions of vegetation installed at the site will be prepared and submitted annually for the first five years following project completion, unless the site is documented to be performing poorly, then monitoring requirements will be extended. Reports will document vegetation health and survivorship and percent cover, natural recruitment of native vegetation (if any), and any maintenance or replanting needs. Photographs must be included. If poor establishment is documented, the report must include recommendations to address the source of the performance problems.

2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, conservation recommendations are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

1. NMFS recommends that Caltrans and/or the County develop a LWD project in or near the action area to promote salmonid habitat quality in Robinson Creek. This project would benefit recovery of critical habitat PBFs for juvenile and adult lifestages of NC steelhead. This project should encompass approximately 500 feet in length and provide 10 to 20 key pieces of LWD.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Lambert Lane Bridge Replacement project. As 50 CFR 402.16 states, reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and if: (1) The amount or extent of incidental taking specified in the ITS is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action.

3. MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT ESSENTIAL FISH HABITAT RESPONSE

Section 305(b) of the MSA directs Federal agencies to consult with NMFS on all actions or proposed actions that may adversely affect EFH. Under the MSA, this consultation is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the physical, biological, and chemical properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects on EFH may result from actions occurring within EFH or outside of it and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the MSA also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH [CFR 600.905(b)]

This analysis is based, in part, on the EFH assessment provided by Caltrans and descriptions of EFH for Pacific Coast salmon (PFMC 2014) contained in the fishery management plans developed by the PFMC and approved by the Secretary of Commerce.

3.1. Essential Fish Habitat Affected by the Project

Pacific coast salmon EFH may be adversely affected by the proposed action. Specific habitats identified in the PFMC (2014) for Pacific coast salmon include habitat areas of particular concern (HAPCs), identified as: 1) complex channels and floodplain habitats; 2) thermal refugia; and 3) spawning habitat. HAPCs for CCC coho salmon include all waters, substrates, and associated biological communities falling within critical habitat areas described above in the accompanying biological opinion for the Lambert Lane Bridge Replacement project located on Robinson Creek in the Navarro River watershed. Essentially, all CCC coho salmon habitat located within the proposed action is considered HAPC as defined in PFMC (2014).

3.2. Adverse Effects on Essential Fish Habitat

The potential adverse effects of the Project on EFH have been described in the preceding biological opinion and include disturbance of the channel bed and banks, temporary loss of wetted habitat, temporary loss of riparian vegetation, and sediment transport through the action area. Therefore, the effects of the project on ESA-listed species are anticipated to be the same as the effects to EFH in the action area.

3.3. Essential Fish Habitat Conservation Recommendations

Section 305(b)(4)(A) of the MSA authorizes NMFS to provide EFH Conservation Recommendations that will minimize adverse effects of an activity on EFH. Although temporary potential adverse effects are anticipated as a result of the project activities, the proposed minimization and avoidance measures, and best management practices in the accompanying biological opinion are sufficient to avoid, minimize, and/or mitigate for the anticipated affects. Therefore, no additional EFH Conservation Recommendations are necessary at this time that would otherwise offset the adverse effects to EFH.

3.4. Supplemental Consultation

Caltrans must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH, or if new information becomes available that effects the basis for NMFS' EFH Conservation Recommendations (50 CFR600.920(1)).

4. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

4.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion is the California Department of Transportation (Caltrans) and the Mendocino County Department of Transportation and individual copies of this opinion were provided to Caltrans. The format and naming adheres to conventional standards for style.

4.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

4.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They

adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 et seq., and the MSA implementing regulations regarding EFH, 50 CFR 600.

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion and EFH consultation, contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and MSA, and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

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